International Symposium of the Society for Information Display (DISPLAY WEEK 2020)

SID International Symposium Digest of Technical Papers
Volume 51

Online
3 – 7 August 2020

Part 1 of 3

ISBN: 978-1-7138-3631-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

John Wiley & Sons
111 River Street
Hoboken, NJ 07030-5774

Phone: (201) 748-6000
Fax: (201) 748-6088

info@wiley.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of Contents/Book 1 (Sessions 3-44)

Session 3: 8K, High Resolution LCDs (Liquid Crystal Technology)

Chair: Miyoshi Ayama, *Utsunomiya University*
Co-Chair: Philip Chen, *National Chiao Tung University*

Kun-Cheng Tien, *AU Optronics Corp.*
Yu-Hsuan Hung, *AU Optronics Corp.*
Cian-Rou Wu, *AU Optronics Corp.*
Chin-An Lin, *AU Optronics Corp.*
Jia-Hao Li, *AU Optronics Corp.*
Chien-Huang Liao, *AU Optronics Corp.*

3-4: **Novel LCD Pixel Design with Extra-Large Aperture Ratio for PsVA-Mode Display** (Page 13)
Surgaltu Borjigin, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Zhengyu Feng, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Zhiqing Shi, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Limei Zeng, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Shu- jhih Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Chia-yu Lee, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Xin Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

3-5: ***Late-News Paper:*** **A Two-Dimensionally Aligned Array with 1-µm Pixel Pitch Using Ferroelectric Liquid-Crystal Pixels for Holography Application** (Page 17)
Shintaro Aso, *Japan Broadcasting Corp.*
Yoshitomo Isomae, *Tohoku University*
Ken-ichi Aoshima, *Japan Broadcasting Corp.*
Ryo Higashida, *Japan Broadcasting Corp.*
Nobuhiko Funabashi, *Japan Broadcasting Corp.*
Junichi Shibasaki, *Japan Broadcasting Corp.*
Takahiro Ishinabe, *Tohoku University*
Yosei Shibata, *Tohoku University*
Kenji Machida, *Japan Broadcasting Corp.*
Hideo Fujikake, *Tohoku University*
Hiroshi Kikuchi, *Japan Broadcasting Corp.*

Session 4: Automotive Display Components

Chair: David Hermann, *Volvo Car Corporation AB*
Co-Chair: Karlheinz Blankenbach, *Pforzheim University*

4-1: ***Invited Paper:*** **Technical Cover Glass Designed for Automotive Infotainment Display** (Page 21)
Casey Kang, *Corning Incorporated*
Michael Linder, *Corning Incorporated*
Khaled Layouni, *Corning Incorporated*
Belma Hota, *Corning Incorporated*
Antoine LeSuffleur, *Corning Incorporated*
Jong-se Park, *Corning Incorporated*
Yawei Sun, *Corning Incorporated*
James West, *Corning Incorporated*

4-2: **Anti-Glare Cover Glass Optical Properties Dependence on the Display Module Configuration** (Page 25)
Masanobu Isshiki, *AGC, Inc.*
Aichi Inouye, *AGC, Inc.*
Aya Yamamoto, *AGC, Inc.*
Yusuke Kobayashi, *AGC, Inc.*

4-3: ***Late-News Paper:*** **OLED Device Technologies for Automotive Application** (Page 29)
Shigeru Mori, *Tianma Japan, Ltd.*
Keita Hamada, *Tianma Japan, Ltd.*
Hiromu Hanashima, *Tianma Japan, Ltd.*
Masamichi Shimoda, *Tianma Japan, Ltd.*
Jiro Yanase, *Tianma Japan, Ltd.*
Yojiro Matsueda, *Tianma Japan, Ltd.*
Hiroshi Tanabe, *Tianma Japan, Ltd.*

4-4: **Increase of Contrast in 3D HUD Using an Active Parallax Barrier** (Page 33)
Akinori Sato, *KYOCERA Corp.*
Kaoru Kusafuka, *KYOCERA Corp.*

Hideaki Kakeya, *University of Tsukuba*

Session 5: AR/VR Invited Session

Chair: Achin Bhowmik, *Starkey Hearing Technologies*
Co-Chair: Seung Woo Lee, *Kyung Hee University*

5-1: ***Invited Paper:*** **Human Factors in Virtual and Augmented Reality** (Page N/A)
Martin Banks, *University of California Berkeley*

5-2: ***Invited Paper:*** **Computational Eyeglasses and Near-eye Displays with Focus Cues** (Page 41)
Gordon Wetzstein, *Stanford University*

5-3: ***Invited Paper:*** **Towards Cost-Effective AR/MR Display Systems: The Emergence of an Industrial Hardware Ecosystem allowing Low Cost Mass Production** (Page 45)
Bernard Kress, *Microsoft Corporation*
Maria Pace, *Microsoft Corporation*
Ishan Chatterjee, *Microsoft Corporation*

5-4: ***Invited Paper:*** **Current Challenges in Augmented-Reality Waveguide Display Technology** (Page 49)
Jonathan D. Waldern, *DigiLens Inc.*
Alastair J. Grant, *DigiLens, Inc.*
Milan M. Popovich, *DigiLens, Inc.*

Session 6: OLED Materials I (OLEDs)

Chair: Denis Kondakov, *DuPont*
Co-Chair: Sven Zimmermann, *Novaled GmbH*

6-1: ***Invited Paper:*** **Lifetime Improvement of TADF-OLEDs** (Page 53)
Jun-Yun Kim, *LG Display*
Tae-Ryang Hong, *LG Display*
Ik-Rang Choe, *LG Display*
Ji-Ae Lee, *LG Display*
Hye-Gun Ryu, *LG Display*
Bo-Min Seo, *LG Display*
Joong-Hwan Yang, *LG Display*
Chang-Wook Han, *LG Display*
Ji-ho Baek, *LG Display*
Hyun-Chul Choi, *LG Display*
In-Byeong Kang, *LG Display*

6-2: ***Invited Paper:*** **Innovative Technological Progress of Lifetime in Hyperfluorescence™** (Page 57)
Ayataka Endo, *Kyulux, Inc.*
Hayato Kakizoe, *Kyulux, Inc.*
Takahito Oyamada, *Kyulux, Inc.*
Junji Adachi, *Kyulux, Inc.*

6-3: **Efficient and Long Lifetime Blue TADF and Deep Blue Hyper Fluorescent Materials and Devices** (Page 61)
Durai Karthik, *Kyung Hee University*
Dae Hyun Ahn, *Kyung Hee University*
Jee Hyun Maeng, *Kyung Hee University*
Hyuna Lee, *Kyung Hee University*
Hanjong Yoo, *Kyung Hee University*
Raju Lampande, *Kyung Hee University*
Ju Young Lee, *Kyung Hee University*
Jang Hyuk Kwon, *Kyung Hee University*

6-4: ***Late-News Paper:*** **Realizing Deep-Blue Emission in Blue-Phosphorescent Organic Light-Emitting Diodes** (Page 65)
Jinwon Sun, *Samsung Display, Co., Ltd.*
Hyein Jeong, *Samsung Display, Co., Ltd.*
Jaejin Lyu, *Samsung Display, Co., Ltd.*

Session 7: Reliability

Chair: Hsing-Hung Hsieh, *HP International Pte. Ltd.*
Co-Chair: Xiaojun Guo, *Shanghai Jiao Tong University*

7-1: ***Distinguished Paper:*** **Alleviation of Abnormal NBTI Phenomenon in LTPS TFTs on Polyimide Substrate for Flexible AMOLED** (Page 67)
Jaeseob Lee, *Samsung Display Co., Ltd.*
Yongsu Lee, *Samsung Display Co., Ltd.*
Taewook Kang, *Samsung Display Co., Ltd.*
Hyeyong Chu, *Samsung Display Co., Ltd.*
Jinoh Kwag, *Samsung Display Co., Ltd.*

7-2: ***Invited Paper:*** **Hot Carrier Degradation in High-Mobility Metal-Oxide Thin-Film Transistors** (Page 71)
Yukiharu Uraoka, *Nara Institute of Science and Technology*
Takanori Takahashi, *Nara Institute of Science and Technology*
Kahori Kise, *Nara Institute of Science and Technology*
Juan Paolo Bermundo, *Nara Institute of Science and Technology*
Mami Fujii, *Nara Institute of Science and Technology*
Mutsunori Uenuma, *Nara Institute of Science and Technology*
Yasuaki Ishikawa, *Nara Institute of Science and Technology*

7-3: **High ESD Robustness and Low Visible Light Reflectance Design for LTPS-TFTs on Glass Substrates in Modular Micro-LED Displays** (Page 75)
Seongho Son, *Samsung Electronics Co., Ltd. & Sungkyunkwan University*
Wonsoon Park, *Samsung Electronics Co., Ltd.*
Jongsung Lee, *Samsung Electronics Co., Ltd.*
Wanchul Seung, *Samsung Electronics Co., Ltd.*
Changjoon Lee, *Samsung Electronics Co., Ltd.*
Byongsu Seol, *Samsung Electronics Co., Ltd.*
Taesang Park, *Samsung Electronics Co., Ltd.*
Jung-Hoon Chun, *Sungkyunkwan University*

7-4: ***Late-News Paper:*** **Development of High-Mobility Top-Gate IGZTO-TFT and Suppression of Threshold-Voltage Shift in Short Channel Utilizing Laser-Irradiation Process** (Page 79)
Mitsuru Nakata, *NHK Science & Technology Research Laboratories*
Mototaka Ochi, *Kobe Steel, Ltd.*
Tatsuya Takei, *NHK Science & Technology Research Laboratories*
Hiroshi Tsuji, *NHK Science & Technology Research Laboratories*
Masashi Miyakawa, *NHK Science & Technology Research Laboratories*
Kohei Nishiyama, *Kobe Steel, Ltd.*
Yoshiki Nakajima, *NHK Science & Technology Research Laboratories*
Takahisa Shimizu, *NHK Science & Technology Research Laboratories*

Session 8: Advances in Lighting: OLEDs, Materials, and Manufacturing

Chair: Eric Margulies, *Universal Display Corporation*
Co-Chair: J. Norman Bardsley, *Bardsley Consulting*

8-1: ***Invited Paper:*** **Development of High-Temperature Stable Red OLEDs for Automotive Lighting** (Page 83)
Marina Kondakova, *OLEDWorks LLC*
Juergen Eser, *OLEDWorks GmbH*
Michael Buechel, *OLEDWorks GmbH*
Joerg Knipping, *OLEDWorks GmbH*
Florian Lindla, *OLEDWorks GmbH*
Michael Boroson, *OLEDWorks LLC*
Jeffrey Spindler, *OLEDWorks LLC*

8-2: ***Invited Paper:*** **High Refractive Index Materials for Display and Lighting Applications** (Page 86)
Selina Monickam, *Pixelligent Technologies LLC*
Todd Newman, *Pixelligent Technologies LLC*

Brian Szychowski, *Pixelligent Technologies LLC*
Serpil Gonen-Williams, *Pixelligent Technologies LLC*
Sang-Hun Choi, *Pixelligent Technologies LLC*

8-3: ***Invited Paper:*** **OLED Lighting Design and Roll-to-Roll Manufacturing** (Page 90)
Christian May, *Fraunhofer FEP*
Michael Toerker, *Fraunhofer FEP*
Jan Hesse, *Fraunhofer FEP*
Jacqueline Hauptmann, *Fraunhofer FEP*
Claudia Keibler-Willner, *Fraunhofer FEP*
André Philipp, *Fraunhofer FEP*
Martin Wieczorek, *Fraunhofer FEP*

8-4: ***Invited Paper:*** **Flexible Glass Substrate for OLED Lighting Application and Efficient Internal Light Extraction for OLED Lighting Devices** (Page 93)
Dipak Chowdhury, *Corning Technology Center Korea*
Kwang-je Woo, *Corning Technology Center Korea*
Bo-Kyung Kong, *Corning Technology Center Korea*
Joo-young Lee, *Corning Technology Center Korea*
Hong Yoon, *Corning Technology Center Korea*
Michal Mlejnek, *Corning Reseach & Development Corp.*

Session 9: MicroLED Manufacturing

Chair: Ion Bita, *Google LLC*
Co-Chair: Bradley Bowden, *Corning Research and Development Corporation*

9-1: ***Invited Paper:*** **Colloidal Lead-Halide Perovskite Nanocrystals as Classical and Quantum Light Sources** (Page N/A)
Maryna I. Bodnarchuk, *Empa - Swiss Federal Laboratories for Materials Science and Technology*
Yevhen Shynkarenko, *Empa - Swiss Federal Laboratories for Materials Science and Technology*
Dmitry N. Dirin, *ETH Zurich and Empa*
Gabriele Rainó, *ETH Zurich and Empa*
Maksym V. Kovalenko, *ETH Zurich and Empa*

9-2: **Manufacturing Process for Mass Production of Micro-LED Displays and High-Speed and High-Yield Laser Lift-Off Systems** (Page 100)
Koichi Kajiyama, *V-Technology Co., Ltd.*
Yoshikazu Suzuki, *V-Technology Co., Ltd.*
Takafumi Hirano, *V-Technology Co., Ltd.*
Yoshikatu Yanagawa, *V-Technology Co., Ltd.*
Koichiro Fukaya, *V-Technology Co., Ltd.*
Naoya Okura, *V-Technology Co., Ltd.*
Takeshi Okuno, *V-Technology Co., Ltd.*
Atsushi Shimoura, *V-Technology Co., Ltd.*

9-3: **Advanced Process and Structure of Backplane for Micro LED Display** (Page 104)
Hua-Fei Xie, *Peking University*
Xue-Ru Mei, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Ma-Cai Lu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Ming-Gang Liu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Nian Liu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Lei Wen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Si-Jia Wu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Yong Fan, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Shu-Jhih Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Chia-Yu Lee, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Sheng-Dong Zhang, *Peking University*
Xin Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

9-4: **Applying FPD Panel and Manufacturing Technologies to High Growth Segments, Alternative Applications, and New Business Models** (Page 107)
Charles A. Annis, *IHS Markit*

9-5: ***Late-News Paper:*** **A 3.9-in. LTPS TFT Full-Color MicroLED Display with Novel Driving and Reflector Cavity Process** (Page 111)
Masaya Tamaki, *Kyocera Corporation*
Takanobu Suzuki, *Kyocera Corporation*
Katsumi Aoki, *Kyocera Corporation*
Ryoichi Yokoyama, *Kyocera Corporation*
Hiroaki Ito, *Kyocera Corporation*
Sho Nakamitsu, *Kyocera Corporation*
Kunio Imaizumi, *Kyocera Corporation*
Katsumi Yamanoguchi, *Kyocera Corporation*
Masahiko Nishide, *Kyocera Corporation*
Fanny Rahadian, *Kyocera Corporation*
Seiji Matsuda, *Kyocera Corporation*
Erwin Lang, *OSRAM Opto Semiconductors GmbH*
Lutz Hoeppel, *OSRAM Opto Semiconductors GmbH*

Session 10: HDR LCDs I

Chair: Brian Berkeley, *Highlight Display LLC*
Co-Chair: Shin-Tson Wu, *University of Central Florida*

10-1: ***Invited Paper:*** **High Dynamic Range Mini-LED and Dual-Cell LCDs** (Page 115)
En-Lin Hsiang, *University of Central Florida*
Yuge Huang, *University of Central Florida*
Qian Yang, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

10-2: ***Invited Paper:*** **Development of Dual-Cell LCD with Mega Contrast** (Page 119)
Lei Guo, *BOE Technology Group Co., Ltd.*
Xibin Shao, *BOE Technology Group Co., Ltd.*
Yanping Liao, *BOE Technology Group Co., Ltd.*
Hao Liu, *BOE Technology Group Co., Ltd.*
Ke Dai, *BOE Technology Group Co., Ltd.*
Seungmin Lee, *BOE Technology Group Co., Ltd.*
Zhangtao Wang, *BOE Technology Group Co., Ltd.*
Hongming Zhan, *BOE Technology Group Co., Ltd.*
Ruichen Zhang, *BOE Technology Group Co., Ltd.*
Yue Du, *BOE Technology Group Co., Ltd.*
Jiaqing Liu, *BOE Technology Group Co., Ltd.*
Zhendong Li, *BOE Technology Group Co., Ltd.*
Liangliang Jiang, *BOE Technology Group Co., Ltd.*

10-3: ***Invited Paper:*** **AM MLED Backlight Units on Glass for 75-inch LCD Displays** (Page 122)
Hongyuan Xu, *TCL China Star Optoelectronics Technology Co., Ltd. & Peking University Shenzhen Graduate School*
Juncheng Xiao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jiayang Fei, *TCL China Star Optoelectronics Technology Co., Ltd.*
Rui Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xu Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Sikun Hao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yongyuan Qiu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jinfeng Liu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yan Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jiaqing Zhuang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Daobing Hu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shengdong Zhang, *Peking University Shenzhen Graduate School*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

10-4: ***Invited Paper:*** **Taking High-Dynamic Range Further: Apple Pro Display XDR** (Page N/A)
Mingxia (Vincent) Gu, *Apple, Inc.*
Ron Liu, *Apple, Inc.*
Marc Albrecht, *Apple, Inc.*
Jun Qi, *Apple, Inc.*

Victor Yin, *Apple, Inc.*

Session 11: Automotive Display Technologies and Systems

Chair: Casey Kang, *Corning Incorporated*
Co-Chair: Rashmi Rao, *Harman International*

11-1: **High Reliability Flexible AMOLED Display with Algorithm Compensation for Automotive Application** (Page 130)
Xin Mou, *BOE Technology Group Co., Ltd.*
Lian Xiang, *BOE Technology Group Co., Ltd.*
Gang Wang, *BOE Technology Group Co., Ltd.*
Xing Huang, *BOE Technology Group Co., Ltd.*
Cuicui Liang, *BOE Technology Group Co., Ltd.*
Guowei Chen, *BOE Technology Group Co., Ltd.*
Lin Zhang, *BOE Technology Group Co., Ltd.*
Suncun Li, *BOE Technology Group Co., Ltd.*
Xueying He, *BOE Technology Group Co., Ltd.*
Wenjie Hu, *BOE Technology Group Co., Ltd.*
Kai Yang, *BOE Technology Group Co., Ltd.*
Zhengmao Yu, *BOE Technology Group Co., Ltd.*
Yan Yang, *BOE Technology Group Co., Ltd.*
Youxiong Feng, *BOE Technology Group Co., Ltd.*
Dawei Wang, *BOE Technology Group Co., Ltd.*
Haijun Qiu, *BOE Technology Group Co., Ltd.*
Wenbao Gao, *BOE Technology Group Co., Ltd.*

11-2: ***Late-News Paper:*** **Display/Projection Features: Next-Growth Driver for Automotive Lighting** (Page N/A)
Pars Mukish, *Yole Développement*
Pierrick Boulay, *Yole Développement*
Martin Vallo, *Yole Développement*

11-3: ***Distinguished Paper:*** **Advanced Methods for Safe Visualization on Automotive Displays** (Page 138)
Benjamin Axmann, *Mercedes-Benz AG*
Frank Langner, *Mercedes-Benz AG*
Karlheinz Blankenbach, *Pforzheim University*
Matthaeus Vogelmann, *Pforzheim University*
Adrian von Gaisberg, *Pforzheim University*
Lukas Strobel, *Pforzheim University*
Jan Bauer, *Karlsruhe University*

11-4: ***Invited Paper:*** **Virtual Prototyping and Testing of Automotive Capacitive Touch Sensors** (Page 142)
Vasileios N. Zagkanas, *Fieldscale PC*
Dimitris A. Orlis, *Fieldscale PC*
Christos G. Daskalou, *Fieldscale PC*
George D. Bouzianas, *Fieldscale PC*
Carsten Temming, *Volkswagen Group Innovation*

Session 12: OLED AR/VR

Chair: Qi Wang, *eMagin Corporation*
Co-Chair: Franky So, *North Carolina State University*

12-1: ***Invited Paper:*** **Directional SPP Emission in OLEDs Using Diffractive Optical Elements** (Page 146)
Xiangyu Fu, *North Carolina State University*
Yi-An Chen, *University of Texas at Austin*
Renuka Gogusetti, *North Carolina State University*
Dong-Hun Shin, *North Carolina State University*
Chih-Hao Chang, *University of Texas at Austin*
Franky So, *North Carolina State University*

12-2: **High-Performance OLED Microdisplays Made with Multi-Stack OLED Formulations** (Page 149)

John Hamer, *OLEDWorks LLC*
Marina Kondakova, *OLEDWorks LLC*
Jeffrey Spindler, *OLEDWorks LLC*
Robert Cupello, *OLEDWorks LLC*
Suzannah Hamer, *OLEDWorks LLC*
Michael Andre, *OLEDWorks LLC*
Scott McClurg, *OLEDWorks LLC*
Anatole Pleten, *OLEDWorks LLC*
Bruno Primerano, *OLEDWorks LLC*
David Scott, *OLEDWorks LLC*
George Scherer, *OLEDWorks LLC*
Scott Stickel, *OLEDWorks LLC*

12-3: **Organic Light-Emitting Diode Microdisplay with a 32:9 Aspect Ratio for Wide Field of View** (Page 153)
Hyunkoo Lee, *Electronics and Telecommunications Research Institute & Sookmyung Women's University*
Hyunsu Cho, *Electronics and Telecommunications Research Institute*
Chun-Won Byun, *Electronics and Telecommunications Research Institute*
Chan-mo Kang, *Electronics and Telecommunications Research Institute*
Jin-Wook Shin, *Electronics and Telecommunications Research Institute*
Sukyung Choi, *Electronics and Telecommunications Research Institute*
Byoung-Hwa Kwon, *Electronics and Telecommunications Research Institute*
Nam Sung Cho, *Electronics and Telecommunications Research Institute*
Ara Cho, *RAONTECH*
Hokwon Kim, *RAONTECH*
Jeong Cho, *RAONTECH*
Sang Hyun Park, *RAONTECH*
Minseok Kim, *RAONTECH*
Soon-gi Park, *LetinAR*
Youngjoon Kim, *LetinAR*
Jeonghun Ha, *LetinAR*
Jaehyeok Kim, *LetinAR*

12-4: **1,000-ppi LTPS OLED Display for VR Application** (Page 156)
Ziyang Yu, *BOE Optoelectronics Technology Co.,Ltd*
Ming Hu, *BOE Optoelectronics Technology Co.,Ltd*
Zhu Wang, *BOE Optoelectronics Technology Co.,Ltd*
Guo Liu, *BOE Optoelectronics Technology Co.,Ltd*
Bin Wang, *BOE Optoelectronics Technology Co.,Ltd*
Peter Jang, *BOE Optoelectronics Technology Co.,Ltd*
Dawei Wang, *BOE Optoelectronics Technology Co.,Ltd*
Haijun Qiu, *BOE Optoelectronics Technology Co.,Ltd*

Session 13: OLED Materials II

Chair: Hitoshi Kuma, *Idemitsu Kosan Co., Ltd.*
Co-Chair: Nicholas Thompson, *Universal Display Corporation*

13-1: ***Invited Paper:*** **Impact of Spontaneous-Orientation Polarization on the Maximum Efficiency and Stability of Organic Light-Emitting Diodes** (Page N/A)
John S. Bangsund, *University of Minnesota*
Jack R. Van Sambeek, *University of Minnesota*
Russell J. Holmes, *University of Minnesota*

13-2: ***Late-News Paper:*** **How to Reduce Harmful Blue Light in OLED Devices** (Page 164)
Jinsook Bang, *Samsung Display Corp.*
Sanghoon Yim, *Samsung Display Corp.*
Donghoon Kim, *Samsung Display Corp.*

13-3: **Improvement of Blue Pixels in OLED Panels with More Efficient Fluorescent and TADF Emitters** (Page 168)
Thomas Baumann, *cynora GmbH*
Matthias Budzynski, *cynora GmbH*
Christian Kasparek, *cynora GmbH*

Sebastian Dueck, *cynora GmbH*
Julian Ochsmann, *cynora GmbH*

13-4: ***Late-News Paper:*** **Effect of Molecular Structure of Host Materials on Thermal Stability and Device Characteristics of Solution Processed OLEDs** (Page 172)
Ja Yeon Lee, *Kyung Hee University*
Jaeseung Kim, *Sogang University*
Hyunjung Kim, *Sogang University*
Min Chul Suh, *Kyung Hee University*

Session 14: Image Sensors

Chair: Sang Hee Park, *KAIST*
Co-Chair: Tse Nga Tina Ng, *University of California San Diego*

14-1: **Flexible Large-Area Multi-Fingerprint Sensors Based on Thermal Mass Detection** (Page 176)
Florian De Roose, *imec*
Jean-François Mainguet, *University Grenoble Alpes*
Didier Gallaire, *University Grenoble Alpes*
Audrey Martinent, *University Grenoble Alpes*
Andrea Torchia, *Bioage*
Umberto Emanuele, *Bioage*
Stefano Sinopoli, *Bioage*
Bart Peeters, *TNO*
Hylke Akkerman, *TNO*
Albert van Breemen, *TNO*
Auke J. Kronemeijer, *TNO*
Marina Pouet, *idemia*
Soeren Steudel, *imec*
Kris Myny, *imec*

14-2: ***Invited Paper:*** **OLED Display Incorporating an Organic Image Sensor** (Page 180)
Yasuhiro Niikura, *Semiconductor Energy Laboratory Co., Ltd.*
Ryo Hatsumi, *Semiconductor Energy Laboratory Co., Ltd.*
Taisuke Kamada, *Semiconductor Energy Laboratory Co., Ltd.*
Akio Yamashita, *Semiconductor Energy Laboratory Co., Ltd.*
Kazunori Watanabe, *Semiconductor Energy Laboratory Co., Ltd.*
Susumu Kawashima, *Semiconductor Energy Laboratory Co., Ltd.*
Ryo Yamauchi, *Semiconductor Energy Laboratory Co., Ltd.*
Masahiro Katayama, *Semiconductor Energy Laboratory Co., Ltd.*
Hiroki Adachi, *Semiconductor Energy Laboratory Co., Ltd.*
Koji Kusunoki, *Semiconductor Energy Laboratory Co., Ltd.*
Daisuke Kubota, *Semiconductor Energy Laboratory Co., Ltd.*
Shingo Eguchi, *Semiconductor Energy Laboratory Co., Ltd.*
Shunpei Yamazaki, *Semiconductor Energy Laboratory Co., Ltd.*

14-3: **Flexible Image Sensor Array Using IGZO TFT Backplane Technology for X-ray Detector** (Page 184)
Rikiya Takita, *Sharp Corporation*
Wataru Nakamura, *Sharp Corporation*
Akinori Kubota, *Sharp Corporation*
Fumiki Nakano, *Sharp Corporation*
Kazuhide Tomiyasu, *Sharp Corporation*
Yu Nakamura, *Sharp Corporation*
Naoki Makita, *Sharp Corporation*

14-4: ***Late-News Paper:*** **Large-Area Optical Fingerprint Sensors for Next-Generation Smartphones** (Page 188)
Noémie Ballot, *ISORG*

Session 15: Advanced TFT Manufacturing

Chair: Chiwoo Kim, *APS Holdings*
Co-Chair: Greg Gibson, *nTact*

15-1: ***Invited Paper:*** **Manufacturing Technology of LTPO TFT** (Page 192)
Ui-Jin Chung, *LG Display Co., Ltd.*
Seung-Chan Choi, *LG Display Co., Ltd.*
So young Noh, *LG Display Co., Ltd.*
Ki-Tae Kim, *LG Display Co., Ltd.*
Kyeong-Ju Moon, *LG Display Co., Ltd.*
Jeong-Hyun Kim, *LG Display Co., Ltd.*
Kwon-Shik Park, *LG Display Co., Ltd.*
Hyun-Chul Choi, *LG Display Co., Ltd.*
In-Byeong Kang, *LG Display Co., Ltd.*

15-2: **Gen 10 Excimer Laser Annealing System** (Page 196)
Takahiro Fuji, *The Japan Steel Works, Ltd.*
Yoshihiro Yamaguchi, *The Japan Steel Works, Ltd.*
Yuki Suzuki, *The Japan Steel Works, Ltd.*
Takahiro Mikami, *The Japan Steel Works, Ltd.*
Sadao Tanigawa, *The Japan Steel Works, Ltd.*

15-3: **Resistance Reduction of Mo Metallization by W Seed Layer** (Page 200)
Harald Köstenbauer, *Plansee SE*
Hennrik Schmidt, *Plansee Shanghai*
Dominik Lorenz, *Plansee SE*
Christian Linke, *Plansee SE*
Ying Zhang, *Shanghai Jiao Tong University*
Chengyuan Dong, *Shanghai Jiao Tong University*
Joerg Winkler, *Plansee SE*

15-4: **New Gen. 6 Exposure Tools for 1.2 µm Resolution** (Page 204)
Nobuhiko Yabu, *Canon, Inc.*
Manabu Hakko, *Canon, Inc.*
Koichi Takasaki, *Canon, Inc.*
Toru Okubo, *Canon, Inc.*
Takeo Oyanagi, *Canon, Inc.*
Miwako Ando, *Canon, Inc.*
Takaaki Terashi, *Canon, Inc.*
Nozomu Izumi, *Canon, Inc.*
Kouhei Nagano, *Canon, Inc.*
Yoshinori Osaki, *Canon, Inc.*

Session 16: MicroLED Color Conversion

Chair: Seth Coe-Sullivan, *Luminit, LLC*
Co-Chair: Ioannis Kymissis, *Columbia University*

16-1: ***Invited Paper:*** **Hybrid Full-Color Micro-LED Display with Quantum Dots Color Conversion by Using Inkjet-Printing and Photo-Lithography Methods** (Page 208)
Yang Gu, *X-Vision Lab, Visionox Technology, Inc.*
Tao Wang, *X-Vision Lab, Visionox Technology, Inc.*
Bo Jiang, *X-Vision Lab, Visionox Technology, Inc.*
Jingjing Li, *X-Vision Lab, Visionox Technology, Inc.*
Chenggong Wang, *X-Vision Lab, Visionox Technology, Inc.*

16-2: **A 4-inch Full Color Active-matrix Mini-LED Display based on 0408 Chip and 500um Pixel** (Page 212)
Yongming Yin, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Yang Sun, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Lu Gao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jack Fan, *TCL China Star Optoelectronics Technology Co., Ltd.*
Lijun Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Minggang Liu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Zhiheng Hua, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bo Yang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Zeng Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jianhang Fu, *TCL China Star Optoelectronics Technology Co., Ltd.*

Pengfei Liang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jason Hwang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shu-jhih Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hong Meng, *Peking University*

16-3: **High-End Display Applications with Micro-LEDs** (Page 215)
Chien-chung Lin, *Industrial Technology Research Institute*
Yen-Hsiang Fang, *Industrial Technology Research Institute*
Wei-Hung Kuo, *Industrial Technology Research Institute*
Kai-Ling Liang, *Industrial Technology Research Institute*
Jie Ting Tseng, *Industrial Technology Research Institute*
Pin Hao Hu, *Industrial Technology Research Institute*
Mao Chi Lin, *Industrial Technology Research Institute*
Chih-I Wu, *Industrial Technology Research Institute*

16-4: ***Late-News Paper:*** **High Color Gamut Mini-LED Backlight Demon based on Dual-Emissive Perovskite Quantum Dots Films** (Page 219)
Fei Li, *Beijing Institute of Technology*
Honglei Ji, *University of Chinese Academy of Sciences & TCL Electronics Holdings Limited.*
Huaishu Xu, *University of Chinese Academy of Sciences*
Zelong Bai, *Beijing Institute of Technology*
Ruikuo Liu, *Zhijing Nanotech Co., Ltd.*
Jing Li, *Zhijing Nanotech Co., Ltd.*
Haizheng Zhong, *Beijing Institute of Technology*

16-5: ***Late-News Paper:*** **High Flux Stable Perovskite Quantum Dots-Polymer Composite for Down-Converting Applications** (Page 222)
Lutfan Sinatra, *Quantum Solutions*
Marat Lutfullin, *Quantum Solutions*
Sergio Lentijo Mozo, *Quantum Solutions*
Osman Mohammed Bakr, *King Abdullah University of Science and Technology (KAUST)*

Session 17: HDR LCDs II

Chair: Jenn Jia Su, *AU Optronics Corporation*
Co-Chair: Matthew Sousa, *3M*

17-1: ***Invited Paper:*** **Invited paper: An Overview of Solutions for Achieving HDR LCDs** (Page 224)
Jenn Jia Su, *AU Optronics Corp.*
Hsueh Ying Huang, *AU Optronics Corp.*
Han Ping Kuo, *AU Optronics Corp.*
Ming Hsien Lee, *AU Optronics Corp.*
Chien Wen Chen, *AU Optronics Corp.*
Chien Huang Liao, *AU Optronics Corp.*
Kai Chieh Chang, *AU Optronics Corp.*
Yang En Wu, *AU Optronics Corp.*
Wei Lung Liau, *AU Optronics Corp.*

17-2: **A Method of Improving Image Contrast based on Dual Cell Display** (Page 228)
Yizhuo Zhao, *TCL China Star Optoelectronics Technology Co., Ltd*
Tao He, *TCL China Star Optoelectronics Technology Co., Ltd*
Yinhong Chen, *TCL China Star Optoelectronics Technology Co., Ltd*
Mingzhong Zhou, *TCL China Star Optoelectronics Technology Co., Ltd*

17-3: **A Novel Pixel-level Local Dimming Backlight System for HDR Display Based on mini-LED** (Page 231)
Enhui Guan, *BOE Technology Group Co., Ltd.*
Xinyi Cheng, *BOE Technology Group Co., Ltd.*
Xiao Zhang, *BOE Technology Group Co., Ltd.*
Zhimao Wang, *BOE Technology Group Co., Ltd.*
Xitong Ma, *BOE Technology Group Co., Ltd.*
Ran Duan, *BOE Technology Group Co., Ltd.*
Xianzhen Li, *BOE Technology Group Co., Ltd.*

Liang Li, *BOE Technology Group Co., Ltd.*
Shuo Chen, *BOE Technology Group Co., Ltd.*
Xinxin Mu, *BOE Technology Group Co., Ltd.*

17-4: **Evaluate and Upgrade Picture Quality of Local Dimming Mini-LED LCD** (Page 235)
Chun-Chi Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Young-Yuan Qiu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Wei-Wei Zheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Gang Yu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chung-Yi Chiu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

17-5: ***Distinguished Student Paper:*** **Birefringent Light-Shaping Film for Mini-LED Backlights** (Page 239)
Ziqian He, *University of Central Florida*
Kun Yin, *University of Central Florida*
En-Lin Hsiang, *University of Central Florida*
Ming-Chun Li, *AU Optronics Corp.*
Seok-Lyul Lee, *AU Optronics Corp.*
Kun-Cheng Tien, *AU Optronics Corp.*
Shin-Tson Wu, *University of Central Florida*

17-6: ***Invited Paper:*** **4K HDR "Stacked-Panel" TV Based on Dual-Cell LCD** (Page 243)
Weidong Liu, *Hisense Visual Technology Co., Ltd*
Linjia Mu, *Hisense Visual Technology Co., Ltd*
Aichen Xu, *Hisense Visual Technology Co., Ltd*
Yuxin Zhang, *Hisense Visual Technology Co., Ltd*
Mingsheng Qiao, *Hisense Visual Technology Co., Ltd*

Session 18: Head-Up Displays (HUD)

Chair: Philippe Coni, *THALES Avionics*
Co-Chair: Haruhiko Okumura, *Toshiba Corporation*

18-1: ***Invited Paper:*** **Holographic Optical Elements for Automotive Windshield Displays** (Page 246)
Ian R. Redmond, *Ceres Holographics, Ltd.*

18-2: **Improvement of Light Leakage of HUD System** (Page 250)
Kenta Kamoshida, *KYOCERA Corp.*
Ryo Tadauchi, *KYOCERA Corp.*
Takashi Shimada, *KYOCERA Corp.*
Kenji Ogura, *KYOCERA Corp.*
Mitsuhiro Murata, *KYOCERA Corp.*

18-3: **Impact Study of Windshield Geometry on the Subjective Customer Perception for Augmented Reality Head-up Displays (AR HUD)** (Page 254)
Daniel Wagner, *Mercedes-Benz AG & Karlsruhe Institute of Technology*
Matthias Schneider, *Mercedes-Benz AG*
Florian Dross, *Mercedes-Benz AG*
Stefan Langer, *Mercedes-Benz AG*
Susanne Zeidler, *Mercedes-Benz AG*
Thomas Ganz, *Mercedes-Benz AG*
Ulrich Lemmer, *Karlsruhe Institute of Technology*

18-4: ***Invited Paper:*** **Switchable Light-Field Displays for Automotive Applications** (Page 258)
David Fattal, *Leia, Inc.*
Kai Hohmann, *Continental Automotive GmbH*

Session 19: Human Factors with AR/VR

Chair: Takashi Shibata, *Tokyo University of Social Welfarae*
Co-Chair: Paolo Sacchetto, *Apple, Inc.*

19-1: ***Distinguished Paper:*** **Differences Between Oculomotor and Perceptual Artifacts for Temporally**

Limited Head Mounted Displays (Page 261)
Alexander Goettker, *Facebook & Justus-Liebig Universität Giessen*
Kevin J. MacKenzie, *Facebook*
T. Scott Murdison, *Facebook*

19-2: **Vergence-Accommodation Conflicts in Augmented Reality: Impacts on Perceived Image Quality** (Page 265)
Ian M. Erkelens, *Facebook*
Kevin J. MacKenzie, *Facebook*

19-3: **Foveated Brightness-Control Technology for VR Applications** (Page 269)
Won-Been Jeong, *Kyung Hee University*
Jeong-Sik Kim, *Kyung Hee University*
Seung-Woo Lee, *Kyung Hee University*

19-4: **Research on Reducing Motion Sickness of Playing First Person Shooting VR Game with Texture Blur** (Page 273)
Ting-Lan Tsai, *National Taiwan University of Science and Technology*
Chih-Hao Chuang, *National Taiwan University*
Chien-Yu Chen, *National Taiwan University of Science and Technology*
Pei-Jung Wu, *National Taichung University of Science and Technology*
Hung-Wei Chen, *National TaiwanUniversity of Science and Technology*

Session 20: OLED Materials III

Chair: Jang Hyuk Kwon, *Kyung Hee University*
Co-Chair: Changwoong Chu, *Samsung Display Corporation*

20-1: ***Invited Paper:*** **High-Efficiency Near-Infrared OLEDs with Pure Organic Materials** (Page N/A)
Ken-Tsung Wong, *National Taiwan University*
Wen-Yi Hung, *National Taiwan Ocean University*
Shun-Wei Liu, *Ming Chi University of Technology*

20-2: **High Efficiency and Long Device Lifetime Green Organic Light Emitting Diodes using a Pt Complex** (Page 281)
Sunghun Lee, *Samsung Electronics*
Myung Sun Sim, *Samsung Electronics*
Seung-Yeon Kwak, *Samsung Electronics*
Hyun Koo, *Samsung Electronics*
Sangdong Kim, *Samsung Electronics*
SeokHwan Hong, *Samsung Electronics*
Kyu Young Hwang, *Samsung Electronics*
Jeoungin Yi, *Samsung Electronics*
Sangho Park, *Samsung Electronics*
YoonHyun Kwak, *Samsung Electronics*
Hyeonho Choi, *Samsung Electronics*
Bang Lin Lee, *Samsung Electronics*
Ohyun Kwon, *Samsung Electronics*
Byoung ki Choi, *Samsung Electronics*
Sung Han Kim, *Samsung Electronics*

20-3: **Universal Method to Inject Electrons Into Organic Semiconductors Utilizing Hydrogen Bonds** (Page 285)
Hirohiko Fukagawa, *NHK Science & Technology Research Laboratories*
Munehiro Hasegawa, *Nippon Shokubai Co., Ltd.*
Katsuyuki Morii, *Nippon Shokubai Co., Ltd.*
Taku Oono, *NHK Science & Technology Research Laboratories*
Tsubasa Sasaki, *NHK Science & Technology Research Laboratories*
Takahisa Shimizu, *NHK Science & Technology Research Laboratories*

20-4: **Study on the Effect of OLED Device Lifetime Improvement according to Hole Injection Barrier and p-Dopants** (Page 289)
Jaechul Hong, *Samsung Display Co., Ltd.*
Yoonsu Kang, *Samsung Display Co., Ltd.*
Jinyoung Lee, *Samsung Display Co., Ltd.*

Seungjae Jeong, *Samsung Display Co., Ltd.*
Jaehong Ahn, *Samsung Display Co., Ltd.*
Changwoong Chu, *Samsung Display Co., Ltd.*

Session 21: Super Resolution and Gen 11

Chair: Kalluri Sarma, *Honeywell, Inc*
Co-Chair: Hyun Jae Kim, *Yonsei University*

21-1: ***Invited Paper:*** **5291-ppi Microdisplay Using CAAC-IGZO FET with Channel Length of 60 nm** (Page 293)
Hideaki Shishido, *Semiconductor Energy Laboratory Co., Ltd.*
Shuichi Katsui, *Semiconductor Energy Laboratory Co., Ltd.*
Hidetomo Kobayashi, *Semiconductor Energy Laboratory Co., Ltd.*
Takashi Nakagawa, *Semiconductor Energy Laboratory Co., Ltd.*
Yuki Tamatsukuri, *Semiconductor Energy Laboratory Co., Ltd.*
Shogo Uesaka, *Semiconductor Energy Laboratory Co., Ltd.*
Takaaki Nagata, *Semiconductor Energy Laboratory Co., Ltd.*
Tomoya Aoyama, *Semiconductor Energy Laboratory Co., Ltd.*
Yutaka Okazaki, *Semiconductor Energy Laboratory Co., Ltd.*
Takayuki Ikeda, *Semiconductor Energy Laboratory Co., Ltd.*
Shunpei Yamazaki, *Semiconductor Energy Laboratory Co., Ltd.*

21-2: ***Invited Paper:*** **1μm Pixel Pitch Spatial Light Modulator Panel for Digital Holography** (Page 297)
Chi-Sun Hwang, *Electronics and Telecommunication Research Institute*
Ji Hun Choi, *Electronics and Telecommunication Research Institute*
Jae-Eun Pi, *Electronics and Telecommunication Research Institute*
Jong-Heon Yang, *Electronics and Telecommunication Research Institute*
Gi Heon Kim, *Electronics and Telecommunication Research Institute*
Yong-Hae Kim, *Electronics and Telecommunication Research Institute*
Joo Yeon Kim, *Electronics and Telecommunication Research Institute*
Won-Jae Lee, *Electronics and Telecommunication Research Institute*
Hee-Ok Kim, *Electronics and Telecommunication Research Institute*
Ha Kyun Lee, *MVTech*
Myung Yu Kim, *Siliconworks*
Jinwoong Kim, *Electronics and Telecommunication Research Institute*

21-3: ***Invited Paper:*** **High Quality 8K4K Displays driven by Oxide Semiconductor Thin Film Transistor in the Generation 11 Equipment** (Page 301)
Hyun-Sik Seo, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Weiran Cao, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Jun Cheng Xiao, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Yuan-Chun Wu, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Xiaolin Yan, *TCL Co., Ltd.*

Session 22: Flexible Technologies I: Manufacturing

Chair: Yukio Endo, *AGC Inc.*
Co-Chair: Kyung-Tae Kang, *Korea Institute of Industrial Technology*

22-1: **Formation of Silicon-Based Thin-Film Encapsulation for Fabrication of Highly Flexible OLED Devices** (Page 305)
Eun Jung, *SAMSUNG Display*
Myung Soo Huh, *SAMSUNG Display*
Sung Hun Key, *SAMSUNG Display*
Jung Gon Kim, *SAMSUNG Display*
Dong Pyo Jeon, *Samsung Display*
Sae Hong Kim, *Samsung Display*
Choel Min Jang, *Samsung Display*

22-2: **An Ultra-thin Flexible Thin Film Encapsulation Structure with High Transmittance and Reliability**

(Page 309)
Youwei Wang, *BOE Technology Group Co., Ltd.*
Tao Sun, *BOE Technology Group Co., Ltd.*
Chengjie Qin, *BOE Technology Group Co., Ltd.*
Song Zhang, *BOE Technology Group Co., Ltd.*
Tao Wang, *BOE Technology Group Co., Ltd.*
Ziyu Zhang, *BOE Technology Group Co., Ltd.*
Rui Hong, *BOE Technology Group Co., Ltd.*

22-3: **5 µm Thickness of Low-Retardation Plastic Foil with Gas Barrier and Transparent Conductive Layer for Bendable Devices** (Page 311)
Hiroki Kinoshita, *LINTEC Corp.*
Takehiro Ohashi, *LINTEC Corp.*
Takumi Furuya, *LINTEC Corp.*
Satoshi Naganawa, *LINTEC Corp.*

22-4: **Development of Rolled, Long Ultra-Thin Glass and Its Mass Production Technology** (Page 315)
Hiroki Mori, *Nippon Electric Glass Co., Ltd.*
Hiroshi Takimoto, *Nippon Electric Glass Co., Ltd.*
Yoshinori Hasegawa, *Nippon Electric Glass Co., Ltd.*

22-5: ***Late-News Paper:*** **Silicone-based Low-k Material for Display** (Page 319)
Yungjin Park, *Dow*
Brandon Swatowski, *Dow*
Takuya Ogawa, *Dow*
EunKyung Jang, *Dow*
Peng-Fei Fu, *Dow*
Myunhwa Chung, *Dow*

Session 23: MicroLED Display Systems

Chair: Yong-Seog Kim, *Hongik University*
Co-Chair: Larry Weber, *Consultant*

23-1: ***Invited Paper:*** **Essentials of MicroLED Display Production** (Page 323)
Reza Chaji, *VueReal Inc.*
Ehsan Fathi, *VueReal Inc.*
Afshin Zamani, *VueReal Inc.,*

23-2: ***Distinguished Paper:*** **Wrap-Around Electrodes for MicroLED Tiled Displays** (Page 328)
David Pastel, *Corning, Inc.*
Richard Peterson, *Corning, Inc.*
Tetyana Buchholz, *Corning, Inc.*
Haregwine Tadesse, *Corning, Inc.*
Rajesh Vaddi, *Corning, Inc.*
Kuan-Ting Kuo, *Corning, Inc.*
Sean Garner, *Corning, Inc.*
Sijan Khan, *Corning, Inc.*
Jamie Curtis, *Corning, Inc.*

23-3: **High Transparent, Ultra-thin Flexible, Full color Mini-LED Display with IGZO TFT substrate** (Page 332)
Yang Sun, *Peking University & Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Jack Fan, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Yongming Yin, *Peking University & Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Minggang Liu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Pei Jiang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Lijun Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Bei Jiang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Chunge Yuan, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Min Zhang, *Peking University*
Shu-jhih Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

Chia-Yu Lee, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Xin Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

23-4: **Full Color, Active-Matrix Micro-LED Display with Dual Gate a-IGZO TFT Backplane** (Page 335)
Hyo-Min Kim, *Kyung Hee University*
Jiseob Lee, *Kyung Hee University*
Sungmin park, *LG Electronics*
Wonseok Choi, *LG Electronics*
Soohyun Kim, *LG Electronics*
Ki-Seong Jeon, *LG Electronics*
Yoon-Ho Choi, *LG Electronics*
Jeong-Soo Lee, *LG Electronics*
Jin Jang, *Kyung Hee University*

23-5: ***Late-News Paper:*** **High-Resolution Monolithic Micro-LED Full-color Micro-display** (Page 339)
Xu Zhang, *Hong Kong University of Science and Technology*
Longheng Qi, *Hong Kong University of Science and Technology*
Wing Cheung Chong, *Hong Kong University of Science and Technology*
Peian Li, *Hong Kong University of Science and Technology*
Kei May Lau, *Hong Kong University of Science and Technology*

Session 24: LTPO

Chair: James Chang, *Apple, Inc.*
Co-Chair: Man Wong, *Hong Kong University of Science & Technology*

24-1: ***Invited Paper:*** **Development of High-Quality IGZO-TFT with Same On-Current as LTPS** (Page 343)
Kazuatsu Ito, *Sharp Corp.*
Aman Mehadi, *Sharp Corp.*
Masahito Sano, *Sharp Corp.*
Shogo Murashige, *Sharp Corp.*
Izumi Ishida, *Sharp Corp.*
Yujiro Takeda, *Sharp Corp.*
Hiroshi Matsukizono, *Sharp Corp.*
Naoki Makita, *Sharp Corp.*

24-2: ***Distinguished Student Paper:*** **Fluorination for Enhancing the Resistance of Indium-Gallium-Zinc Oxide Thin-Film Transistors against Hydrogen-Induced Degradation** (Page 347)
Sisi Wang, *The Hong Kong University of Science and Technology*
Runxiao Shi, *The Hong Kong University of Science and Technology*
Jiapeng Li, *The Hong Kong University of Science and Technology*
lei Lu, *The Hong Kong University of Science and Technology & Peking University (Shenzhen)*
Zhihe Xia, *The Hong Kong University of Science and Technology*
Hoi Sing Kwok, *The Hong Kong University of Science and Technology*
Man Wong, *The Hong Kong University of Science and Technology*

24-3: **Complementary LTPO Technology, Pixel Circuits, and Integrated Gate Drivers for AMOLED Displays Supporting Variable Refresh Rates** (Page 351)
Haojun Luo, *Royole Corp.*
Shaowen Wang, *Royole Corp.*
Jiahao Kang, *Royole Corp.*
Yu-Min Wang, *Royole Corp.*
Jigang Zhao, *Royole Corp.*
Tina Tsong, *Royole Corp.*
Ping Lu, *Royole Corp.*
Amit Gupta, *Royole Corp.*
Wenbing Hu, *Royole Corp.*
Huanda Wu, *Shenzhen Royole Technologies Co., Ltd.*
Shengwu Zhang, *Shenzhen Royole Technologies Co., Ltd.*
Jiha Kim, *Shenzhen Royole Technologies Co., Ltd.*
Chang Ming Chiu, *Shenzhen Royole Technologies Co., Ltd.*
Bong-Geum Lee, *Shenzhen Royole Technologies Co., Ltd.*
Ze Yuan, *Royole Corp. & Shenzhen Royole Technologies Co., Ltd.*

Xiaojun Yu, *Royole Corp. & Shenzhen Royole Technologies Co., Ltd.*

24-4: ***Distinguished Paper:*** **High Refresh Rate and Low Power Consumption AMOLED Panel Using Top-Gate n-Oxide and p-LTPS TFTs** (Page 355)
Ryo Yonebayashi, *Sharp Corp.*
Kohei Tanaka, *Sharp Corp.*
Kuniaki Okada, *Sharp Corp.*
Kaoru Yamamoto, *Sharp Corp.*
Keiichi Yamamoto, *Sharp Corp.*
Seiichi Uchida, *Sharp Corp.*
Tomohisa Aoki, *Sharp Corp.*
Yujiro Takeda, *Sharp Corp.*
Hiroaki Furukawa, *Sharp Corp.*
Kazuatsu Ito, *Sharp Corp.*
Hiromi Katoh, *Sharp Corp.*
Wataru Nakamura, *Sharp Corp.*

Session 25: Innovative Display Driving Circuits

Chair: Ya Hsiang Tai, *National Chuao Tung University*
Co-Chair: Soo-Yeon Lee, *Seoul National University*

25-1: **Multi-bit MIP(Memory-in-Pixel)-based Pixel Circuit of CMOS Backplane for Micro-LED Display** (Page 359)
Jewoo Seong, *Ulsan National Institute of Science and Technology (UNIST)*
Jinwoong Jang, *Sapien Semiconductors, Inc.*
Jaehoon Lee, *Sapien Semiconductors, Inc.*
Myunghee Lee, *Sapien Semiconductors, Inc.*

25-2: **LTPO TFT Technology for Level Shifter Integrated Gate Driver in UHD 4K Displays** (Page 363)
Abidur Rahaman, *Kyung Hee University*
Hyunho Kim, *Kyung Hee University*
Jin Jang, *Kyung Hee University*

25-3: **Fault-Tolerant Integrated Gate Driver for Flexible Displays** (Page 367)
Jae-Hee Jo, *Kyung Hee University*
Hoon-Ju Chung, *Kumoh National Insitute of Technology*
Sooji Nam, *Electronics and Telecommunications Research Institute (ETRI)*
Jong-Heon Yang, *Electronics and Telecommunications Research Institute (ETRI)*
Sujung Kim, *Electronics and Telecommunications Research Institute (ETRI)*
Seung-Woo Lee, *Kyung Hee University*

Session 26: Novel Waveguides for AR Glasses

Chair: Nikhil Balram, *Google Inc.*
Co-Chair: Brian Schowengerdt, *Magic Leap*

26-1: ***Distinguished Paper:*** **Chirped Polarization Volume Grating for Wide FOV and High Efficiency Waveguide-based AR Displays** (Page 371)
Kun Yin, *University of Central Florida*
Hung-Yuan Lin, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

26-2: ***Invited Paper:*** **A Holographic Waveguide Display with Polarization Volume Gratings** (Page 375)
Yuning Zhang, *Southeast University*
Jingyi Cui, *Southeast University*
Yishi Weng, *Southeast University*
Jun Xia, *Southeast University*

26-3: **Tolerancing Capabilities of Crossed Gratings Versus Linear Gratings** (Page 379)
Alexandra Crai, *WaveOptics, Ltd.*
Kai Wang, *WaveOptics, Ltd.*
Sébastien de Cunsel, *WaveOptics, Ltd.*
Salim Valera, *WaveOptics, Ltd.*

26-4: ***Late-News Paper:*** **Super-Light Smart Glasses Using a Thin Plastic Light-Guide Plate** (Page 383)
Shigenobu Hirano, *RICOH COMPANY, LTD.*
Naoki Nakamura, *RICOH COMPANY, LTD.*
Masahiro Itoh, *RICOH COMPANY, LTD.*
Yoshifumi Sudoh, *RICOH COMPANY, LTD.*
Shun Okazaki, *RICOH COMPANY, LTD.*
Susumu Momma, *RICOH COMPANY, LTD.*
Shiori Ohsugi, *RICOH COMPANY, LTD.*
Masamichi Yamada, *RICOH COMPANY, LTD.*
Takashi Maki, *RICOH COMPANY, LTD.*
Aino Hasegawa, *RICOH COMPANY, LTD.*
Norikazu Igarashi, *RICOH COMPANY, LTD.*
Kenji Kameyama, *RICOH COMPANY, LTD.*
Yasuo Katano, *RICOH COMPANY, LTD.*

Session 27: Printed OLEDs I

Chair: Changwoong Chu, *Samsung Display Corporation*
Co-Chair: Yasunori Kijima, *Huawei Technologies Japan K.K.*

27-1: ***Invited Paper:*** **Latest Development of Soluble OLED Material for Printed Display.** (Page 387)
Daisuke Fukushima, *Advanced Material Development Laboratory*
Shinya Tanaka, *Advanced Material Development Laboratory*
Hidenobu Kakimoto, *Advanced Material Development Laboratory*
Takeshi Yamada, *Sumitomo Chemical Co., Ltd.*

27-2: ***Invited Paper:*** **Soluble Small Molecules in Top-Emission OLED Devices from Inkjet Printing: Requirements and Performance Status** (Page 391)
Sebastian Meyer, *Merck KGaA*
Sebastian Stolz, *Merck KGaA*
Manuel Hamburger, *Merck KGaA*
Hsin-Rong Tseng, *Merck KGaA*
Miriam Engel, *Merck KGaA*
Anna Hayer, *Merck KGaA*
Rouven Linge, *Merck KGaA*
Steven Tierney, *Merck KGaA*
Georg Bernatz, *Merck KGaA*
Rémi Anémian, *Merck KGaA*

27-3: **Improved Device Performance for Inkjet-Printed OLEDs via Interfacial Mixing Control** (Page 395)
Heung Gyu Kim, *Samsung Display Co., Ltd.*
Seung Mook Lee, *Samsung Display Co., Ltd.*
Dongwoo Shin, *Samsung Display Co., Ltd.*
Jaekook Ha, *Samsung Display Co., Ltd.*
Changhee Lee, *Samsung Display Co., Ltd.*

27-4: ***Late-News Paper:*** **Key Materials for High-Performance Solution-Process OLEDs** (Page 399)
Koichiro Iida, *Mitsubishi Chemical Corp.*
Hideki Gorohmaru, *Mitsubishi Chemical Corp.*
Koichi Ishibashi, *Mitsubishi Chemical Corp.*
Yoshiko Shoji, *Mitsubishi Chemical Corp.*

Session 28: Seeing Through the Display

Chair: Steven Bathiche, *Microsoft*
Co-Chair: Jeff Han, *Consultant*

28-1: **Image Capture through TFT Arrays** (Page 402)
Neil Emerton, *Microsoft*
David Ren, *University of California, Berkeley*
Tim Large, *Microsoft*

28-2: **Study of Image Blur through FFS LCD Panel Caused by Diffraction for Camera under Panel** (Page 406)
Quan Tang, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
He Jiang, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Xindong Mei, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Shaojun Hou, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Jimmy, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Guanghui Liu, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Cooper, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Zhifu Li, *Wuhan China Star Optoelectronics Technology Co., Ltd.*

28-3: **Pixel Design for Transparent MicroLED Display with Low Blurring** (Page 410)
Zhengyu Feng, *Peking University Shenzhen Graduate School & TCL China Star Optpelectronics Technology Co., Ltd.*
Yongwei Wu, *Peking University Shenzhen Graduate School & TCL China Star Optpelectronics Technology Co., Ltd.*
Zhiqing Shi, *China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Surigalatu , *China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Zengli Mei, *China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Shu- jhih Chen, *China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Chia-yu Lee, *China Star Optpelectronics Semiconductor Display Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optpelectronics Technology Co., Ltd.*

28-4: **Investigation of Moiré Interference in Pinhole Matrix Fingerprint on Display Technology** (Page 413)
Yang Zeng, *Shanghai Tianma Microelectronics*
Feng Lu, *Shanghai Tianma Microelectronics*
Qijun Yao, *Shanghai Tianma Microelectronics*
Haochi Yu, *Shanghai Tianma Microelectronics*
Qing Zhang, *Shanghai Tianma Microelectronics*
Xiaoyue Su, *Shanghai Tianma Microelectronics*

Session 29: Flexible/Foldable Device Manufacturing

Chair: Tian Xiao, *NEXT Biometrics Inc.*
Co-Chair: Wei Lung Liau, *AU Optronics Corp.*

29-1: ***Invited Paper:*** **Analysis of Dynamic Strain on Foldable Devices** (Page 417)
Naotsugu Ando, *Yuasa System*
Kei Hyodo, *Yuasa System*
Hisao Sasaki, *Yuasa System*
Yoshihito Ota, *Yuasa System*
Nao Terasaki, *AIST*
Tomoki Sasayama, *Shimadzu*
Yusuke Yokoi, *Shimadzu*
Atsushi Shishido, *Tokyo Institute of Technology*
Norishisa Akamatsu, *Tokyo Institute of Technology*
Ryo Taguchi, *Tokyo Institute of Technology*

29-2: ***Invited Paper:*** **Mechanics of Bendable Glass Substrates** (Page 421)
Timothy M. Gross, *Corning Incorporated*
Claire R. Coble, *Corning Incorporated*
Kuan-Ting Kuo, *Corning Incorporated*
Peter J. Lezzi, *Corning Incorporated*
Toshihiko Ono, *Corning Incorporated*

29-4: **Edge Strength Measurement of Free-form Displays** (Page 425)
Bosun Jang, *Corning Incorporated*
Richard Priestley, *Corning Incorporated*
Dani Liu, *Corning Incorporated*
Toshihiko Ono, *Corning Incorporated*
Michael Segar, *Corning Incorporated*
Bala Sundaram, *Corning Incorporated*

Session 30: MicroLED Displays

Chair: Francois Templier, *CEA-LETI*
Co-Chair: Jean-Jacques Drolet, *Osram Opto Semiconductors*

30-1: ***Invited Paper:*** **Development of MicroLED Display by PixeLED Display Technology** (Page 429)
Ying-Tsang (Falcon) Liu, *PlayNitride, Inc.*
Kuan-Yung Liao, *PlayNitride, Inc.*
Yun-Li Li, *PlayNitride, Inc.*

30-3: ***Distinguished Paper:*** **Sub-Micron Full-Color LED Pixels for Micro-Displays and Micro-LED Main Displays** (Page 432)
Yong-Ho Ra, *McGill University*
Renjie Wang, *McGill University*
Matthew Stevenson, *NS Nanotech*
Seth Coe-Sullivan, *NS Nanotech*
Zetian Mi, *NS Nanotech & University of Michigan*

30-4: **MicroLED Display Technology Trends and Intellectual Property Landscape** (Page 436)
Eric H. Virey, *Yole Developpement*
Nicolas Baron, *Knowmade*
Zine Bouhamri, *Yole Developpement*

30-5: ***Late-News Paper:*** **Glass-based High brightness AMLED using Dual Gate Coplanar a-IGZO TFT** (Page 440)
Jin-Woo Choi, *Samsung Display*
Dae-Ho Song, *Samsung Display*
Hyung-Il Chun, *Samsung Display*
Min-Woo Kim, *Samsung Display*
ByungChoon Yang, *Samsung Display*
Jong-Ho Hong, *Samsung Display*
Hyo-Min Kim, *Kyung Hee University*
Jin Jang, *Kyung Hee University*
Sung-Chan Jo, *Samsung Display*

Session 31: Structure Engineering

Chair: Norbert Fruehauf, *University of Stuttgart*
Co-Chair: Kwon-Shik Park, *LG Display*

31-1: ***Invited Paper:*** **The Multimodal Thin-Film Transistor (MMT): A Versatile Low-Power and High-Gain Device with Inherent Linear Response** (Page 444)
Eva Bestelink, *University of Surrey*
Olivier de Sagazan, *University of Rennes*
Max Bateson, *University of Surrey*
Radu A. Sporea, *University of Surrey*

31-2: ***Invited Paper:*** **Nanostructures Oxide Thin-Film Transistors Fabricated by Near-Field Nanolithography with Enhanced Device Performance** (Page 448)
Kairong Huang, *Sun Yat-sen University*
Zihao Chen, *Sun Yat-sen University*
Sujuan Hu, *Sun Yat-sen University*
Lichao Gao, *Sun Yat-sen University*
Chuan Liu, *Sun Yat-sen University*

Session 32: Algorithms for Image Quality Improvement

Chair: Mainak Biswas, *Google*
Co-Chair: Moon-Sang Hwang, *Samsung Display Co., Ltd.*

32-1: **Weak Sub-color Sub-sampling for High Resolution Image Bandwidth Reduction** (Page 452)
JoonHee Lee, *LG Display*
DongWon Park, *LG Display*
Changgone Kim, *LG Display*

SooYoung Yoon, *LG Display*

32-2: **Improvement in Directional Cubic-Convolution Image Interpolation** (Page 455)
Xiaolei Liu, *Beijing BOE Optoelectronics Technology Corp.*
Jiankang Sun, *Beijing BOE Optoelectronics Technology Corp.*
Guixin Yan, *Beijing BOE Optoelectronics Technology Corp.*
Yaoyu Lu, *Beijing BOE Optoelectronics Technology Corp.*
Yachong Xue, *Beijing BOE Optoelectronics Technology Corp.*
Gang Li, *Beijing BOE Optoelectronics Technology Corp.*
Lili Chen, *Beijing BOE Optoelectronics Technology Corp.*
Hao Zhang, *Beijing BOE Optoelectronics Technology Corp.*

32-3: **AMOLED IR Drop Compensation for Channel Length Modulation** (Page 459)
Jun-Yu Yang, *Novatek Microelectronics Corp.*
Wei-Jhe Ma, *Novatek Microelectronics Corp.*
Yung-Cheng Tsai, *Novatek Microelectronics Corp.*
Feng-Ting Pai, *Novatek Microelectronics Corp.*

32-4: ***Late-News Paper:*** **OLED display Gamma LUT optimization based on Principal Component Analysis** (Page 463)
Hyunchul Kim, *Google LLC*
Sun-il Chang, *Google LLC*
Sang Young Yoon, *Google LLC*
Ken Foo, *Google LLC*
Taesung Kim, *Google LLC*

Session 33: 3D and Holographic

Chair: W. Hendrick, *Collins Aerospace*
Co-Chair: Zong Qin, *National Chiao Tung University*

33-1: ***Invited Paper:*** **Tabletop True 3D Display Systems Based on Projection Light Field and Integral Imaging** (Page 467)
Qiong-Hua Wang, *Beihang University*
Hai-Feng Li, *Zhejiang University*
Yun-Peng Xia, *Sichuan University*
Shuang Li, *Sichuan University*
Hui Ren, *Sichuan University*
Li-Xia Ni, *Zhejiang University*

33-2: **Improving Image Quality of 360-Degree Tabletop 3D Screen System** (Page 470)
Motohiro Makiguchi, *NTT Service Evolution Laboratories*
Hideaki Takada, *NTT Service Evolution Laboratories*
Tohru Kawakami, *Tohoku University*
Mutsumi Sasai, *Tohoku University*

33-3: **Viewing Angle Enhanced DMD Holographic Display with Reduced Speckle Noise** (Page 474)
Byounghyo Lee, *Seoul National University*
Dongheon Yoo, *Seoul National University*
Jinsoo Jeong, *Seoul National University*
Dukho Lee, *Seoul National University*
Byoungho Lee, *Seoul National University*

Session 34: Printed OLEDs II

Chair: CC Lee, *BOE Technology Group Co., Ltd.*
Co-Chair: JJ Lih, *CPT Technology Group*

34-1: ***Invited Paper:*** **Towards Efficient and Stable Printed Single-layer OLEDs** (Page 478)
Naresh B. Kotadiya, *Max Planck Institute for Polymer Research*
Paul W.M. Blom, *Max Planck Institute for Polymer Research*
Gert-Jan A.H. Wetzelaer, *Max Planck Institute for Polymer Research*

34-2: ***Distinguished Paper:*** **Development of 55inch 8K AMOLED TV by Inkjet Printing Process** (Page 481)

Zhongyuan Wu, *Hefei BOE Joint Technology Co., Ltd.*
Liangchen Yan, *Hefei BOE Joint Technology Co., Ltd.*
Yongqian Li, *Hefei BOE Joint Technology Co., Ltd.*
Huaiting Shih, *Hefei BOE Joint Technology Co., Ltd.*
Xuehuan Feng, *Hefei BOE Joint Technology Co., Ltd.*
Taejin Kim, *Hefei BOE Joint Technology Co., Ltd.*
Yuqing Peng, *Hefei BOE Joint Technology Co., Ltd.*
Jianwei Yu, *Hefei BOE Joint Technology Co., Ltd.*
Xue Dong, *Hefei BOE Joint Technology Co., Ltd.*

34-3: **OLED Display with High Resolution Fabricated by Electrohydrodynamic Printing** (Page 485)
Lan Mu, *South China University of Technology*
Congbiao Jiang, *South China University of Technology*
Juanhong Wang, *South China University of Technology*
Hua Zheng, *Dongguan University of Technology,*
Lei Ying, *South China University of Technology*
Miao Xu, *South China University of Technology*
Jian Wang, *South China University of Technology*
Junbiao Peng, *South China University of Technology*
Yong Cao, *South China University of Technology*

Session 35: Touch Sensing on Flexible Displays

Chair: Martin Grunthaner, *Apple*
Co-Chair: Shiming Shi, *BOE Technology Group Co., Ltd.*

35-1: **The Mechanism and Solution of Horizontal Line Defects by Mutual Interference of Flexible OLED and Touch Sensor** (Page 489)
Hyun Wook Cho, *Samsung Display Corporation*
Innam Lee, *Samsung Display Corporation*
Hyun Jae Lee, *Samsung Display Corporation*
Min Hong Kim, *Samsung Display Corporation*
Jae Hyun Park, *Samsung Display Corporation*
Ye Rin Oh, *Samsung Display Corporation*

35-2: **Influence of Low Ground Mass and Moisture Touch in On-Cell Touch with Foldable AMOLED** (Page 493)
Shih-Hsuan Huang, *AU Optronics Corp.*
Wei-Jen Su, *AU Optronics Corp.*
Chien-Ming Ko, *AU Optronics Corp.*
Heng-Chia Hsu, *AU Optronics Corp.*
Hong-Shen Lin, *AU Optronics Corp.*

35-3: **The Application of Metal Mesh Manhattan Patterns in Flexible Touch Panel** (Page 497)
Shuang Wang, *Shanghai Tianma Micro-Electronics Co., Ltd.*
Conghua Ma, *Shanghai Tianma Micro-Electronics Co., Ltd.*
Qijun Yao, *Shanghai Tianma Micro-Electronics Co., Ltd.*
Lihua Wang, *Shanghai Tianma Micro-Electronics Co., Ltd.*

35-4: **High Sensitive Pen Writing Solution Based on Mechanical Sensing** (Page 501)
Hee Seomoon, *Samsung Display Co., Ltd*
Wonki Hong, *Samsung DisplaySamsung Display Co., Ltd*
Jongin Baek, *Samsung Display Co., Ltd*
Wonsang Park, *Samsung Display Co., Ltd*
Bonghyun You, *Samsung Display Co., Ltd*

Session 36: Novel Process for Printed Displays

Chair: Toshiaki Arai, *JOLED Inc*
Co-Chair: Yong Taek Hong, *Seoul National University*

36-1: ***Invited Paper:*** **High-Resolution Induced-Electrohydrodynamic (iEHD) Jet Printing for Display** (Page 505)
Doyoung Byun, *Sungkyunkwan University & ENJET Corp.*

Giho Kang, *Sungkyunkwan University*
Zhang Bin, *Sungkyunkwan University*
Yonghee Jang, *ENJET Corp.*
Kwang Seon Jeon, *ENJET Corp.*
Baekhoone Seong, *ENJET Corp.*
Wonil Son, *ENJET Corp.*
Vu Dat Nguyen, *ENJET Corp.*

36-2: ***Invited Paper:*** **The Latest Breakthrough of Printing Technology for Next-Generation Premium TV** (Page 508)
Jueng Gil (James) Lee, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Lei Yu, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Jinyong Zhuang, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Zhe Li, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Yawen Chen, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Ting Dong, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Xianwen Sun, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Songjin Yao, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Xiangwei Xie, *TCL Corporate Research*
Dong Fu, *Guangdong Juhua Printed Display Technology Co., Ltd.*
Xiaolin Yan, *TCL Corporate Research*

36-3: **Novel and Simple Patterning process of Quantum Dots via Transfer Printing for Active Matrix QD-LED** (Page 512)
Sang Yun Bang, *University of Cambridge*
Xiangbing Fan, *University of Cambridge*
Sang Hyo Lee, *Unviersity of Cambridge*
Hyung Woo Choi, *University of Cambridge*
Dong Wook Shin, *University of Cambridge*
Sung Min Jung, *University of Cambridge*
Hanleem Lee, *University of Cambridge*
Jiajie Yang, *University of Cambridge*
Yo-han Suh, *University of Cambridge*
Luigi G. Occhipinti, *University of Cambridge*
Soo Deok Han, *Univeristy of Cambridge*
Jong Min Kim, *University of Cambridge*

36-4: **Solution-Processed Transparent Top Electrode for QD-LED** (Page 516)
Hywel T. Hopkin, *Sharp Laboratories of Europe, Ltd.*
Edward A. Boardman, *Sharp Laboratories of Europe, Ltd.*
Tim M. Smeeton, *Sharp Laboratories of Europe, Ltd.*

Session 37: MicroLEDs: Manufacturing and Characterization

Chair: Ioannis Kymissis, *Columbia University*
Co-Chair: Zhaojun Liu, *Southern University of Science and Technology*

37-1: **Yield Statistics for Fault-Tolerant Micro LED Displays** (Page 520)
Khaled Ahmed, *Intel Corp.*

37-3: **Power Consumption of OLED and µLED Displays** (Page 528)
En-Lin Hsiang, *University of Central Florida*
Ming-Yang Deng, *National Cheng Kung University*
Yuge Huang, *University of Central Florida*
Fangwang Gou, *University of Central Florida*
Ziqian He, *University of Central Florida*
Chih-Lung Lin, *Department of Electrical Engineering, National Cheng Kung University*
Shin-Tson Wu, *University of Central Florida*

37-4: **Micro LED Defect Analysis via Photoluminescent and Cathodoluminescent Imaging** (Page 532)
Keith Behrman, *Columbia University*
Julie Fouilloux, *Brunel University London*
Terry Ireland, *Brunel University London*
George R. Fern, *Brunel University London*

Jack Silver, *Brunel University London*
Ioannis Kymissis, *Columbia University*

Session 38: Circuit and New Application of TFTs

Chair: Takashi Nakamura, *Japan Display Inc.*
Co-Chair: Chen Xi, *BOE Technology Group Co., Ltd.*

38-1: ***Invited Paper:*** **High-Performance Metal-Oxide Semiconductor-Based Optoelectronics** (Page 536)
Jaehyun Kim, *Chung-Ang University*
Sung Min Kwon, *Chung-Ang University*
Jeong-Wan Jo, *Chung-Ang University*
Chanho Jo, *Chung-Ang University*
Jaekyun Kim, *Hanyang University & Chung-Ang University*
Yong-Hoon Kim, *Sungkyunkwan University*
Myung-Gil Kim, *Sungkyunkwan University*
Sung Kyu Park, *Chung-Ang University*

38-2: **Magnifying Viewer using Poly-Si Thin-Film Phototransistor and Liquid-Crystal Micro-Lens Array** (Page 540)
Mutsumi Kimura, *Ryukoku University*
Shuhei Kitajima, *Ryukoku University*
Kun Li, *University of Cambridge*
Daping Chu, *University of Cambridge*

38-3: **A Novel Gate Driver Circuit Employing IGZO TFTs for External Compensation** (Page 544)
Xuehuan Feng, *BOE Technology Group Co., Ltd.*
Yongqian Li, *BOE Technology Group Co., Ltd.*
Can Yuan, *BOE Technology Group Co., Ltd.*
Zhidong Yuan, *BOE Technology Group Co., Ltd.*
Pan Xu, *BOE Technology Group Co., Ltd.*
Dongxu Han, *BOE Technology Group Co., Ltd.*
Song Meng, *BOE Technology Group Co., Ltd.*
Xiaolong Wei, *BOE Technology Group Co., Ltd.*
Enming Xie, *BOE Technology Group Co., Ltd.*
Wenchao Bao, *BOE Technology Group Co., Ltd.*
Fengjuan Liu, *BOE Technology Group Co., Ltd.*
Zhongyuan Wu, *BOE Technology Group Co., Ltd.*
Jianwei Yu, *BOE Technology Group Co., Ltd.*
Xue Dong, *BOE Technology Group Co., Ltd.*

38-4: **A 2T1C AMOLED Display with External Compensation Reducing On-Panel Current Variations to 0.079%** (Page 547)
Lynn Verschueren, *imec & ESAT, KU Leuven*
Marc Ameys, *imec*
Mauricio Velazquez Lopez, *imec*
Steve Smout, *imec*
Tung Huei Ke, *imec*
Erwin Vandenplas, *imec*
Auke Jisk Kronemeijer, *TNO/Holst Centre*
Paul Heremans, *imec & ESAT, KU Leuven*
Jan Genoe, *imec & ESAT, KU Leuven*
Wim Dehaene, *ESAT, KU Leuven & imec*
Kris Myny, *imec*

Session 39: Advanced Pixel and Driving Circuits

Chair: Richard McCartney, *Pixel Scientific, Inc.*
Co-Chair: Carlin Vieri, *Google*

39-1: **8K Broadcast Monitor Display System** (Page 551)
Ran Duan, *BOE Technology Group Co., Ltd.*
Lihua Geng, *BOE Technology Group Co., Ltd.*

Xiao Zhang, *BOE Technology Group Co., Ltd.*
XiTong Ma, *BOE Technology Group Co., Ltd.*
Okamura, *BOE Technology Group Co., Ltd.*
Xian Wang, *BOE Technology Group Co., Ltd.*

39-2: ***Distinguished Paper:*** **A 14-Gb/s Dual-Mode Receiver with MIPI D-PHY and C-PHY Interfaces for Mobile Display Drivers** (Page 555)
Tae-Jin Kim, *Samsung Electronics*
Jong-Il Hwang, *Samsung Electronics*
Sangkyu Lee, *Samsung Electronics*
Sengsub Chun, *Samsung Electronics*
Seong-Young Ryu, *Samsung Electronics*
Soo-Joo Lee, *Samsung Electronics*
Hyunwoo Cho, *Samsung Electronics*
Wonho Tak, *Samsung Electronics*
Yong-Jae Kim, *Samsung Electronics*
Hoomin Lee, *Samsung Electronics*
Hansu Pae, *Samsung Electronics*
Hyun-Wook Lim, *Samsung Electronics*
Jae-Youl Lee, *Samsung Electronics*

39-3: ***Distinguished Student Paper:*** **In-Pixel Temperature Sensor for High-Luminance Active-Matrix Micro-LED Display using LTPO TFTs** (Page 559)
Yuanfeng Chen, *Kyung Hee University*
Suhui Lee, *Kyung Hee University*
Hyunho Kim, *Kyung Hee University*
Jiseob Lee, *Kyung Hee University*
Di Geng, *Chinese Academy of Sciences*
Jin Jang, *Kyung Hee University*

39-4: **A Method of Panel-Current Limitation for Automotive OLED Displays** (Page 563)
Hyun-Chang Kim, *Samsung Display Co.*
Sung-Chun Park, *Samsung Display Co.*
Eun-Ryeol Baek, *Samsung Display Co.*
Won-Jun Choe, *Samsung Display Co.*

Session 40: Novel Optics for HMDs

Chair: Susan Jones, *Nulumina Corp.*
Co-Chair: Gary Jones, *Nanoquantum Corporation*

40-1: ***Invited Paper:*** **Fast-Switching Liquid Crystal Devices for Near-Eye and Head-Up Displays** (Page 567)
Tao Zhan, *University of Central Florida*
Jianghao Xiong, *University of Central Florida*
Guanjun Tan, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

40-2: **Demonstration of a Novel Single-Layer Double-Pass Optical Architecture for a Pupil-Matched Occlusion-Capable Optical See-Through Head-Mounted Display** (Page 571)
Austin Wilson, *University of Arizona*
Hong Hua, *University of Arizona*

40-3: ***Invited Paper*** **A Large RGB-Achromatic Metalens for Virtual/Augmented-Reality Applications** (Page 575)
Zhaoyi Li, *Harvard University*
Peng Lin, *Boston University*
Yao-Wei Huang, *Harvard University & National University of Singapore*
Joon-Suh Park, *Harvard University*
Wei-Ting Chen, *Harvard University*
Zhujun Shi, *Harvard University*
Cheng-Wei Qiu, *National University of Singapore*
Federico Capasso, *Harvard University*

40-4: **Cost-Efficient Polymer Flat Lens for Chromatic Aberration Correction in Virtual Reality Displays**

(Page 579)
Tao Zhan, *University of Central Florida*
Junyu Zou, *University of Central Florida*
Jianghao Xiong, *University of Central Florida*
Xiaomin Liu, *University of Central Florida & Zhengzhou University*
Hao Chen, *University of Central Florida*
Sheng Liu, *GoerTek Electronics*
Yajie Dong, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

40-5: ***Distinguished Student Paper:*** **A Scanning Waveguide Display with 100° FoV** (Page 583)
Jianghao Xiong, *University of Central Florida*
Guanjun Tan, *University of Central Florida*
Kun Yin, *University of Central Florida*
Tao Zhan, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

Session 41: Printed OLEDs III

Chair: DZ Peng, *TIanma*
Co-Chair: Yifan Zhang, *Apple, Inc.*

41-1: ***Invited Paper:*** **Recent Technology of Printed OLED Displays and World's First Commercialization** (Page 587)
Kazuhiro Noda, *JOLED, Inc.*
Takahiro Komatsu, *JOLED, Inc.*
Toshihiro Fukuda, *JOLED, Inc.*
Masashi Goto, *JOLED, Inc.*

41-2: ***Invited Paper:*** **Recent Developments in Inkjet-printed OLEDs for High Resolution, Large Area Applications** (Page 591)
Jin-goo Kang, *Samsung Display Co., Ltd.*
Youngmo Koo, *Samsung Display Co., Ltd.*
Jaekook Ha, *Samsung Display Co., Ltd.*
Changhee Lee, *Samsung Display Co., Ltd.*

41-3: **17.3 Inch UHD Resolution AMOLED Panel Fabricated by Ink Jet Printing Process** (Page 595)
Peng-Yu Chen, *AU Optronics Corp.*
Chien-Chuan Chen, *AU Optronics Corp.*
Yu-Syuan Lin, *AU Optronics Corp.*
Chun-Han Li, *AU Optronics Corp.*
Hsieh-Tsung Hsieh, *AU Optronics Corp.*
Hsueh-Hsing Lu, *AU Optronics Corp.*
Sin-Shen Chiang, *AU Optronics Corp.*
Robin Cheng, *AU Optronics Corp.*
Nick C.C. Chen, *AU Optronics Corp.*
KR Jen, *AU Optronics Corp.*
Daniel C.M. Hsu, *AU Optronics Corp.*
Ming-Wei Sun, *AU Optronics Corp.*
Joanne Kuo, *AU Optronics Corp.*
Leo Tsai, *AU Optronics Corp.*

41-4: **Preparation of High Performance Top-Emission OLED for Large Size Display** (Page 599)
Chunjing Hu, *Hefei BOE Joint Technology Co., Ltd.*
Qing Dai, *Hefei BOE Joint Technology Co., Ltd.*
Juanjuan You, *Hefei BOE Joint Technology Co., Ltd.*
Ying Cui, *Hefei BOE Joint Technology Co., Ltd.*
Yue Zhang, *Hefei BOE Joint Technology Co., Ltd.*
Li Sun, *Hefei BOE Joint Technology Co., Ltd.*
Wenfeng Song, *Hefei BOE Joint Technology Co., Ltd.*
Chang-Yen Wu, *Hefei BOE Joint Technology Co., Ltd.*
Huai-Ting Shih, *Hefei BOE Joint Technology Co., Ltd.*
Zhongyuan Wu, *Hefei BOE Joint Technology Co., Ltd.*

Session 42: Fingerprint Sensing Displays

Chair: Patrick Worfolk, *Synaptics*
Co-Chair: Hong-Jye Hong, *AU Optronics*

42-1: **A Controller IC for On-display Touch and Multi-Fingerprint Sensor** (Page 603)
Min Gyu Kim, *Samsung Electronics*
Sunkwon Kim, *Samsung Electronics*
Youngkil Choi, *Samsung Electronics*
Kang Joo Kim, *Samsung Electronics*
Uijong Song, *Samsung Electronics*
Sewoong Ahn, *Samsung Electronics*
Yilho Lee, *Samsung Electronics*
Yunjeong Kim, *Samsung Electronics*
Moonsuk Jeong, *Samsung Electronics*
Jongsung Lee, *Samsung Electronics*
Hee Bum Lee, *Samsung Electronics*
Yongjin Park, *Samsung Electronics*
SuHyun Cheon, *Samsung Electronics*
Sungmok Lee, *Samsung Electronics*
Sungoh Choi, *Samsung Electronics*
Yoon-Kyung Choi, *Samsung Electronics*

42-2: **Establishment and Simulation Optimization of Optical Fingerprint Recognition Structure in LCD Screen** (Page 607)
Jianmou Huang, *XiaMen Tianma Microelectronics Co., Ltd.*
Hailiang Wang, *XiaMen Tianma Microelectronics Co., Ltd.*
Yan Lin, *XiaMen Tianma Microelectronics Co., Ltd.*
Wenqi Zhou, *XiaMen Tianma Microelectronics Co., Ltd.*
Yaqiong Long, *XiaMen Tianma Microelectronics Co., Ltd.*
Yan Yang, *XiaMen Tianma Microelectronics Co., Ltd.*
Ling Wu, *XiaMen Tianma Microelectronics Co., Ltd.*
Ting Zhou, *XiaMen Tianma Microelectronics Co., Ltd.*
Boping Shen, *XiaMen Tianma Microelectronics Co., Ltd.*
Junyi Li, *XiaMen Tianma Microelectronics Co., Ltd.*

42-3: ***Late-News Paper:*** **Full-Screen Capacitive Fingerprint and Touch Sensor** (Page 611)
Toshinori Uehara, *Japan Display, Inc.*
Makoto Hayashi, *Japan Display, Inc.*
Akihiko Fujisawa, *Japan Display, Inc.*
Shinya Iuchi, *Japan Display, Inc.*
Yuji Suzuki, *Japan Display, Inc.*
Fumihoru Nakano, *Japan Display, Inc.*
Takaaki Kono, *Japan Display, Inc.*
Takanori Tsunashima, *Japan Display, Inc.*
Akihiko Saito, *Japan Display, Inc.*
Teppei Yamada, *Japan Display, Inc.*
Naoshi Goto, *Japan Display, Inc.*

42-4: **LTPS TFT-LCD with In-Cell Optical Fingerprint Scanner** (Page 615)
Bozhi Liu, *XiaMen Tianma Microelectronics*
Binbin Chen, *XiaMen Tianma Microelectronics*
Xiaoxiao Wu, *XiaMen Tianma Microelectronics*
Xuanxian Cai, *XiaMen Tianma Microelectronics*
Xiaoqi Shi, *XiaMen Tianma Microelectronics*
Min Huang, *XiaMen Tianma Microelectronics*
Jiaqian Wu, *XiaMen Tianma Microelectronics*
Hailiang Wang, *XiaMen Tianma Microelectronics*
Xuexin Lan, *XiaMen Tianma Microelectronics*
Guozhao Chen, *XiaMen Tianma Microelectronics*
Junyi Li, *XiaMen Tianma Microelectronics*

42-5: **Spoof Detection Scheme for Optical Fingerprint Sensors under the Display** (Page 619)

Soon-Gyu Lee, *Samsung Display Corporation*
Jin-Woo Kim, *Samsung Display Corporation*
Kyo-Won Ku, *Samsung Display Corporation*
Hee-Chul Hwang, *Samsung Display Corporation*
Seung-Hyun Moon, *Samsung Display Corporation*
Won-Jun Choe, *Samsung Display Corporation*

Session 43: OLED Analysis and Mechanisms

Chair: Nicholas Thompson, *Universal Display Corporation*
Co-Chair: Hitoshi Kuma, *Idemitsu Kosan Co., Ltd.*

43-1: ***Invited Paper:*** **A Quantitative Microscopic Kinetic Model for Efficiency Roll-Off in OLEDs** (Page N/A)
Alexandra McIsaac, *MIT*
Valerie Vaissier-Welborn, *MIT*
Markus Einzinger, *MIT*
Nadav Geva, *MIT*
Hayley Weir, *MIT*
Marc Baldo, *MIT*
Troy Van Voorhis, *MIT*

43-2: **Application of Liquid Extraction Surface Analysis (LESA)- NanoESI-Orbitrap-MS to a Degradation Analysis of Organic EL Elements** (Page 626)
Hikaru Takano, *Toray Research Center, Inc.*
Tsuyoshi Akiyama, *Toray Research Center, Inc.*
Hirotaka Shioji, *Toray Research Center, Inc.*
Takahiro Shibamori, *Toray Research Center, Inc.*
Naoki Muraki, *Toray Research Center, Inc.*

43-3: **Ab-initio Simulation of Doped Injection Layers** (Page 630)
Franz Symalla, *Nanomatch GmbH*
Artem Fediai, *Karlsruhe Institute of Technology, Institute of Nanotechnology*
Jonas Armleder, *Karlsruhe Institute of Technology, Institute of Nanotechnology*
Simon Kaiser, *Karlsruhe Institute of Technology, Institute of Nanotechnology*
Timo Strunk, *Nanomatch GmbH*
Tobias Neumann, *Nanomatch GmbH*
Wolfgang Wenzel, *Karlsruhe Institute of Technology, Institute of Nanotechnology*

43-4: **Combining Steady-State, Frequency, and Time Domain Data for a Comprehensive Analysis of Multilayer TADF OLEDs** (Page 634)
Sandra Jenatsch, *Fluxim AG*
Simon Züfle, *Fluxim AG & ZHAW Zurich University of Applied Sciences*
Balthasar Blülle, *Fluxim AG*
Beat Ruhstaller, *Fluxim AG & ZHAW Zurich University of Applied Sciences*

Session 44: Highly Integrated Semiconductor Information Displays

Chair: Qun Yan, *Fuzhou University*
Co-Chair: Kevin Gahagan, *Corning Incorporated*

44-1: ***Invited Paper:*** **Micro-LEDs for Technological Convergence between Displays, Optical Communications, and Sensing and Imaging Systems** (Page 638)
Martin D. Dawson, *University of Strathclyde*
Johannes Herrnsdorf, *University of Strathclyde*
Enyuan Xie, *University of Strathclyde*
Erdan Gu, *University of Strathclyde*
Jonathan J.D. McKendry, *University of Strathclyde*
Alexander D. Griffiths, *University of Strathclyde*
Michael J. Strain, *University of Strathclyde*

44-2: ***Invited Paper:*** **More than MicroLED: Mass Transfer of Pixel Engines for Emissive Displays** (Page 642)
Nikhil Jain, *X Display Company (XDC) Inc.*

Christopher A. Bower, *X Display Company (XDC) Inc.*
Matthew A. Meitl, *X Display Company (XDC) Inc.*
Salvatore Bonafede, *X Display Company (XDC) Inc.*
Erich Radauscher, *X Display Company (XDC) Inc.*
Andrew Pearson, *X Display Company (XDC) Inc.*
Brook Raymond, *X Display Company (XDC) Inc.*
Erik Vick, *X Display Company (XDC) Inc.*
Chris Verreen, *X Display Company (XDC) Inc.*
Carl Prevatte, *X Display Company (XDC) Inc.*
Tiffany Weeks, *X Display Company (XDC) Inc.*
Brad Krongard, *X Display Company (XDC) Inc.*
Robert Rotzoll, *X Display Company (XDC) Inc.*
John A. Rogers, *Northwestern University*

44-3: ***Invited Paper:*** **Integration of Additional Functionalities into the Frontplane of AMOLED Displays** (Page 646)
Pawel E. Malinowski, *imec*
Tung-Huei Ke, *imec*
Hylke Akkerman, *TNO/Holst Centre*
Albert van Breemen, *TNO/Holst Centre*
David Cheyns, *imec*
Erwin Vandenplas, *imec*
Luis Moreno Hagelsieb, *imec*
Santhosh Shanmugam, *TNO/Holst Centre*
Auke Jisk Kronemeijer, *TNO/Holst Centre*
Paul Heremans, *imec*

44-4: **A Brief Survey of MicroLED Technologies** (Page 650)
Ioannis Kymissis, *Columbia University & Lumiode*
Keith Behrman, *Columbia University*

SOCIETY FOR INFORMATION DISPLAY

Table of Contents/Book 2 (Sessions 45-86)

Session 45: Conformable LCDs

Chair: Takahiro Ishinabe, *Tohoku University*
Co-Chair: Linghui Rao, *Microsoft*

Ruizhi Yang, *BOE Technology Group Co., Ltd.*
Yang You, *BOE Technology Group Co., Ltd.*
Jun Wu, *BOE Technology Group Co., Ltd.*
Shiqing Ma, *BOE Technology Group Co., Ltd.*
Guang Yan, *BOE Technology Group Co., Ltd.*
Guangdong Shi, *BOE Technology Group Co., Ltd.*
Lianjie Qu, *BOE Technology Group Co., Ltd.*
Xiaoling Xu, *BOE Technology Group Co., Ltd.*
Hebin Zhao, *BOE Technology Group Co., Ltd.*
Yun Qiu, *BOE Technology Group Co., Ltd.*
Dan Wang, *BOE Technology Group Co., Ltd.*

45-4: ***Late-News Paper:*** **A Novel ADS Display Technology without Light Leakage** (Page 665)
Feifei Wang, *BOE Technology Group Co., Ltd.*
Hongming Zhan, *BOE Technology Group Co., Ltd.*
Xibin Shao, *BOE Technology Group Co., Ltd.*
Zhao Kang, *BOE Technology Group Co., Ltd.*
Hua Huang, *BOE Technology Group Co., Ltd.*
Lintao Ji, *BOE Technology Group Co., Ltd.*
Kaixuan Wang, *BOE Technology Group Co., Ltd.*
Xi Chen, *BOE Technology Group Co., Ltd.*
Zhangtao Wang, *BOE Technology Group Co., Ltd.*
Hailin Xue, *BOE Technology Group Co., Ltd.*
Guangcai Yuan, *BOE Technology Group Co., Ltd.*
Lifeng Lin, *BOE Technology Group Co., Ltd.*

Session 46: Variable Refresh Rate

Chair: Taesung Kim, *Google LLC*
Co-Chair: Bong-Hyun You, *Samsung Display Co.*

46-1: ***Invited Paper:*** **Variable Refresh Rate Displays** (Page 669)
Gerrit Ary Slavenburg, *NVIDIA*
Marcel Janssens, *UpLift, Inc.*
Luis Lucas, *NVIDIA*
Robert-Jan Schutten, *NVIDIA*
Tom Verbeure, *NVIDIA*

46-2: **A Novel Hybrid Frame Rate Driving Method for Low frequency OLED Displays** (Page 673)
Nana Xiong, *Tianma Micro-Electronics Co., Ltd.*
Tianyi Wu, *Tianma Micro-Electronics Co., Ltd.*
Jujian Fu, *Tianma Micro-Electronics Co., Ltd.*
Xingda Xia, *Tianma Micro-Electronics Co., Ltd.*
Yuqi Hu, *Tianma Micro-Electronics Co., Ltd.*
Mengmeng Xie, *Tianma Micro-Electronics Co., Ltd.*

46-3: ***Invited Paper:*** **Image Adaptive Refresh Rate technology for Ultra Low Power Consumption** (Page 676)
Bonghyun You, *Samsung Display Co., Ltd*
Hui Nam, *Samsung Display Co., Ltd*
Hyojin Lee, *Samsung Display Co., Ltd*

46-4: **Novel OLED Low Frame Frequency Driving Method with Minimized Flicker** (Page 680)
Jieliang Li, *XiaMen Tianma Microelectronics*
Yong Yuan, *XiaMen Tianma Microelectronics*
Yuan Ding, *XiaMen Tianma Microelectronics*
wanming Huang, *XiaMen Tianma Microelectronics*
Zhoulin Ke, *XiaMen Tianma Microelectronics*
Yuheng Zhang, *XiaMen Tianma Microelectronics*
Shui He, *XiaMen Tianma Microelectronics*
Qingjun Lai, *XiaMen Tianma Microelectronics*
Yuping Xu, *XiaMen Tianma Microelectronics*

Session 47: Micro-Projection Technology

Chair: Satoshi Ouchi, *Hitachi, Ltd*
Co-Chair: Fujio Okumura, *NEC Corporation*

47-1: **The World Smallest OLED Microdisplay Projection Device Design Methodology** (Page 683)
Kazuichiro Itonaga, *Sony Corp.*
Shoji Sudo, *Sony Corp.*
Jun Nishikawa, *Sony Corp.*
Kei Kimura, *Sony Corp.*
Hiroki Uchiyama, *Sony Corp.*
Masato Yagi, *Sony Corp.*
Ryosuke Sawano, *Sony Corp.*
Takatoshi Matsuyama, *Sony Corp.*
Kouji Sasaki, *Sony Corp.*
Kentaro Itatsu, *Sony Corp.*
Takahiro Tsuchiya, *Sony Corp.*
Yoshiyuki Nomura, *Sony Corp.*
Yoshihisa Sato, *Sony Corp.*

47-2: **Solid State Projection Display Based on Angular Color Projection and MicroLED** (Page 687)
Yong-Jing Wang, *Photonic Crystal Co., Ltd.*
John Miller, *Photonic Crystal Co., Ltd.*

47-3: ***Invited Paper:*** **High Brightness and RGB Integration of Eu-doped GaN-based Red LEDs for Ultrahigh-resolution Micro-LED Display** (Page 691)
Yasufumi Fujiwara, *Osaka University*
Shuhei Ichikawa, *Osaka University*
Dolf Timmerman, *Osaka University*
Jun Tatebayashi, *Osaka University*

47-4: **Fiber-Scanning Technology with Rectangular Display Area for Projection Unit** (Page 695)
Shinsuke Onoe, *Hitachi, Ltd.*
Takahiro Matsuda, *Hitachi, Ltd.*
Yoshiho Seo, *Hitachi, Ltd.*
Satoshi Ouchi, *Hitachi, Ltd.*

Session 48: OLED Devices I

Chair: Yasunori Kijima, *Huawei Technologies Japan K.K.*
Co-Chair: Denis Kondakov, *DuPont*

48-1: ***Invited Paper:*** **Next Generation Highly Efficient and Stable Phosphorescent Emitting Materials For OLEDs** (Page 699)
Byoung Ki Choi, *Samsung Electronics*
Yong Suk Cho, *Samsung Electronics*
Jong Won Choi, *Samsung Electronics*
Seung Yeon Kwak, *Samsung Electronics*
Sukekazu Aratani, *Samsung Electronics*
Myung Sun Sim, *Samsung Electronics*
Hyun Koo, *Samsung Electronics*
Dmitry Kravchuk, *Samsung Electronics*
Kyu Hyun Im, *Samsung Electronics*
Ji Youn Lee, *Samsung Electronics*
So Yeon Kim, *Samsung Electronics*
Bang Lin Lee, *Samsung Electronics*
Yoon Hyun Kwak, *Samsung Electronics*
Sung Hun Lee, *Samsung Electronics*
Sung Han Kim, *Samsung Electronics*

48-2: **Design Strategies of Fluorescent Dopants toward Pure Blue for Highly Efficient Top Emission OLEDs** (Page 703)
Ryota Takahashi, *Idemitsu Kosan Co., Ltd.*
Hirokatsu Ito, *Idemitsu Kosan Co., Ltd.*

Session 49: E-Paper

Chair: Makoto Omodani, *Tokai University*
Co-Chair: Keisuke Hashimoto, *E Ink Holdings*

Session 50: Display Measurement Standards I

Chair: Stephen Atwood, *Consultant*
Co-Chair: Thomas Fiske, *Microsoft*

Session 51: Quantum Dot Electroluminescence I

Chair: Michele Ricks, *EMD Performance Materials*
Co-Chair: Jean-Jacques Drolet, *Osram Opto Semiconductors*

Session 52: Fast Switching LCDs

Chair: Akihiro Mochizuki, *I-CORE Technology, LLC*
Co-Chair: Jian Gang Lu, *Shanghai Jiao Tong University*

Yannanqi Li, *University of Central Florida*
Yuge Huang, *University of Central Florida*
Haruki Ooishi, *DIC Corp.*
Kifumi Yoshidaya, *DIC Corp.*
Shin-Tson Wu, *University of Central Florida*

52-3: **Fast-response Cloud-point Ferroelectric Liquid Crystal Dammann Grating for LiDAR Applications Based on Double-cell setup** (Page 769)
Zheng-Nan Yuan, *The Hong Kong University of Science and Technology*
Zhibo Sun, *The Hong Kong University of Science and Technology*
Hoi-Sing Kwok, *The Hong Kong University of Science and Technology*
Abhishek Kumar Srivastava, *The Hong Kong University of Science and Technology*

52-4: ***Late-News Paper:*** **Development of 240-Hz Refresh Rate ADS-Mode Gaming Product** (Page 773)
Dongchuan Chen, *BOE Technology Group Co., Ltd.*
Bingyang Liu, *BOE Technology Group Co., Ltd.*
Kaixuan Wang, *BOE Technology Group Co., Ltd.*
Hongming Zhan, *BOE Technology Group Co., Ltd.*
Xi Chen, *BOE Technology Group Co., Ltd.*
Xiawei Yun, *BOE Technology Group Co., Ltd.*
Weifan Yang, *BOE Technology Group Co., Ltd.*
Lei Liu, *BOE Technology Group Co., Ltd.*
Zhangtao Wang, *BOE Technology Group Co., Ltd.*
Hailin Xue, *BOE Technology Group Co., Ltd.*
Xibin Shao, *BOE Technology Group Co., Ltd.*

Session 53: Emerging Processes and Materials

Chair: Abhishek Srivastava, *Hong Kong University of Science & Technology*
Co-Chair: Ian Underwood, *University of Edinburgh*

53-2: **Composite Films with Ultra-Thin Glass and Polymer for Novel Optically Functional Films** (Page 777)
Takeshi Murashige, *Nitto Denko Corporation*
Junichi Inagaki, *Nitto Denko Corporation*
Keisuke Sato, *Nitto Denko Corporation*
Atsushi Kishi, *Nitto Denko Corp.*
Minoru Miyatake, *Nitto Denko Corp.*
Hiroki Mori, *Nippon Electric Glass Co., Ltd.*
Yoshinori Hasegawa, *Nippon Electric Glass Co., Ltd.*

53-3: **CdSe/CdS Nanorod-Enhancement Film for Blue-Laser-Based Visible-Light Communication Systems** (Page 781)
Chun-Hin Cheng, *The Hong Kong University of Science and Technology*
Jian Kang, *HKUST Shenzhen Research Institute & The Hong Kong University of Science and Technology*
Swadesh K. Gupta, *The Hong Kong University of Science and Technology*
C. Patrick Yue, *HKUST Shenzhen Research Institute & The Hong Kong University of Science and Technology*
H. S. Kwok, *The Hong Kong University of Science and Technology*
Abhishek Kumar Srivastava, *The Hong Kong University of Science and Technology*

53-4: **Dielectric Metasurfaces: Design for Manufacturability** (Page 785)
Khaled Ahmed, *Intel Corp.*

53-5: ***Late-News Paper:*** **a-IGZO TFT Based Active Matrix Pressure Sensor by Integrating ZnO Nanowires as Sensing Unit** (Page 789)
Xuewen Shi, *Chinese Academy of Sciences*
Congyan Lu, *Chinese Academy of Sciences*
Li Zhang, *Chinese Academy of Sciences*
Di Geng, *Chinese Academy of Sciences*
Ling Li, *Chinese Academy of Sciences*
Caofeng Pan, *Chinese Academy of Sciences*

Session 54: AR/VR Technologies

Chair: Sergei Yakovenko, *Apple*
Co-Chair: Grace Lee, *Google*

54-1: **Improved Polarizing Film for PBS Applications in HMDs** (Page 792)
David J. W. Aastuen, *3M Display Materials & Systems Division*
Zhisheng Yun, *3M Display Materials & Systems Division*
John D. Le, *3M Display Materials & Systems Division*

54-2: ***Distinguished Student Paper:*** **Increasing the Pixel Density for VR Displays with a Polarization Grating** (Page 796)
Junyu Zou, *University of Central Florida*
Tao Zhan, *University of Central Florida*
Jianghao Xiong, *University of Central Florida*
Shin-Tson Wu, *University of Central Florida*

54-3: **Digitally Switchable Micro lens Array for Integral Imaging** (Page 800)
Xuan Wang, *University of Arizona*
Hong Hua, *University of Arizona*

54-4: **Prediction of Saccadic Eye Movement for Foveated Rendering** (Page 803)
Anna Kruchinina, *Lomonosov Moscow State University*
Viktor Chertopolohov, *Lomonosov Moscow State University*
Grigory Grigoryan, *Lomonosov Moscow State University & Total Vision ltd.*
Victor Belyaev, *Moscow Region State University & RUDN University*

54-5: **Measuring Direct Retinal Projection Displays** (Page 807)
John Penczek, *NIST and University of Colorado*
Richard L. Austin, *Gamma Scientific*
Sonika Obheroi, *Gamma Scientific*
Monirul Hasan, *Gamma Scientific*
Gavin J. Cook, *Gamma Scientific*
Paul A. Boynton, *NIST*

Session 55: OLED Devices II

Chair: Sven Zimmermann, *Novaled GmbH*
Co-Chair: Qi Wang, *eMagin Corporation*

55-1: ***Invited Paper:*** **Self-Assembled Cathode Patterning in AMOLED for Under-Display Camera** (Page 811)
Zhibin Wang, *OTI Lumionics, Inc.*
Yilu Chang, *OTI Lumionics, Inc.*
Qi Wang, *OTI Lumionics, Inc.*
Yingjie Zhang, *OTI Lumionics, Inc.*
Jacky Qiu, *OTI Lumionics, Inc.*
Michael Helander, *OTI Lumionics, Inc.*

55-2: **Methods for Overcoming the Trade-off between Efficiency and Lifetime of Organic Light-Emitting Diodes: OLED Lifetime Simulation** (Page 815)
Junyoung Lee, *Samsung Display Corp.*
Mira Han, *Samsung Display Corp.*
Woojin Song, *Samsung Display Corp.*
Kyungbok Choi, *Samsung Display Corp.*
Hyunguk Cho, *Samsung Display Corp.*
Yongjo Kim, *Samsung Display Corp.*

55-3: **Efficient, Low-Haze Light Extraction for OLED Displays Using Micro-Optic Patterns Imprinted on Glass** (Page 818)
Dmitri V. Kuksenkov, *Corning Research & Development Corp.*
Casey Kang, *Corning Research & Development Corp.*
Christopher M. Lynn, *Corning Research & Development Corp.*
Nikolay T. Timofeev, *Corning Scientific Center*
Alejandro Aguilar, *Corning, Inc.*

Felipe M. Joos, *Corning, Inc.*
Tomohiro Ishikawa, *Corning Research & Development Corp.*
Michal Mlejnek, *Corning Research & Development Corp.*

55-4: **Novel Methodology for Reproducibility of OLED Lifetimes and Identification of Killer Impurities** (Page 822)
Hiroshi Fujimoto, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) & Kyushu University*
Toshimitsu Nakamura, *ULVAC, Inc.*
Kaori Nagayoshi, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera)*
Kentaro Harada, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) & Kyushu University*
Hiroshi Miyazaki, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) & Kyushu University*
Takaomi Kurata, *ULVAC, Inc.*
Junya Kiyota, *ULVAC, Inc.*
Chihaya Adachi, *Fukuoka i3 -Center for Organic Photonics and Electronics Research (i3 -opera) & Kyushu University*

Session 56: Foldable Displays I

Chair: Kyung Cheol Choi, *KAIST*
Co-Chair: Cheng-Chung Lee, *ITRI*

56-1: ***Invited Paper:*** **Research on a Commercial Foldable AMOLED and Relevant Technologies** (Page 826)
Shiming Shi, *BOE Technology Group Co., Ltd.*
Zhao Li, *BOE Technology Group Co., Ltd.*
Paoming Tsai, *BOE Technology Group Co., Ltd.*
Liming Dong, *BOE Technology Group Co., Ltd.*
Dawei Wang, *BOE Technology Group Co., Ltd.*
Yongxiang Shi, *BOE Technology Group Co., Ltd.*
Shuang Du, *BOE Technology Group Co., Ltd.*
Peng Cai, *BOE Technology Group Co., Ltd.*
Meiling Gao, *BOE Technology Group Co., Ltd.*
Meizhu Zheng, *BOE Technology Group Co., Ltd.*
Haoran Wang, *BOE Technology Group Co., Ltd.*

56-2: **Thin Foldable AMOLED Module with Excellent Low-Temperature-Bendability and Pencil Hardness** (Page 830)
Takehiro Murao, *Sharp Corp.*
Ryo Kikuchi, *Sharp Corp.*
Kenichiro Tsuchida, *Sharp Corp.*
Yasuyuki Togashi, *Sharp Corp.*
Akira Sakai, *Sharp Corp.*
Masahiro Hasegawa, *Sharp Corp.*
Miho Yamada, *Sharp Corp.*
Noriko Watanabe, *Sharp Corp.*
Yuki Yasuda, *Sharp Corp.*
Tim M. Smeeton, *Sharp Laboratories of Europe, Ltd.*
Edward A. Boardman, *Sharp Laboratories of Europe, Ltd.*

56-3: **Quantitative Evaluation of Neutral-plane Splitting in Foldable Displays Using Folding Stiffness Measurements and Finite Element Method Simulations** (Page 834)
Masumi Nishimura, *Japan Display, Inc.*
Masatomo Hishinuma, *Japan Display, Inc.*
Hajime Yamaguchi, *Japan Display, Inc.*
Akio Murayama, *Japan Display, Inc.*

56-4: **Suppression of Angular Color Shift for Foldable OLEDs by Integrating an Advanced Circular Polarizer** (Page 838)
Wei-Feng Xu, *BenQ Materials Corp.*
Fung-Hsu Wu, *BenQ Materials Corp.*
Wei-Sheng Cheng, *BenQ Materials Corp.*

Chun-Nan Shen, *BenQ Materials Corp.*
Cyun-Tai Hong, *BenQ Materials Corp.*
Chen-Kuan Kuo, *BenQ Materials Corp.*

Session 57: Display Measurement Standards II

Chair: Udo Krueger, *TechnoTeam*
Co-Chair: Frank Rochow, *Adviser*

57-1: **Spatiotemporal Noise Targets Inspired by Natural Imagery Statistics** (Page 842)
Timo Kunkel, *Dolby Labs, Inc.*
Scott Daly, *Dolby Labs, Inc.*

57-2: **A New Approach to Motion Frequency Metrics Quantifies Motion-induced Blur** (Page 846)
Dale Stolitzka, *Samsung Display America Lab*
Jong-Ho Chong, *Samsung Display Company, Ltd.*
Wei Xiong, *Samsung Display America Lab*
ChangHee Lee, *Samsung Display Company, Ltd.*
Jinoh Kwag, *Samsung Display Company, Ltd.*

57-3: **Characterizing Image Retention for HDR OLED Displays** (Page 850)
Kevin Kam, *Columbia University*
Tiantong Yu, *Columbia University*
Keith Behrman, *Columbia University*
Caroline Yu, *Columbia University*
Ioannis Kymissis, *Columbia University*

57-4: **Simulation of Line-Based MTF Measurements for Pixelated Displays** (Page 854)
Kenichiro Masaoka, *NHK Science & Technology Research Laboratories*

Session 58: Quantum Dot Electroluminescence II

Chair: Chang Hee Lee, *Samsung Display Corporation*
Co-Chair: Xiao Wei Sun, *Southern University of Science and Technology*

58-1: ***Invited Paper:*** **Progress in High-Efficiency Heavy-Metal-Free QD-LED Development** (Page 858)
Christian Ippen, *Nanosys, Inc.*
Benjamin Newmeyer, *Nanosys, Inc.*
Don Zehnder, *Nanosys, Inc.*
Daekyoung Kim, *Nanosys, Inc.*
Diego Barrera, *Nanosys, Inc.*
Charlie Hotz, *Nanosys, Inc.*
Ruiqing Ma, *Nanosys, Inc.*

58-2: ***Distinguished Paper:*** **Active Matrix QD-LED with Top Emission Structure by UV Lithography for RGB Patterning** (Page 862)
Yohei Nakanishi, *Sharp Corporation*
Tomohiro Takeshita, *Sharp Corporation*
Yang Qu, *Sharp Corporation*
Hiroki Imabayashi, *Sharp Corporation*
Shota Okamoto, *Sharp Corporation*
Hisayuki Utsumi, *Sharp Corporation*
Masayuki Kanehiro, *Sharp Corporation*
Enrico Angioni, *Sharp Laboratories of Europe, Ltd.*
Edward A. Boardman, *Sharp Laboratories of Europe, Ltd.*
Iain Hamilton, *Sharp Laboratories of Europe, Ltd.*
Andrea Zampetti, *Sharp Laboratories of Europe, Ltd.*
Valerie Berryman-Bousquet, *Sharp Laboratories of Europe, Ltd.*
Tim M. Smeeton, *Sharp Laboratories of Europe, Ltd.*
Takeshi Ishida, *Sharp Corporation*

58-3: ***Distinguished Paper:*** **High-Efficient Quantum-Dot Light-Emitting Diodes with Blue Cadmium-free Quantum Dots** (Page 866)

Tatsuya Ryowa, *Sharp Corp.*
Takeshi Ishida, *Sharp Corp.*
Yusuke Sakakibara, *Sharp Corp.*
Keisuke Kitano, *Sharp Corp.*
Masaya Ueda, *Sharp Corp.*
Makoto Izumi, *Sharp Corp.*
Yuko Ogura, *NS Materials, Inc.*
Masanori Tanaka, *NS Materials, Inc.*
Soichiro Nikata, *NS Materials, Inc.*
Mayuko Watanabe, *NS Materials, Inc.*
Mikihiro Takasaki, *NS Materials, Inc.*
Tetsuji Itoh, *NS Materials, Inc.*
Akiharu Miyanaga, *NS Materials, Inc.*

58-4: **Efficient Cadmium-Free Quantum-Dot Light-Emitting Diodes** (Page 870)
Hin-Wai Mo, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera)*
Kentaro Harada, *Center for Organic Photonics and Electronics Research (OPERA), Kyushu University*
Hiroshi Miyazaki, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera)*
Chihaya Adachi, *Kyushu University*

Session 59: Privacy and Sunviewable Displays

Chair: Xiao-Yang Huang, *Ebulent Technologies Corp*
Co-Chair: Gang Xu, *Huawei*

59-1: **FFS-Based Privacy LCD with High Contrast and Transmittance** (Page 874)
Koji Murata, *Sharp Corp.*
Hidefumi Yoshida, *Sharp Corp.*
Kazutaka Hanaoka, *Sharp Corp.*
Shinji Shimada, *Sharp Corp.*

59-2: **Brightness Improvement of Reflective LCD** (Page 878)
Xinli Ma, *BOE Technology Group Co., Ltd.*
Wei Zhao, *BOE Technology Group Co., Ltd.*
Xuan Zhong, *BOE Technology Group Co., Ltd.*
Tianyu Xu, *BOE Technology Group Co., Ltd.*
Dongchuan Chen, *BOE Technology Group Co., Ltd.*
Kaixuan Wang, *BOE Technology Group Co., Ltd.*
Hongming Zhan, *BOE Technology Group Co., Ltd.*
Xi Chen, *BOE Technology Group Co., Ltd.*
Hailin Xue, *BOE Technology Group Co., Ltd.*
Xibin Shao, *BOE Technology Group Co., Ltd.*

59-3: **A Novel Transflective 31.5-in. IGZO-TFT LCD with a Twisted-VA Mode** (Page 882)
Takahiro Sasaki, *Sharp Corp.*
Hiroyuki Hakoi, *Sharp Corp.*
Junichi Hashimoto, *Sharp Corp.*
Ming Ni, *Sharp Corp.*
Masashi Otsubo, *Sharp Corp.*
Takashi Sato, *Sharp Corp.*
Shinji Shimada, *Sharp Corp.*
Kiyoshi Minoura, *Sharp Corp.*

59-4: ***Late-News Paper:*** **High-Transmittance and High-Charging-Rate 8K 120-Hz ADS LCD TV** (Page 885)
He He Hu, *BOE Technology Group Co., Ltd.*
Guangcai Yuan, *BOE Technology Group Co., Ltd.*
Zhaoyun Gu, *BOE Technology Group Co., Ltd.*
Jianhua Huang, *Beijing BOE Display Technology Co., Ltd.*
Ce Ning, *BOE Technology Group Co., Ltd.*
Baoqiang Wang, *Fuzhou BOE Display Technology Co., Ltd.*
Yun Qiu, *BOE Technology Group Co., Ltd.*
Xiaocheng Ma, *BOE Technology Group Co., Ltd.*
Liwei Liu, *BOE Technology Group Co., Ltd.*

Rui Liu, *BOE Technology Group Co., Ltd.*
Zhengliang Li, *BOE Technology Group Co., Ltd.*
Guangdong Shi, *BOE Technology Group Co., Ltd.*
Lizhong Wang, *BOE Technology Group Co., Ltd.*
Nianqi Yao, *BOE Technology Group Co., Ltd.*
Shuilang Dong, *BOE Technology Group Co., Ltd.*
Dapeng Xue, *BOE Technology Group Co., Ltd.*

Session 60: Machine Learning for Display Algorithms and Electronics

Chair: Chaohao Wang, *Apple Inc.*
Co-Chair: Hyoungsik Nam, *Kyung Hee University*

60-1: **Novel Image-Sticking Prevention Method Using Deep Learning** (Page 889)
Youngwook Yoo, *Samsung Display Co., Ltd.*
Jungyu Lee, *Samsung Display Co., Ltd.*
Byungki Chun, *Samsung Display Co., Ltd.*
Kukhwan Ahn, *Samsung Display Co., Ltd.*
Yongseok Choi, *Samsung Display Co., Ltd.*
Junhee Moon, *Samsung Display Co., Ltd.*
Bonghyun You, *Samsung Display Co., Ltd.*

60-2: **Self-supervised Perceptual Motion Deblurring using a Conditional Generative Neural Network Guided by Optical Flow** (Page 893)
Jaihyun Koh, *Samsung Display Corp. & Seoul National University*
Sungroh Yoon, *Seoul National University*

60-3: ***Invited Paper:*** **Machine-Learning Approaches to Active Stylus for Capacitive Touchscreen Panel Applications** (Page 897)
Hyoungsik Nam, *Kyung Hee University*
Ki-Hyuk Seol, *Kyung Hee University*
Seungjun Park, *Kyung Hee University*

60-4: **Implementation and Optimization of FSRCNN-s Algorithm Based on SDSoC Platform** (Page 901)
Yanan Ji, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dalton Lai, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yufeng Jin, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yin-Hung Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Ming-Jong Jou, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Session 61: High-Resolution OLED Display Manufacturing

Chair: Robert Visser, *Applied Materials*
Co-Chair: Joerg Winkler, *Plansee SE*

61-1: **FMM Pixel Patterning for Various OLED Displays** (Page 905)
Chiwoo Kim, *APS Holdings Corporation*
Kisoo Kim, *APS Holdings Corporation*
Ohseob Kwon, *APS Holdings Corporation*
Jaehoon Jung, *APS Holdings Corporation*
Jong Kab Park, *APS Holdings Corporation*
Doh Hoon Kim, *APS Holdings Corporation*
Kiro Jung, *APS Holdings Corporation*

61-2: **2-inch, 2,000-ppi Silicon Nitride Mask for Patterning Ultra-High-Resolution OLED Displays** (Page 909)
Yibin Jiang, *Hong Kong University of Science and Technology*
Bryan Siu Ting Tam, *Hong Kong University of Science and Technology*
Shou-Cheng Dong, *Hong Kong University of Science and Technology*
Ching W. Tang, *Hong Kong University of Science and Technology*

61-3: **OLED Display with High Resolution Fabricated by Electrohydrodynamic PrintingVertically**

Session 62: OLED Devices III

Chair: Chang-Wook Han, *LG Display Co., Ltd*
Co-Chair: Jang Hyuk Kwon, *Kyung Hee University*

Session 63: Foldable Displays II

Chair: Kyung Cheol Choi, *KAIST*
Co-Chair: Meng-Ting Lee, *Huawei Technology*

Shiming Shi, *BOE Technology Group Co., Ltd.*
Lu Liu, *BOE Technology Group Co., Ltd.*
Lijuan Zhao, *BOE Technology Group Co., Ltd.*

63-2: **Continuous Observation of Neutral-Plane Splitting throughout the Folding Process of Foldable Displays Using Optical Microscopy and Digital Image Correlation Method** (Page 941)
Masatomo Hishinuma, *Japan Display Inc.*
Masumi Nishimura, *Japan Display Inc.*
Hajime Yamaguchi, *Japan Display Inc.*
Akio Murayama, *Japan Display Inc.*

63-3: **Translating 2-Point Bend with Step-Stress Methodology** (Page 945)
Kurt E. Gerber, *Corning, Inc.*
Douglas M. Noni, *Corning, Inc.*
Jamie T. Westbrook, *Corning, Inc.*

Session 64: Flexible Technologies II: Measurement

Chair: Makoto Omodani, *Tokai University*
Co-Chair: Stephen Atwood, *Consultant*

64-1: **Separating Specular Reflection from Diffuse Haze for e-Paper Using the Extended Variable-Aperture Source Method** (Page 949)
Dirk Hertel, *E Ink Corp.*
Edward F. Kelley, *KELTEK, LLC*
John Penczek, *University of Colorado*

64-2: **Metrology of Non-Planar Light Sources Using Near-Field Goniometric Measurement Method** (Page 953)
K. Käläntär, *Global Optical Solutions*
Tomonori Tashiro, *Yamagata University*
Toshihiro Toyota, *Industrial Research Institute of Shizuoka Prefecture*
Yasuki Yamauchi, *Yamagata University*

64-3: **Simulation of Beam Shaping by Micro-textures for Curved Displays** (Page 957)
Urs Aeberhard, *Fluxim AG*
Roman Hiestand, *Fluxim AG*
Beat Ruhstaller, *Fluxim AG & Zurich University of Applied Sciences*

Session 65: Quantum Dot Electroluminescence III

Chair: Jonathan Steckel, *ST Microelectronics*
Co-Chair: Yajie Dong, *University of Central Florida*

65-1: ***Invited Paper:*** **Enhanced Efficiency of InP-based Red and Green Quantum-Dot Light-emitting Diodes** (Page 960)
Yanzhao Li, *BOE Technology Group Co., Ltd.*
Dong Li, *BOE Technology Group Co., Ltd.*
Boris Kristal, *BOE Technology Group Co., Ltd.*
Jingwen Feng, *BOE Technology Group Co., Ltd.*
Zhigao Lu, *BOE Technology Group Co., Ltd.*
Zhuo Chen, *BOE Technology Group Co., Ltd.*
Xinguo Li, *BOE Technology Group Co., Ltd. and Peking University*

65-2: **High-Luminescent Red Quantum-Dot Light-Emitting Diodes by Inkjet Printing** (Page 964)
Siqi Jia, *Southern University of Science and Technology & Jilin University*
Pai Liu, *Southern University of Science and Technology & Shenzhen Planck Innovation Technologies Co., Ltd.*
Haodong Tang, *Southern University of Science and Technology*
Jingrui Ma, *Southern University of Science and Technology*
Bing Xu, *Southern University of Science and Technology & Shenzhen Planck Innovation Technologies Co., Ltd.*
Guangyu Li, *Jilin University*
Kai Wang, *Southern University of Science and Technology*

Xiao Wei Sun, *Southern University of Science and Technology*

65-3: **Green Top-Emission Quantum-Dot Light-Emitting Diodes (TE-QLEDs) with Normal and Inverted Structure** (Page 968)
Kun-Rong Lin, *National Taiwan University*
Chun-Yu Lee, *AU Optronics Corp.*
Wen-Cheng Ding, *National Taiwan University*
Chia-Hsun Chen, *National Taiwan University*
Da-Chen Chien, *National Taiwan University*
Ya-Pei Kuo, *AU Optronics Corp.*
Peng-Yu Chen, *AU Optronics Corp.*
Hsueh-Hsing Lu, *AU Optronics Corp.*
Tien-Lung Chiu, *Yuan Ze University*
Bo-Yen Lin, *National Taiwan University*
Jiun-Haw Lee, *National Taiwan University*

65-4: **Control of Carrier Injection and Transport Behavior in QLEDs via Modulating Schottky Barrier** (Page 971)
Sun-Kyo Kim, *Hongik University*
Yong-Seog Kim, *Hongik University*

Session 66: Self-Aligned LCDs

Chair: Michael Wittek, *Merck KGaA*
Co-Chair: Shui Chih Lien, *CSOT*

66-1: ***Invited Paper:*** **Liquid-Crystal Mixture with a Composition Including Highly Reliable Fluorinated Diluter and RM Monomer for PSVA and PI-Less IPS LCDs** (Page 975)
Masanobu Mizusaki, *Sharp Corp.*
Tsuyoshi Okazaki, *Sharp Corp.*
Kazuo Okamoto, *Organo Science Co., Ltd. Omaezaki*
Toshihiro Shibata, *Chiracol Co., Ltd. Saitama*

66-2: ***Invited Paper:*** **Reactive-Mesogen Multi-Twist Retarders for Advanced AR/VR Displays** (Page N/A)
Michael J. Escuti, *ImagineOptix Corp.*

66-3: **The Way to Improve Black Circle Mura in Curved Displays by Polyimide-less Technology** (Page 983)
Wei Cui, *Peking University and Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Song Lan, *Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Te-Jen Tseng, *Shenzhen China Star Optoelectronics Technology Co., Ltd.*
Chung-Ching Hsieh, *Shenzhen China Star Optoelectronics Technology Co., Ltd.*

66-4: **Reactive Monomers Optimized for Fast-Response Liquid Crystals with High Reliability** (Page 986)
Mei Chen, *TCL China Star Optoelectronics Technology Co., Ltd. & Peking University Shenzhen Graduate School*
Qi Song, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hongquan Wei, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xingwu Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Te-Jen Tseng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chung-Ching Hsieh, *TCL China Star Optoelectronics Technology Co., Ltd.*
Juncheng Xiao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Lixuan Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hong Meng, *Peking University Shenzhen Graduate School*

66-5: ***Late-News Paper:*** **Fast Response Texture Free Polymer Stabilized Vertically Aligned Liquid Crystal Displays** (Page 989)
Yong-Woon Lim, *Samsung Display*
Won Hyuk Jang, *Samsung Display*
Cheolsu Jeong, *Samsung Display*
Hyeon Hwan Kim, *Samsung Display*

Session 67: Emerging Applications with Machine Learning

Chair: K. Käläntär, *Global Optical Solutions*
Co-Chair: Fang-Cheng Lin, *Apple Inc*

67-1: ***Distinguished Paper:*Efficient Multi-Quality Super Resolution Using a Deep Convolutional Neural Network for an FPGA Implementation** (Page 993)
Min Beom Kim, *LG Display R&D Center*
Sanglyn Lee, *LG Display R&D Center*
Ilho Kim, *LG Display R&D Center*
Hee Jung Hong, *LG Display R&D Center*
Chang Gone Kim, *LG Display R&D Center*
Soo Young Yoon, *LG Display R&D Center*

67-2: **Lightweight Tone-Mapped HDRNET with Exposure Stack Generation** (Page 997)
So Yeon Jo, *Sogang University*
Namhyun Ahn, *Sogang University*
Suk-Ju Kang, *Sogang University*

67-3: **ColorNet: A Neural Network-Based System for Consistent Display of Brand Colors for Video** (Page 1001)
Erica Black Walker, *Clemson University*
Dane Hudson Smith, *Clemson University*
John Paul Lineberger, *Clemson University*
Michelle Leigh Mayer, *Clemson University*
Emma Elizabeth Mayes, *Clemson University*
Andrew Thomas Sanborn, *Clemson University*

67-4: **Visual Simultaneous Localization and Mapping with Deep Neural Network Based Loop Detection for Augmented Reality** (Page 1005)
Yang Li, *Shanghai Jiao Tong University*
Chao Ping Chen, *Shanghai Jiao Tong University*
Yuan Liu, *Shanghai Jiao Tong University*
Jie Chen, *Shanghai Jiao Tong University*
Changzhao Zhu, *Shanghai Jiao Tong University*
Ziqi Peng, *Kura AR*

Session 68: Light Field 3D

Chair: Shinichi Uehara, *AGC Inc.*
Co-Chair: K. Käläntär, *Global Optical Solutions*

68-1: **Investigation on Defocusing-Induced Accommodation Shift in Microlens Array-Based Near-Eye Light Field Displays** (Page 1009)
Zong Qin, *Sun Yat-sen University*
Jui-Yi Wu, *National Chiao Tung University*
Ping-Yen Chou, *National Chiao Tung University*
Jing Xie, *National Taiwan University*
Cheng-Ting Huang, *National Chiao Tung University*
Jang-Lin Chen, *National Chiao Tung University*
Han-Ping D. Shieh, *National Chiao Tung University*
Yi-Pai Huang, *National Chiao Tung University*

68-2: **View-Dependent Light-Field Display that Supports Accommodation Using a Commercially-Available High Pixel Density LCD Panel** (Page 1013)
Tuotuo Li, *Intel Labs*
Qiong Huang, *Intel Labs*
Santiago Alfaro, *Intel Labs*
Alexey Supikov, *Intel Labs*
Ronald Azuma, *Intel Labs*

68-3: **A Super-Multiview Display with Horizontal and Vertical Parallax by Time Division and Color Multiplexing** (Page 1017)
Yuta Watanabe, *University of Tsukuba*
Hideki Kakeya, *University of Tsukuba*

68-4: ***Late-News Paper:*** **3D/2D Partially Convertible Integral Imaging Display Using Geometric Phase Lens Array** (Page 1021)
Hayato Watanabe, *NHK (Japan Broadcasting Corp.)*
Takuya Omura, *NHK (Japan Broadcasting Corp.)*
Naoto Okaichi, *NHK (Japan Broadcasting Corp.)*
Hisayuki Sasaki, *NHK (Japan Broadcasting Corp.)*
Masahiro Kawakita, *NHK (Japan Broadcasting Corp.)*
Bahram Javidi, *University of Connecticut*

Session 69: OLED Devices IV

Chair: Franky So, *North Carolina State University*
Co-Chair: Chihaya Adachi, *Kyushu University*

69-1: ***Invited Paper:*** **Trap-dependent Electrical Characteristics of Organic Semiconductor Devices** (Page 1025)
Donghyun Ko, *Seoul National University*
Jaesang Lee, *Seoul National University*

69-2: **Transparent Conductive Hybrid Cathode Structure for Top-Emitting Organic Light-Emitting Devices** (Page 1029)
Wei Quan, *Hefei BOE Joint Technology Co., Ltd.*
Chang-Yen Wu, *Hefei BOE Joint Technology Co., Ltd.*
Juanjuan You, *Hefei BOE Joint Technology Co., Ltd.*
Linlin Wang, *Hefei BOE Joint Technology Co., Ltd.*
Wenfeng Song, *Hefei BOE Joint Technology Co., Ltd.*
Yongqi Shen, *Hefei BOE Joint Technology Co., Ltd.*
Chengyuan Luo, *Hefei BOE Joint Technology Co., Ltd.*
Donghui Yu, *Hefei BOE Joint Technology Co., Ltd.*
Bin Bo, *Hefei BOE Joint Technology Co., Ltd.*
Li Sun, *Hefei BOE Joint Technology Co., Ltd.*
Huai-Ting Shih, *Hefei BOE Joint Technology Co., Ltd.*
Zhongyuan Wu, *Hefei BOE Joint Technology Co., Ltd.*

69-3: **Examination of Degradation Analysis of p-i-n Type OLEDs Devices** (Page 1033)
Daichi Shirakura, *Toray Research Center, Inc.*
Shinji Okamura, *Toray Research Center, Inc.*
Yoshihiko Taguchi, *Toray Research Center, Inc.*
Hikaru Takano, *Toray Research Center, Inc.*
Takahiro Shibamori, *Toray Research Center, Inc.*
Takashi Miyamoto, *Toray Research Center, Inc.*
Junichiro Sameshima, *Toray Research Center, Inc.*

69-4: ***Late-News Paper:*** **High-Transparency Adhesive-Encapsulation Film for OLED Device** (Page 1036)
Satoru Ohashi, *Ajinomoto Fine-Techno Co., Inc.*
Eiji Baba, *Ajinomoto Fine-Techno Co., Inc.*
Manami Okuno, *Ajinomoto Fine-Techno Co., Inc.*
Mai Hosoi, *Ajinomoto Fine-Techno Co., Inc.*
Yuki Shindo, *Ajinomoto Fine-Techno Co., Inc.*
Motoyuki Takada, *Ajinomoto Fine-Techno Co., Inc.*

Session 70: Flexible Technologies III

Chair: Yong Taek Hong, *Seoul National University*
Co-Chair: Simon Kang, *Apple*

70-1: ***Invited Paper:*** **Advances in the Development of Flexible AMOLED Displays** (Page 1040)
Ze Yuan, *Shenzhen Royole Technologies Co. Ltd. and Royole Corp.*
Jiahao Kang, *Royole Corp.*
Haojun Luo, *Royole Corp.*
Kun Zhang, *Shenzhen Royole Technologies Co., Ltd.*
Long Chen, *Shenzhen Royole Technologies Co., Ltd.*

Charles Kim, *Shenzhen Royole Technologies Co., Ltd.*
Jiha Kim, *Shenzhen Royole Technologies Co., Ltd.*
Chang Ming Chiu, *Shenzhen Royole Technologies Co., Ltd.*
Jian-Peng Li, *Shenzhen Royole Technologies Co., Ltd.*
Zhen-Peng Chen, *Shenzhen Royole Technologies Co., Ltd.*
Jie-Hui Qin, *Shenzhen Royole Technologies Co., Ltd.*
Jin-Jie Zhou, *Shenzhen Royole Technologies Co., Ltd.*
Bong-Geum Lee, *Shenzhen Royole Technologies Co., Ltd.*
Xiaojun Yu, *Shenzhen Royole Technologies Co. Ltd. and Royole Corp.*
Peng Wei, *Shenzhen Royole Technologies Co. Ltd. and Royole Corp.*
Zihong Bill Liu, *Shenzhen Royole Technologies Co. Ltd. and Royole Corp.*

70-2: ***Invited Paper:*** **Low Temperature Process and Material Development for Flexible/Stretchable Transparent Conductor** (Page 1044)
Seung Hwan Ko, *Seoul National University*

70-3: ***Distinguished Paper:*** **Flexible OLED Display with 620 Degree Celsius LTPS TFT and Touch Sensor Manufactured by Weak Bonding Method** (Page 1048)
Tsung-Ying Ke, *AU Optronics Corp.*
Ting Kang, *AU Optronics Corp.*
Chih-Tsung Lee, *AU Optronics Corp.*
Chun-Yu Chen, *AU Optronics Corp.*
Wei-Jen Su, *AU Optronics Corp.*
Wen-Ting Wang, *AU Optronics Corp.*
Zih-Shuo Huang, *AU Optronics Corp.*
Jen-Chih Wang, *AU Optronics Corp.*
Shou-Te Hsu, *AU Optronics Corp.*
Cheng-Liang Wang, *AU Optronics Corp.*
Yen-Huei Lai, *AU Optronics Corp.*
Wan-Tsang Wang, *AU Optronics Corp.*
Chun-Hsin Liu, *AU Optronics Corp.*
Kun-Yu Lin, *AU Optronics Corp.*

70-4: ***Distinguished Student Paper:*** **Flexible OLED-Based Photonic Skin for Attachable Phototherapeutics** (Page 1052)
Yongmin Jeon, *Korea Advanced Institute of Science and Technology (KAIST)*
Hye-Ryung Choi, *Seoul National University Bundang Hospital (SNUBH)*
Kyoung-Chan Park, *Seoul National University Bundang Hospital (SNUBH)*
Kyung Cheol Choi, *Korea Advanced Institute of Science and Technology (KAIST)*

Session 71: Spatial Uniformity

Chair: Thomas Fiske, *Microsoft*
Co-Chair: Frank Rochow, *Adviser*

71-1: **Fractional Pixel Method for Improved Pixel-Level Measurement and Correction (Demura) of High-Resolution Displays** (Page 1056)
Gary R. Pedeville, *Radiant Vision Systems LLC*
Joshua H. Rouse, *Radiant Vision Systems LLC*
Douglas F. Kreysar, *Radiant Vision Systems LLC*

71-2: **Subpixel Non-Uniformity Correction for Displays** (Page 1060)
Xiaofan Feng, *Jingce Electronic (USA)*

71-3: **Meeting Optical Testing Challenges of High-Resolution µLED Displays** (Page 1063)
Tobias Steinel, *Instrument Systems GmbH*
Martin Wolf, *Instrument Systems GmbH*

71-4: **Imaging Luminance Measuring Devices (ILMDs) – Characterization and Standardization with Respect to Display Measurements** (Page 1067)
Udo Krüger, *TechnoTeam Bildverarbeitung GmbH*
Ingo Rotscholl, *TechnoTeam Bildverarbeitung GmbH*
Alexandre Fong, *Techno Team Vision USA, Inc.*

Session 72: Quantum Dot Electroluminescence IV

Chair: Kevin Gahagan, *Corning Incorporated*
Co-Chair: Yanzhao Li, *BOE Technology Group Co., Ltd.*

72-1: ***Invited Paper:*** **Realizing Long Lifetime Blue Quantum Dots Light Emitting Diodes (QLEDs) through Quantum Dot Structure Tailoring** (Page 1071)
Longjia Wu, *TCL Corporate Research*
Wenyong Liu, *TCL Corporate Research*
Zizhe Lu, *TCL Corporate Research*
Yiran Yan, *TCL Corporate Research*
Jianxin Zhang, *TCL Corporate Research*
Wei Xu, *TCL Corporate Research*
Yixing Yang, *TCL Corporate Research*
Xiaolin Yan, *TCL Corporate Research*

72-2: **Highly Efficient Cadmium-Free Quantum-Dot Light-Emitting Diodes Employing Top-Emitting Architecture** (Page 1075)
Myoungjin Park, *Samsung Display Co., Ltd.*
Jaehong Park, *Samsung Display Co., Ltd.*
Sungwoon Kim, *Samsung Display Co., Ltd.*
Jaekook Ha, *Samsung Display Co., Ltd.*
Changhee Lee, *Samsung Display Co., Ltd.*

72-3: **Influence of Mobility Effect on Top-Emission Red Quantum-Dot Light-Emitting Diode with Weak-Cavity Structure** (Page 1078)
Chun-Yu Lee, *AU Optronics Corp.*
Ya-Pei Kuo, *AU Optronics Corp.*
Peng-Yu Chen, *AU Optronics Corp.*
Hsieh-Hsing Lu, *AU Optronics Corp.*
Ming-Yi Lin, *National United University*

72-4: **Spectrum Narrowing and Efficiency Enhancement of Quantum-Dot Light-Emitting Diodes by Microcavity** (Page 1082)
Ding Shihao, *Shenzhen Planck Innovation Technologies Co., Ltd. & Southern University of Science and Technology*
Cai Rui, *Southern University of Science and Technology*
Xiao Xiangtian, *Southern University of Science and Technology*
Wu Zhenghui, *Southern University of Science and Technology*
Xu Bing, *Shenzhen Planck Innovation Technologies Co., Ltd. & Southern University of Science and Technology*
Wang Kai, *Southern University of Science and Technology*
Sun Xiao Wei, *Southern University of Science and Technology*

Session 73: Displays and Health

Chair: Chien-Yu Chen, *National Taiwan University of Science & Technology*
Co-Chair: Marina Kondakova, *OLEDWorks*

73-1: ***Invited Paper:*** **Pediatric Device Use: Implications for Myopia Development** (Page 1086)
Elise N. Harb, *University of California at Berkeley*
Christine F. Wildsoet, *University of California at Berkeley*

73-2: ***Invited Paper:*** **Effects of Displays on Myopia and Possible Countermeasures Based on Epidemiology in Japan** (Page 1090)
Takushi Kawamorita, *Kitasato University*

73-3: ***Invited Paper:*** **Influences of Circadian Illuminance from Lighting and TV on Human Locomotor Activity, Sleep Disorder, EEG, HRV, and Melatonin Secretion** (Page 1094)
Dae Hwan Kim, *Kookmin University*
Changwook Kim, *Kookmin University*
Seung Min Lee, *Kookmin University*
Sunwoong Choi, *Kookmin University*
Hyun-Sun Mo, *Kookmin University*

Session 74: Seeing Through the Display Image Reconstruction Techniques

Chair: Steven Bathiche, *Microsoft*
Co-Chair: Jeff Han, *Consultant*

Session 75: Display Systems and Backlights

Chair: Jean-Pierre Guillou, *Apple, Inc.*
Co-Chair: Masaru Suzuki, *Kriya Materials*

Wageesha Senaratne, *Corning Research & Development Corp.*

Session 76: OLED Displays I

Chair: Yifan Zhang, *Apple, Inc.*
Co-Chair: DZ Peng, *TIanma*

76-1: ***Invited Paper:*** **Electroforming Fine-Metal Mask for High-Resolution OLED Displays** (Page 1128)
Xialing Chen, *Changzhou UGOLED*
TK Pan, *Changzhou UGOLED*
Weiwei Xu, *Changzhou UGOLED*

76-2: ***Distinguished Paper:*** **A High-Image-Quality OLED Display with Motion Blur Reduction for Ultra-High Resolution and Premium TVs** (Page 1131)
Hong-Jae Shin, *LG Display*
Soo-Hong Choi, *LG Display*
Sung-Joong Kim, *LG Display*
Jae-Kyu Park, *LG Display*
Seong-Ho Yun, *LG Display*
Jeong-Rim Seo, *LG Display*
Jae-Yi Choi, *LG Display*
Sung-Joon Bae, *LG Display*
Han-Seop Kim, *LG Display*
Chang-Ho Oh, *LG Display*

76-3: **Ultra-High-Efficiency OLED Display by 3D Pixel Configuration** (Page 1135)
Robert Jan Visser, *Applied Materials, Inc.*
Chung-Chia Chen, *Applied Materials, Inc.*
Hyunsung Bang, *Applied Materials, Inc.*
Wan-Yu Lin, *Applied Materials, Inc.*
Lisong Xu, *Applied Materials, Inc.*
Gang Yu, *Applied Materials, Inc.*
B. Leo Kwak, *Applied Materials, Inc.*
Yi-Ting Chen, *National Taiwan University*
Sheng-Wen Wen, *National Taiwan University*
Po-Hsiang Liao, *National Taiwan University*
Chang-Cheng Lee, *National Taiwan University*
Wei-Kai Lee, *National Taiwan University*
Chun-Wei Huang, *National Taiwan University*
Guo-Dong Su, *National Taiwan University*
Hoang Yan Lin, *National Taiwan University*
Chung-Chih Wu, *National Taiwan University*

76-4: ***Late-News Paper:*** **Aromatic Hydrocarbon Macrocycles for Highly Efficient Organic Light-Emitting Devices with Simple-Layer Architectures** (Page 1138)
Tomoo Izumi, *Konica Minolta, Inc. & JST*
Hideo Taka, *Konica Minolta, Inc. & JST*
Hiroshi Kita, *Konica Minolta, Inc. & JST*
Jing Yang Xue, *Tohoku University*
Asami Yoshii, *Tohoku University*
Yi Tian, *JST & Tohoku University*
Koki Ikemoto, *The University of Tokyo & JST*
Sota Sato, *The University of Tokyo & JST*
Hiroyuki Isobe, *The University of Tokyo & JST*

Session 77: Free Form Displays I

Chair: Jennifer Lin, *AU Optronics*
Co-Chair: Hajime Yamaguchi, *Japan Display Inc.*

77-1: **Design of Stretchable AMOLED Display with Transitional Area** (Page 1142)
Qian Yang, *BOE Technology Group Co., Ltd.*
Pinfan Wang, *BOE Technology Group Co., Ltd.*

Fangxu Cao, *BOE Technology Group Co., Ltd.*
Libin Liu, *BOE Technology Group Co., Ltd.*
Zheng Liu, *BOE Technology Group Co., Ltd.*
Shiming Shi, *BOE Technology Group Co., Ltd.*
Dawei Wang, *BOE Technology Group Co., Ltd.*

77-2: **Stretchability Improvement of Stretchable OLED by Pillar-Array Substrate and Rotation-Plate Structure** (Page 1145)
Minwoo Nam, *Korea Advanced Institute of Science and Technology (KAIST)*
Young Hyun Son, *Korea Advanced Institute of Science and Technology (KAIST)*
Kyung Cheol Choi, *Korea Advanced Institute of Science and Technology (KAIST)*

77-3: **Wearable Organic Light-Emitting Diode Displays – From Fibers to Textiles** (Page 1149)
Young Jin Song, *Kookmin University*
Ha-Eun Cho, *Kookmin University*
Ha-Young Song, *Kookmin University*
Jung-Hoon Ryu, *Kookmin University*
Sung-Min Lee, *Kookmin University*

77-4: **HIgh-Efficiency Flexible Fiber-Based Light-Emitting Devices Processed by Phosphorescent Solution** (Page 1152)
Yong Ha Hwang, *Korea Advanced Institute of Science and Technology (KAIST)*
Seonil Kwon, *Korea Advanced Institute of Science and Technology (KAIST)*
Hyuncheol Kim, *Korea Advanced Institute of Science and Technology (KAIST)*
Jeong Bin Shin, *Korea Advanced Institute of Science and Technology (KAIST)*
Kyung Cheol Choi, *Korea Advanced Institute of Science and Technology (KAIST)*

Session 78: Novel Display Applications

Chair: Gary Jones, *Nanoquantum Corporation*
Co-Chair: Vincent Gu, *Apple, Inc.*

78-1: ***Invited Paper:*** **Application of OLED Area Light in Textiles: Approaches, Challenges, Limitations, and Perspectives** (Page 1155)
Jan Hesse, *Fraunhofer-Institute for Organic Electronics, Electron Beam and Plasma Technology FEP*
Claudia Keibler-Willner, *Fraunhofer-Institute for Organic Electronics, Electron Beam and Plasma Technology FEP*
André Philipp, *Fraunhofer-Institute for Organic Electronics, Electron Beam and Plasma Technology FEP*

78-2: **Using Physical Books as Interfaces to Digital Displays** (Page 1159)
Georgios Bairaktaris, *University of Surrey*
Brice Le Borgne, *University of Surrey*
Sirpa Nordman, *VTT Technical Research Centre of Finland*
Samuli Yrjänä, *VTT Technical Research Centre of Finland*
Vikram Turkani, *NovaCentrix*
Rudresh Gosh, *NovaCentrix*
Vahid Akhavan, *NovaCentrix*
Peter Bagge, *Otava Book Printing, Ltd.*
Timo Turpela, *Otava Book Printing, Ltd.*
David M. Frohlich, *University of Surrey*
Radu A. Sporea, *University of Surrey*

78-3: ***Distinguished Paper:*** **Vein Detection with Near-Infrared Organic Photodetectors for Biometric Authentication** (Page 1163)
Daniel Tordera, *TNO/Holst Centre*
Bart Peeters, *TNO/Holst Centre*
Ezequiel Delvitto, *TNO/Holst Centre*
Santhosh Shanmugam, *TNO/Holst Centre*
Joris Maas, *TNO/Holst Centre*
Joris de Riet, *TNO/Holst Centre*
Roy Verbeek, *TNO/Holst Centre*
Robert van der Laar, *TNO/Holst Centre*
Thijs Bel, *TNO/Holst Centre*

Gerard Haas, *TNO/Holst Centre*
Leslye Ugalde, *TNO/Holst Centre*
Albert van Breemen, *TNO/Holst Centre*
Ilias Katsouras, *TNO/Holst Centre*
Auke Jisk Kronemeijer, *TNO/Holst Centre*
Hylke Akkerman, *TNO/Holst Centre*
Eric Meulenkamp, *TNO/Holst Centre*
Gerwin Gelinck, *TNO/Holst Centre & Eindhoven University of Technology*

78-4: **IGZO-based Identification Tags Communicating with Everyday Touchscreens** (Page 1167)
Nikolaos Papadopoulos, *imec*
Hikmet Celiker, *imec & KU Leuven*
Weiming Qiu, *imec*
Marc Ameys, *imec*
Steve Smout, *imec*
Myriam Willegems, *imec*
Filip Deroo, *Cartamundi Digital*
Jan-Laurens van der Steen, *TNO/Holst Centre*
Auke Jisk Kronemeijer, *TNO/Holst Centre*
Marco Dehouwer, *Cartamundi*
Alexander Mityashin, *imec*
Robert Gehlhaar, *imec*
Wim Dehaene, *KU Leuven & imec*
Kris Myny, *imec*

Session 79: Quantum Dot Color Conversion I

Chair: John Van Derlofske, *3M*
Co-Chair: Seth Coe-Sullivan, *Luminit, LLC*

79-1: ***Invited Paper:*** **A New Generation of QD-Diffusion Plate Technology for TV** (Page 1171)
Honglei Ji, *University of Chinese Academy of Sciences and TCL Electronics Holdings, Ltd.*
Huaishu Xu, *TCL Electronics Holdings, Ltd.*
Junqiu Guo, *TCL Electronics Holdings, Ltd.*

79-2: **Ambient Light Excitation in Quantum-Dot-Converted MicroLED Displays** (Page 1174)
Fangwang Gou, *University of Central Florida*
Guanjun Tan, *University of Central Florida*
Yi-Fen Lan, *AU Optronics Corp.*
Seok-Lyul Lee, *AU Optronics Corp.*
Shin-Tson Wu, *University of Central Florida*

79-3: ***Invited Paper:*** **The Past, the Present, and the Future of Perovskite QDs** (Page 1178)
Norman Lüchinger, *Avantama AG*
Marek Oszajca, *Avantama AG*

79-4: **Theoretical Prediction of Changes in Emission and Absorption Spectra of InP- and InGaP-Based Quantum Dots and Comparison with Experimental Measurement of InP-Based Quantum Dots** (Page 1182)
Seungin Baek, *Samsung Display*
Younho Han, *Samsung Display*
Deokho Jang, *Kyung Hee University*
Jungho Kim, *Kyung Hee University*
Sangwoo Ha, *Samsung Display*
Raeyoung Kim, *Samsung Display*
Baek-Hee Lee, *Samsung Display*
Taekjoon Lee, *Samsung Display*
Jun Woo Lee, *Samsung Display*
Yongjo Kim, *Samsung Display*

79-5: ***Late-News Paper:*** **Bright and Narrow Green Emitting InP-based Quantum Dots for Wide Color Gamut Displays** (Page 1186)
Yongwook Kim, *Samsung Electronics*
Hyosook Jang, *Samsung Electronics*

Ji Hyun Min, *Samsung Electronics*
Eunjoo Jang, *Samsung Electronics*

Session 80: Color Perception

Chair: Youngshin Kwak, *Ulsan National Institute of Science and Technology*
Co-Chair: Youn Jin Kim, *Xiaomi Corporation*

80-1: **OLED Gamut-Mapping Method to Generate Exact Standard Color Results** (Page 1190)
Jongwoong Park, *Samsung Display Co., Ltd.*
Jaewoo Song, *Samsung Display Co., Ltd.*
Jiyeon Baik, *Samsung Display Co., Ltd.*
Wonjun Choe, *Samsung Display Co., Ltd.*

80-2: **Spatiochromatic Model for Image-Quality Prediction of High-Dynamic-Range and Wide-Color-Gamut Content** (Page 1194)
Robert Wanat, *Dolby Laboratories, Inc.*
Anustup Choudhury, *Dolby Laboratories, Inc.*
Scott Daly, *Dolby Laboratories, Inc.*

80-3: **Immanent Dichromaticity in Trichromatic Observer: 2nd Coordinate in MDS Analyses of R-G Neutral- and Y-B Only Changed-Stimuli Reflects Chromatic Saliency** (Page 1198)
Shoko Hira, *Kagoshima University*
Rei Endo, *Kagoshima University*
Kanta Mochihara, *Kagoshima University*
Minoru Ohkoba, *Utsunomiya University*
Tomoharu Ishikawa, *Utsunomiya University*
Miyoshi Ayama, *Utsunomiya University*
Sakuichi Ohtsuka, *Kagoshima University*

80-4: **Human Visual System Uses Just a Few Transfer Functions Depending on Various Environments to Realize Normalized Visual Percept: Investigation Using Real Photographic Images** (Page 1202)
Sakuichi Ohtsuka, *Kagoshima University*
Masahiro Nakamura, *Kagoshima University*
Yuichiro Orita, *Kagoshima University*
Saki Iwaida, *Kagoshima University*
Shoko Hira, *Kagoshima University*

80-5: **An Experimental Study of the Effect of Subpixel Arrangements on Subjective Spatial Resolution** (Page 1206)
Midori Tanaka, *Chiba University*
Daisuke Nakayama, *Chiba University*
Takahiko Horiuchi, *Chiba University*
Kenichiro Masaoka, *NHK Science & Technology Research Laboratories*

Session 81: Machine Learning for Manufacturing and Calibration

Chair: Andriy Romanyuk, *Glas Troesch AG*
Co-Chair: Stephen Atwood, *Consultant*

81-1: ***Invited Paper:*** **Data Augmentation for Applying Deep Learning to Display Manufacturing Defect Detection** (Page 1210)
Wei Xiong, *Samsung Display America Lab*
Janghwan Lee, *Samsung Display America Lab*
Shuhui Qu, *Samsung Display America Lab*
Wonhyouk Jang, *Samsung Display Co., Ltd.*

81-2: ***Invited Paper:*** **Neural Network-Based Quantitative Evaluation of Display Nonuniformity Corresponds Well with Human Visual Evaluation** (Page 1214)
Kazuki Tsutsukawa, *EIZO Corp. & Konica Minolta, Inc.*
Manabu Kobayashi, *EIZO Corp.*
Yusuke Bamba, *EIZO Corp.*

81-3: **Display Graylevel Gamma Tuning Algorithm and System Implementation** (Page 1218)

Peng Xu, *Jingce Electronics Inc*
Hao Tang, *Jingce Electronic USA*
Gang Xu, *Jingce Electronic USA*

81-4: **Array Defect Detection and Repair Based on Deep Learning** (Page 1222)
Kai Guo, *BOE Technology Group Co., Ltd.*
Xiaolong Li, *BOE Technology Group Co., Ltd.*
Yanan Niu, *BOE Technology Group Co., Ltd.*
Wei Qin, *BOE Technology Group Co., Ltd.*
Kuanjun Peng, *BOE Technology Group Co., Ltd.*
Weixing Liu, *BOE Technology Group Co., Ltd.*
Zhiqiang Xu, *BOE Technology Group Co., Ltd.*
Wanpeng Teng, *BOE Technology Group Co., Ltd.*
Tieshi Wang, *BOE Technology Group Co., Ltd.*
Chunfang Zhang, *BOE Technology Group Co., Ltd.*
Bin Qin, *BOE Technology Group Co., Ltd.*
Wei Wang, *BOE Technology Group Co., Ltd.*

81-5: **Image Quality Predication System in Display Fabrication Process** (Page 1226)
Yong Woo Lee, *Samsung Display*
Gi Chang Lee, *Samsung Display*
Hyun Young Choi, *Samsung Display*
Dong Il Yoo, *Samsung Display*
Kyu Soo Ahn, *Samsung Display*
Cheol ho Kim, *Samsung Display*
Hae Ryung Park, *Samsung Display*
Min Jae Ko, *Han Yang University*
Yong Jo Kim, *Samsung Display*

Session 82: Projectors and Light Sources

Chair: David Eccles, *Collins Aerospace*
Co-Chair: Hidekazu Hatanaka, *Ushio Inc.*

82-1: ***Invited Paper:*** **Latest Status of Blue and Green Laser Diodes and Laser Packages for Display Applications** (Page 1230)
Eiichiro Okahisa, *Nichia Corp.*
Shingo Masui, *Nichia Corp.*
Tomoya Yanamoto, *Nichia Corp.*
Shin-ichi Nagahama, *Nichia Corp.*

82-2: ***Invited Paper:*** **Latest Progress of Laser Phosphor Projection Display** (Page 1234)
Fei Hu, *Appotronics Corp., Ltd.*
Cuiping Zhang, *Appotronics Corp., Ltd.*
Zuqiang Guo, *Appotronics Corp., Ltd.*
Chen Chen, *Appotronics Corp., Ltd.*
Yi Li, *Appotronics Corp., Ltd.*

82-3: **Red-Enhanced Laser-Phosphor Light Source with Quantum-Dot Conversion Layer** (Page 1240)
Tomohiro Kaji, *Sony Corp.*
Hiroki Morita, *Sony Corp.*
Yuki Maeda, *Sony Corp.*
Clemens Wall, *Sony Europe B.V.*
Dennis Chercka, *Sony Europe B.V.*
Nadejda Krasteva, *Sony Europe B.V.*
Izushi Kobayashi, *Sony Corp.*

82-4: ***Invited Paper:*** **Speckle Reduction in Laser Projectors by Angular, Wavelength, and Polarization Diversities** (Page 1243)
Hirotaka Yamada, *Ushio Inc. & Osaka University*
Kengo Moriyasu, *Ushio, Inc.*
Hiroto Sato, *Ushio, Inc.*
Hidekazu Hatanaka, *Ushio, Inc.*
Kazuhisa Yamamoto, *Osaka University*

Session 83: OLED Displays II

Chair: Chihaya Adachi, *Kyushu University*
Co-Chair: Chang-Wook Han, *LG Display Co., Ltd*

83-1: ***Invited Paper:*** **Optimization of High Performance Deep Red OLEDs Using Tandem Structure for Automotive Lighting Application** (Page 1247)
Huiqing Pang, *Beijing Summer Sprout Technology Co., Ltd.*
Liang Gao, *Beijing Summer Sprout Technology Co., Ltd.*
Menglan Xie, *Beijing Summer Sprout Technology Co., Ltd.*
Nannan Lu, *Beijing Summer Sprout Technology Co., Ltd.*
Ray Kwong, *Beijing Summer Sprout Technology Co., Ltd.*
Sean Xia, *Beijing Summer Sprout Technology Co., Ltd.*

83-2: **Reliability Characterization of Luminance Degradation of OLED Mobile Display Considering Color Difference Index Based on Usage Patterns** (Page 1251)
Heejin Kim, *Samsung Display Co., Ltd.*
Yoonsuk Choi, *Samsung Display Co., Ltd.*
Sangkil Kim, *Samsung Display Co., Ltd.*
Sam Chung, *Samsung Display Co., Ltd.*
Jongwoo Park, *Samsung Display Co., Ltd.*

83-3: **TE-Type AMOLED Display with Wide Viewing Angle and Ultra-Low Reflectance** (Page 1255)
Kaoru Abe, *Sharp Corp.*
Tokio Taguchi, *Sharp Corp.*
Bai Zhang, *Sharp Corp.*
Yu Yamane, *Sharp Corp.*
Kohji Yasukawa, *Sharp Corp.*
Shinichi Kawato, *Sharp Corp.*
Seiichi Mitsui, *Sharp Corp.*

83-4: **Techniques to Achieve an AMOLED Display with Ultra-narrow Border** (Page 1258)
Quan Liu, *Kunshan Govisionox Optoelectronics Co., Ltd.*
Chunming Jin, *Kunshan Govisionox Optoelectronics Co., Ltd.*
Weilong Li, *Kunshan Govisionox Optoelectronics Co., Ltd.*
Siming Hu, *Kunshan Govisionox Optoelectronics Co., Ltd.*
Zhenzhen Han, *Kunshan Govisionox Optoelectronics Co., Ltd.*
Xiaoyu Gao, *Kunshan Govisionox Optoelectronics Co., Ltd.*

Session 84: Free Form Displays II

Chair: Paul Drzaic, *Apple, Inc.*
Co-Chair: Joon Young Yang, *LG Display Co. Ltd*

84-1: ***Invited Paper:*** **30-inch 4K Rollable OLED Display** (Page 1261)
Tohru Sonoda, *Sharp Corp.*
Shogo Murashige, *Sharp Corp.*
Kohhei Tanaka, *Sharp Corp.*
Kenji Takase, *Sharp Corp.*
Hiromi Katoh, *Sharp Corp.*
Yoshiharu Kataoka, *Sharp Corp.*
Takenobu Usui, *NHK Science & Technology Research Laboratories*
Takuya Okada, *NHK Science & Technology Research Laboratories*
Takahisa Shimizu, *NHK Science & Technology Research Laboratories*

84-2: **Study on Reliability for Impact and Rolling of Film Stacks in Rollable AMOLED Display by Finite Element Analysis** (Page 1265)
Aries Cheng, *Tianma Micro-Electronics Group*
Qiaoqiao Wei, *Tianma Micro-Electronics Group*
Jian Jin, *Tianma Micro-Electronics Group*
Tsungyi Su, *Tianma Micro-Electronics Group*
DZ Peng, *Tianma Micro-Electronics Group*

84-3: ***Invited Paper:*** **Advanced Cover Window and Thin-film Encapsulation Technologies for Foldable AMOLED Display** (Page 1269)
Glory Chen, *Industrial Technology Research Institute (ITRI)*
Shu-Tang Yeh, *Industrial Technology Research Institute (ITRI)*
Jia-Chong Ho, *Industrial Technology Research Institute (ITRI)*
Cheng-Chung Lee, *Industrial Technology Research Institute (ITRI)*
Chen-Kuan Kuo, *BenQ Materials Corp.*
Hao-Fei Kuo, *BenQ Materials Corp.*
Yu-Hsun Wu, *BenQ Materials Corp.*
Wen-Hsin Yang, *BenQ Materials Corp.*
Chih-Wei Lin, *BenQ Materials Corp.*
Kuo-Hsuan Yu, *BenQ Materials Corp.*
Chih-Haw Wang, *BenQ Materials Corp.*

84-4: **New Barrier Fabrication Method based on an Infiltration Technology for Flexible OLED Displays** (Page 1273)
Seung Hun Kim, *Samsung Display*
Seung Yong Song, *Samsung Display*
Soo Youn Kim, *Samsung Display*
Moon Won Chang, *Samsung Display*
Hyo Jeong Kwon, *Samsung Display*
Myung Mo Sung, *Hanyang University*
Hye Yong Chu, *Samsung Display*

84-5: ***Late-News Paper:*** **Flexible Cover Window Film with Improved Optical Clarity** (Page 1276)
Min Sang Park, *SK Innovation*
Sun Kug Kim, *SK Innovation*
Sangyoon Park, *SK Innovation*
Ho Chul Yoon, *SK Innovation*
Jinwoong Kim, *SK ie Technology*

Session 85: Novel Displays and Optics

Chair: Timothy Large, *Microsoft Corp*
Co-Chair: Adi Abileah, *Adi - Displays Consulting LLC*

85-1: ***Invited Paper:*** **Organic LCDs Using Polarisers as Substrates: Enabling Pixel-level Dimming in Dual-Cell LCDs** (Page 1279)
James Harding, *FlexEnable*
Paul Cain, *FlexEnable*
Will Reeves, *FlexEnable*
May Wheeler, *FlexEnable*
Mike Banach, *FlexEnable*

85-2: ***Invited Paper:*** **Fourth Gen Optics - Planar Optics Revolutionized by LCD Technology** (Page 1282)
Nelson Tabiryan, *BEAM Engineering for Advanced Measurements Co.*
David Roberts, *BEAM Engineering for Advanced Measurements Co.*
Brian Kimball, *U.S. Army Natick Soldier Systems Center*
Diane Steeves, *U.S. Army Natick Soldier Systems Center*
Timothy J. Bunning, *Air Force Research Laboratories*

85-3: **In-Cell Optical Compensation Technology for OLED Demura Application** (Page 1285)
Yunke Qin, *BOE Technology Group Co., Ltd.*
Xiaoliang Ding, *BOE Technology Group Co., Ltd.*
Yangbing Li, *BOE Technology Group Co., Ltd.*
Wenjuan Wang, *BOE Technology Group Co., Ltd.*
Zhen Zhang, *BOE Technology Group Co., Ltd.*
Ping Zhang, *BOE Technology Group Co., Ltd.*
Fangyuan Zhao, *BOE Technology Group Co., Ltd.*

85-4: **Enhancing Ambient Viewing Performance of Anisotropic Nano-Structure Light Control Film** (Page 1288)
Lung-Hai Wu, *BenQ Materials*
Kuang-Tsin Lee, *BenQ Materials*

Min-Chao Chuang, *BenQ Maerials*
Pei-Hsun Wu, *BenQ Materials*
Pei-Yi Liu, *BenQ Materials*

85-5: ***Late-News Paper:*** **Real-Time Dynamic Holographic Display Based on Perovskite-Doped Liquid Crystal** (Page 1292)
Siyao Wu, *Shanghai Jiao Tong University*
Dingyan Xu, *Shanghai Jiao Tong University*
Zekun Yan, *Shanghai Jiao Tong University*
Xinglei Xu, *Shanghai Jiao Tong University*
Yunfeng Wang, *Shanghai Jiao Tong University*
Yan Li, *Shanghai Jiao Tong University*
Gufeng He, *Shanghai Jiao Tong University*

Session 86: Quantum Dot Color Conversion II

Chair: Jean-Jacques Drolet, *Osram Opto Semiconductors*
Co-Chair: John Van Derlofske, *3M*

86-1: ***Invited Paper:*** **Nano-particle Heat Sink for Quantum-dot Color Conversion** (Page 1296)
Jinhyun Cho, *Samsung Electronics*
Pilyong Oh, *Samsung Electronics*

86-2: **Color Conversion Using Quantum Dots for LCD, OLED, and MicroLED Displays** (Page 1299)
Ravi Tangirala, *Nanosys, Inc.*
Ernest Lee, *Nanosys, Inc.*
Charlie Hotz, *Nanosys, Inc.*
Yuichiro Kunai, *Sumitomo Chemical Co., Ltd.*
Yoshifumi Komatsu, *Sumitomo Chemical Co., Ltd.*
Yoshihiro Harada, *Sumitomo Chemical Co., Ltd.*
Megumi Komada, *Sumitomo Chemical Co., Ltd.*
Masayoshi Tokuda, *Sumitomo Chemical Co., Ltd.*
Tomohiro Fukuura, *Sumitomo Chemical Co., Ltd.*

86-3: **Ultra-Stable Deep-Dyed Perovskite-Polymer Composites as Tunable Downconverters** (Page 1303)
Caicai Zhang, *University of Central Florida*
Ziqian He, *University of Central Florida*
Chunhong Gao, *University of Central Florida & Southwest University, China*
Shin-Tson Wu, *University of Central Florida*
Yajie Dong, *University of Central Florida*

86-4: **Color Conversion Enhancement of Perovskite Quantum Dots by Integrating with Cholesteric Liquid Crystals** (Page 1307)
Su Pan, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Miao Duan, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Zhiping Hu, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Dongze Li, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Shu-jhih Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Xin Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

86-5: ***Late-News Paper:*** **Giant Shell Quantum Dots for Color Conversion and as Active Material in QLEDs** (Page 1310)
Sonja Krohn, *Fraunhofer IAP-CAN*
Hendrik Schlicke, *Fraunhofer IAP-CAN*
Jan Niehaus, *Fraunhofer IAP-CAN*

SOCIETY FOR INFORMATION DISPLAY

Table of Contents/Book 3 (Posters)

POSTER SESSIONS

Active-Matrix Devices

P-1:

Zhibo Yao, *Visionox Technology, Inc. & Tsinghua University*
Cuicui Sheng, *Visionox Technology, Inc.*
Zhisheng Li, *Visionox Technology, Inc.*
Xuan Cao, *Visionox Technology, Inc.*
Chenggong Wang, *Visionox Technology, Inc.*
Lian Duan, *Tsinghua University*

P-2:

Hydrogenated SnO for *p*-Channel Oxide Thin-Film Transistor (Page 1315)
Alex Wootae Lee, *University of California, San Diego*
Kosuke Matsuzaki, *Tokyo Institute of Technology*
Kenji Nomura, *University of California, San Diego*

P-3:

Effects of Negative Bias Illumination Stress on IGZO Device and Luminance Behaviors in OLED Display Panel Operated by AC Conditions (Page 1319)
Kiju Im, *Samsung Display Co., Ltd.*
Hyojung Kim, *Samsung Display Co., Ltd.*
Hyuncheol Hwang, *Samsung Display Co., Ltd.*
Junehwan Kim, *Samsung Display Co., Ltd.*
Taeyoung Khim, *Samsung Display Co., Ltd.*
Sam Chung, *Samsung Display Co., Ltd.*
Jongwoo Park, *Samsung Display Co., Ltd.*

P-4:

Enhanced Scalability and Reliability of High-Mobility Elevated-Metal Metal-Oxide Thin-Film Transistors with Bandgap Engineering (Page 1322)
Zhihe Xia, *The Hong Kong University of Science and Technology*
Xuchi Liu, *The Hong Kong University of Science and Technology*
Yuqi Wang, *The Hong Kong University of Science and Technology*
Jiapeng Li, *The Hong Kong University of Science and Technology*
Rongsheng Chen, *South China University of Technology*
Lei Lu, *Peking University & The Hong Kong University of Science and Technology*
Hoi-Sing Kwok, *The Hong Kong University of Science and Technology*
Man Wong, *The Hong Kong University of Science and Technology*

P-5:

Compact Modeling of Independent Dual Gate TFTs and OLED for Display Panel Circuit Simulations (Page 1326)
Jiahao Kang, *Royole Corporation*
Shaowen Wang, *Royole Corporation*
Ze Yuan, *Royole Corporation & Shenzhen Royole Technologies Co. Ltd.*
Xiaojun Yu, *Royole Corporation & Shenzhen Royole Technologies Co. Ltd.*

P-6:

4-Sided Micro Border 8K4K LCD with Oxide-TFT Gate Driver Embedded Array (Page 1330)
ManHong Na, *AU Optronics Corp.*
Che-Wei Tung, *AU Optronics Corp.*
YuZuo Lin, *AU Optronics Corp.*
Wei-Li Lin, *AU Optronics Corp.*
Center Chen, *AU Optronics Corp.*

P-7:

Improvement of Electrical Stability of In-Ga-Zn-O Thin-film Transistors by Incorporation of Polytetrafluoroethylene in the Back Channel Region (Page 1334)
I Sak Lee, *Yonsei University*
Jae Won Na, *Yonsei University*
Byung Ha Kang, *Yonsei University*
Hyung Tae Kim, *Yonsei University*
Hyun Jae Kim, *Yonsei University*

Degradation Model of LTPS TFT Aged off-State Bias Stress on Flexible Substrate (Page 1338)
Kihwan Kim, *Sungkyunkwan University & Samsung Display Company*

Hyojung Kim, *Sungkyunkwan University & OLED Business Samsung Display*
Minjun Song, *Sungkyunkwan University*
P-8: Soonkon Kim, *Sungkyunkwan University*
Hyunguk Cho, *Samsung Display Company*
Youngmi Cho, *Samsung Display Company*
Yongjo Kim, *Samsung Display Company*
Byungderg Choi, *Sungkyunkwan University*

Timing Model and Maximum-Aperture Pixel Design of an Active-Matrix Display (Page 1342)
Xuchi Liu, *The Hong Kong University of Science and Technology*
P-9: Zhihe Xia, *The Hong Kong University of Science and Technology*
Hoi-Sing Kwok, *The Hong Kong University of Science and Technology*
Man Wong, *The Hong Kong University of Science and Technology*

Advantages of Active Pixel Circuit Using Gap-Type TFT as the Photo Device to Sense Low Intensity Light (Page 1346)
Cheng-Che Tu, *National Chiao Tung University*
P-10: Sin-You Wu, *National Chiao Tung University*
Ya-Hsiang Tai, *National Chiao Tung University*

High Performance All-Solution Processed InZnO Thin-Film Transistors via Photo-Functionalization at Varying Fluence and Annealing Environment (Page 1350)
Dianne Corsino, *Nara Institute of Science and Technology*
Juan Paolo Bermundo, *Nara Institute of Science and Technology*
P-11: Mami Fujii, *Nara Institute of Science and Technology*
Yasuaki Ishikawa, *Kyushu University*
Hiroshi Ikenoue, *Nara Institute of Science and Technology*
Yukiharu Uraoka, *Kyushu University*

A Robust a-IGZO TFT Integrated Scan/Emission Driver with Dynamic Inverter for AMOLED Display (Page 1354)
Tengteng Lei, *Peking University*
P-12: Congwei Liao, *Peking University*
Jie Huang, *Peking University*
Shengdong Zhang, *Peking University*

Large Subthreshold Swing of LTPS TFTs by Efficient Annealing Method for Light Emitting Diode Displays (Page 1358)
Takao Saito, *Sharp Corporation*
Yosuke Kanzaki, *Sharp Corporation*
P-13: Masahiko Miwa, *Sharp Corporation*
Masaki Yamanaka, *Sharp Corporation*
Yi Sun, *Sharp Corporation*
Seiji Kaneko, *Sharp Corporation*
Yoshiharu Kataoka, *Sharp Corporation*

Electrical Characteristics of P3HT:TIPS-Pentacene Blend Organic Thin-Film Transistor under Light Irradiation (Page 1362)
P-14: Hyunji Shin, *Hongik University*
Jaehoon Park, *Hallym University*
Jong Sun Choi, *Hongik University*

Thermal Conductivity Measurement of Indium-Gallium-Zinc-Oxide Thin Films Utilizing Three-Omega Method (Page 1365)
P-15: Rauf Khan, *Kyushu University*
Shim Chang-Hoon, *Kyushu University*
Reiji Hattori, *Kyushu University*

P-16: **Homojunction Indium–Gallium–Zinc Oxide Thin-Film Transistors by Selective Simultaneous UV and Thermal Treatment** (Page 1369)
Hyung Tae Kim, *Yonsei University*
Hyukjoon Yoo, *Yonsei University*
Jeong Woo Park, *Yonsei University*
Won-Gi Kim, *Yonsei University*
Dong Hyun Choi, *Yonsei University*
Hyun Jae Kim, *Yonsei University*

P-17: **Low-Temperature, Solution-Processed Inorganic p-Channel Cu-based Thin-Film Transistors and Circuits** (Page 1372)
Ao Liu, *Pohang University of Science and Technology (POSTECH)*
Huihui Zhu, *Pohang University of Science and Technology (POSTECH)*
Yong-Young Noh, *Pohang University of Science and Technology (POSTECH)*

P-18: **Ultra-Compact Multi-Level Digital-to-Analog Converter Based on Linear Multimodal Thin-Film Transistors** (Page 1375)
Eva Bestelink, *University of Surrey*
Olivier de Sagazan, *University of Rennes*
Radu Alexandru Sporea, *University of Surrey*

P-19: **A Study of Oxide TFT Vth Shift Behavior by Characterizing with Nano-scale SIMS** (Page 1379)
Jung Hwa Park, *Samsung Display Co., Ltd.*
Jae Bum Han, *Samsung Display Co., Ltd.*
Soo Im Jeong, *Samsung Display Co., Ltd.*
Young Gil Park, *Samsung Display Co., Ltd.*
Nari Ahn, *Samsung Display Co., Ltd.*

P-191: ***Late-News-Poster:*** **Effects of Channel Doping on Flexible LTPS TFTs: Density of State, Generation Lifetime, and Image Sticking** (Page 1383)
Hyojung Kim, *OLED Business Samsung Display Co., Ltd. and Sungkyunkwan University*
Jongwoo Park, *OLED Business Samsung Display Co., Ltd.*
Jangkun Song, *Sungkyunkwan University*
Byungdeog Choi, *Sungkyunkwan University*

P-192: ***Late-News-Poster:*** **Study of IGZO Dual Gate with BCE Structure in a Touch In-Cell Smartphone** (Page 1386)
Chih-Yu Su, *Mantix Display Technology Co., Ltd.*
P.-S. Kuo, *Mantix Display Technology Co., Ltd.*
Mingxia Xu, *Mantix Display Technology Co., Ltd.*
Yuan-Hang Li, *Mantix Display Technology Co., Ltd.*
Chih-Yuan Tseng, *Mantix Display Technology Co., Ltd.*

P-193: ***Late-News-Poster:*** **A Novel Charge Based TFT Compact Model Applicable to Image-Retention Simulation of AMOLEDs** (Page 1390)
Genshiro Kawachi, *Tianma Japan Ltd.*

P-194: ***Late-News-Poster:*** **Selenium 4p Orbital Enables High-Mobility p-Type Tin Oxyselenide Semiconductor for Thin-Film Transistor Applications** (Page 1394)
Taikyu Kim, *Hanyang University*
Jae Kyeong Jeong, *Hanyang University*

P-195: ***Late-News-Poster:*** **Data Retention in Pixel Drivers Based on Source-Gated Transistors** (Page 1397)
Eva Bestelink, *University of Surrey*
André Dale, *University of Surrey*

Radu A. Sporea, *University of Surrey*

P-196: ***Late-News-Poster:*** **Low-Temperature All Sputter IGZO-TFT Fabricated with Amorphous Metal Thin-Films** (Page 1400)
Dylan River Kearney, *Amorphyx, Inc.*
Jose Eduardo Mendez, *Amorphyx, Inc.*
Sarah R. Self, *Amorphyx, Inc.*
Jason P. Anderson, *Amorphyx, Inc.*
Sean W. Muir, *Amorphyx, Inc.*

Applied Vision

P-20: **Image Distortion and Image Correction of Curved OLED Displays** (Page 1404)
Wei-Kai Lee, *National Taiwan University*
Po-Jui Chen, *National Taiwan University*
Zih-Rou Cyue, *National Taiwan University*
Chung-Chih Wu, *National Taiwan University*

P-21: **A New Perceptual-driven Approach to Foveated Head-Mounted Displays** (Page 1408)
Pengyinjie Lyu, *University of Arizona*
Hong Hua, *University of Arizona*

P-22: **Correlation Analysis for Subjective and Non-Subjective Evaluation of Holograms Generated by Digital and Analog Spatial Light Modulators** (Page 1411)
Chih-Hao Chuang, *National Taiwan University*
Siao-Ting Li, *National Taiwan University of Science and Technology*
Chien-Yu Chen, *National Taiwan University of Science and Technology*
Hoang Yan Lin, *National Taiwan University*
Kuan-Hsu Fan-Chiang, *Himax Display, Inc.*
Hsien-Chang Tsai, *Himax Display, Inc.*

P-23: **A Subjective Method for Evaluating Foveated Image Quality in HMDs** (Page 1415)
Vijayaraghavan Thirumalai, *Samsung Display America Lab*
Javier Ribera, *Samsung Display America Lab*
Jie Xiang, *University of British Columbia*
Junbin Zhang, *University of British Columbia*
Maryam Azimi, *The University of British Columbia*
Jalil Kamali, *Samsung Display America Lab*
Panos Nasiopoulos, *University of British Columbia*

P-24: **The Visual Effect Evaluation of High Frame Rate Gaming LCD** (Page 1419)
Jianyou Chen, *XiaMen TianMa Microelectronics Co., Ltd.*
Ting Zhou, *XiaMen TianMa Microelectronics Co., Ltd.*
Caijiao Zhong, *XiaMen TianMa Microelectronics Co., Ltd.*
Ting Zhou, *XiaMen TianMa Microelectronics Co., Ltd.*
Junyi Li, *XiaMen TianMa Microelectronics Co., Ltd.*

P-197: ***Late-News-Poster:*** **Visual Advantages of Curved Displays for Working Efficiency** (Page 1423)
Daeun Park, *Ewha Womans University*
Wonyoung Seo, *Ewha Womans University*
JaeEun Cho, *Ewha Womans University*
HaeRyung Hong, *Ewha Womans University*
YoonJung Kim, *Ewha Color Design Institute*
YungKyung Park, *Ewha Womans University*

Automotive/Vehicular Displays and HMI Technologies

P-201: ***Late-News-Poster:*** **Synchronization Technique of Multi-Chip Cascade Architecture for Automotive TDDI** (Page 1462)
Daisuke Ito, *Synaptics Japan G.K.*
Ken Satou, *Synaptics Japan G.K.*
Kota Kitamura, *Synaptics Japan G.K.*
Takayuki Noto, *Synaptics Japan G.K.*
Albert Y. Lee, *Synaptics*
Vishal S. Shah, *Synaptics*
Joseph Yen Chen, *Synaptics*

Display Electronics

P-31: **Full Screen with High Refresh Frequency-120HZ and Low Power Consumption-30HZ for 5G** (Page N/A)
Bingping Liu, *XiaMen Tianma Microelectronics Co., Ltd.*
Jun Zhang, *XiaMen Tianma Microelectronics Co., Ltd.*
Bozhi Liu, *XiaMen Tianma Microelectronics Co., Ltd.*
Xiaoxiao Wu, *XiaMen Tianma Microelectronics Co., Ltd.*
Guozhao Chen, *XiaMen Tianma Microelectronics Co., Ltd.*
Junyi Li, *XiaMen Tianma Microelectronics Co., Ltd.*

P-32: **Novel Gate-Driving Circuit Integrated within Active Area Based on Amorphous Oxide TFT** (Page 1470)
MingXin Wang, *Nanjing CEC Panda LCD Technology Co., Ltd.*
Liufei Zhou, *Nanjing CEC Panda LCD Technology Co., Ltd.*
Zhijun Wang, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Shangjun Xu, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Yang Shu, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Huaipei Wang, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Ling Yuan, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Cunjian Bian, *Nanjing CEC Panda FPD Technology Co., Ltd.*
Mi Fei, *Nanjing CEC Panda FPD Technology Co., Ltd.*

P-33: **A High Current-Drive, Step-Up Capacitive Power Converter for Display Driver** (Page 1474)
Chenglin Li, *Peking University*
Dewei Zhang, *Peking University*
Weiling Zeng, *Peking University*
Hesheng Lin, *Peking University*
Min Zhang, *Peking University*

P-34: **New P-type Gate Driver Circuit with Simultaneous and Progressive Output Waveforms in One Frame for AMOLED Displays of Simultaneous Emission Driving Method** (Page 1478)
Chia-Lun Lee, *National Cheng Kung University*
Mao-Hsun Cheng, *AU Optronics Corp.*
Chih-Lung Lin, *National Cheng Kung University*

P-35: **Applying HVS Model to Construct SPR Algorithm for PenTile RGB Display** (Page 1482)
Baojun Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yufeng Jin, *TCL China Star Optoelectronics Technology Co., Ltd.*
Ching-Hong Lai, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yin-Hung Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Ming-Jong Jou, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Highly Reliable a-IGZO TFT Gate Driver Circuit to Prevent Leakage Path in Depletion Mode

Display Manufacturing

Kazutaka Hayashi, *AGC, Inc.*

Polysulfide Elastomers as Highly Elastic Materials for Flexible Displays (Page 1513)
Abraham Vega, *Ares Materials*
P-44: Kejia Yang, *Ares Materials*
Radu Reit, *Ares Materials*

Effect of Ar / O_2 Flow Ratio during Sputtering of InZnO Active Layer on Photocurrent and Responsivity Characteristics of Amorphous InZnO Thin Film Transistors (Page 1515)
Changhui Fan, *Peking University*
Yu Xin, *Peking University*
P-45: Ludong Qin, *Peking University*
Xiaoliang Zhou, *Peking University*
Shengdong Zhang, *Peking University & Active Matrix Display Beijing Engineering Research Center*

Fabrication and characterization of thick Cu films deposited on G8.5 LCD glass substrates for 8k and large TV panels (Page 1519)
Guo Li, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Xia Hui, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-46: Tan Zhiwei, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xiao Juncheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Zhou Hang, *Peking University*

Influences of Mo Film Residual Stress on Cu/Mo Interface and Undercut Performance (Page 1523)
Guo Li, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Chen Meng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Sun Sheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-47: Sun Yao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Liu Huangzheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Tan Zhiwei, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xiao Juncheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Zhou Hang, *Peking University*

Study of ITO Electrode on the White Color Uniformity of TFT-LCD (Page 1526)
Hui An, *BOE Technology Group co., Ltd.*
Binbin Cao, *BOE Technology Group co., Ltd.*
Yanming Lv, *BOE Technology Group co., Ltd.*
Chengzhi Ye, *BOE Technology Group co., Ltd.*
Fangfang Li, *BOE Technology Group co., Ltd.*
Li Ma, *BOE Technology Group co., Ltd.*
P-48: Qingyong Duanmu, *BOE Technology Group co., Ltd.*
Zengqian Yang, *BOE Technology Group co., Ltd.*
Junlin Peng, *BOE Technology Group co., Ltd.*
Zengli Liu, *BOE Technology Group co., Ltd.*
Fajie Li, *BOE Technology Group co., Ltd.*
Hongyong Peng, *BOE Technology Group co., Ltd.*
Xiangwan Lu, *BOE Technology Group co., Ltd.*
Hengbin Li, *BOE Technology Group co., Ltd.*

Ultimate Solution: The Belt Plane Source Evaporators for Future AMOLED and QD OLED TV (Page 1530)
Changhun Hwang, *Dankook University*
P-49: Sung Su Kim, *Dankook University*
Byung Doo Chin, *Dankook University*

P-57: Yuehchun Liao, *Tokyo Ohka Kogyo Co., Ltd.*
Kenri Konno, *Tokyo Ohka Kogyo Co., Ltd.*
Isao Hirano, *Tokyo Ohka Kogyo Co., Ltd.*
Kouichi Misumi, *Tokyo Ohka Kogyo Co., Ltd.*
Dai Shiota, *Tokyo Ohka Kogyo Co., Ltd.*
Katsumi Ohmori, *Tokyo Ohka Kogyo Co., Ltd.*

Properties of Diffraction Optical Elements on the Base of Discotic Liquid Crystal for Display Applications (Page 1558)

P-58: Victor V. Belyaev, *Moscow Region State University & RUDN University*
Alexey S. Solomatin, *Moscow Region State University & Mendeleev Russian Chemistry Technology University*
Andrey A. Belyaev, *Moscow Region State University*
Nune Hakobyan, *Yerevan State University*
Hakob Margaryan, *Yerevan State University*
Sandeep Kumar, *Raman Research Institute*
Alexander G. Smirnov, *Belarusian State University of Informatics and Radio-Electronics*

An Analytical Method of Small Size Module Waving based on the Finite Element Simulation (Page 1562)

P-59: Xiaohua Li, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Bingchuan Zhang, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Lei Zhu, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Qing Guo, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Wei Zhou, *Wuhan China Star Optoelectronics Technology Co., Ltd.*

Single-Step Plasma-Enhanced Chemical Vapor Deposition of Graphene on Cu Ink and Sputtered Cu Thin Films (Page 1565)

P-60: Chen-Hsuan Lu, *California Institute of Technology*
Chyi-Ming Leu, *Industrial Technology Research Institute*
Tzong-Ming Lee, *Industrial Technology Research Institute*
Nai-Chang Yeh, *California Institute of Technology*

Research on Key Factors Affecting the LC Margin Lower Limit of LCD (Page 1569)

P-61: Le Liu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Lang Xiao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Pang-Ling Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Cen Yi, *TCL China Star Optoelectronics Technology Co., Ltd.*
Qian-Shuang Hu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*

***Late-News-Poster:* Laser Assisted Plasma Enhanced Chemical Vapor Deposition for Damage-Resistive and Reliable Thin Film Encapsulation of Organic Light Emitting Diodes** (Page 1572)

P-232: Kunsik An, *Korea Institute of Industrial Technology (KITECH)*
Ho-Nyun Lee, *Korea Institute of Industrial Technology (KITECH)*
Kwan Hyun Cho, *Korea Institute of Industrial Technology (KITECH)*
Seung-Woo Lee, *Hanyang University*
Sung-Hwan Choi, *Korea Institute of Industrial Technology (KITECH)*
David J. Hwang, *State University of New York*
Kyung-Tae Kang, *Korea Institute of Industrial Technology (KITECH)*

Display Measurement

P-62: **Effect of Viewpoints of Integral Image 3D Display on Human Eye Accommodation Response** (Page 1576)
Cong Chen, *Sichuan University*

Huan Deng, *Sichuan University*
Qiong-Hua Wang, *Beihang University*
Fei-Yan Zhong, *Sichuan University*
Qing-Lin Ji, *Sichuan University*
Qiang Li, *Sichuan University*

P-63: **Measurements of Viewing Angle and Angular Resolution of Electronic Holographic Display** (Page 1580)
Jeho Nam, *Electronics and Telecommunications Research Institute (ETRI)*
Jinwoong Kim, *Electronics and Telecommunications Research Institute (ETRI)*

P-64: **Micro Optics Array for Aerial Display System and its Imaging Performance Evaluation Method** (Page 1584)
Hayato Kikuta, *Japan Electronics and Information Technology Industries Association (JEITA) & Utsunomiya University & Mitsubishi Electric*
Norikazu Kawagishi, *Japan Electronics and Information Technology Industries Association (JEITA) & Utsunomiya University & Yazaki Corporation*
Ryota Kakinuma, *Japan Electronics and Information Technology Industries Association (JEITA) & Utsunomiya University*
Shinichi Uehara, *Japan Electronics and Information Technology Industries Association (JEITA) & AGC, Japan*
Toru Iwane, *Japan Electronics and Information Technology Industries Association (JEITA) & Nikon*
Hiroshi Murayama, *Japan Electronics and Information Technology Industries Association (JEITA) & Sony Home Entertainment & Sound Products, Inc.*
Osamu Konuma, *Japan Electronics and Information Technology Industries Association (JEITA) & Samsung R&D Japan*
Tomoaki Ryu, *Japan Electronics and Information Technology Industries Association (JEITA) & Mitsubishi Electric*
Hirotsugu Yamamoto, *Japan Electronics and Information Technology Industries Association (JEITA) & Utsunomiya University & JST*

P-65: **Analysis on Local Area Cell Parameter Distribution Cause by Different Dosage on Photo Alignment PI of FFS mode LCD** (Page 1588)
Kun-Tsai Huang, *HannStar Display Corporation*
Yu-Wen Hung, *HannStar Display Corporation*
Ri-Xen Feng, *HannStar Display Corporation*
Sung-Chin Lin, *HannStar Display Corporation*
Chia-Hua Yu, *HannStar Display Corporation*

P-66: **Overview of International Standardization for Optical Fundamental Measurement of Eyewear Displays** (Page N/A)
Tongsheng Mou, *Zhejiang University*

Display Systems

P-67: **Analysis of Random Depolarization Films with Birefringent Micro particles for Liquid-Crystal and OLED Displays** (Page 1596)
Shizuki Sasaki, *Keio University*
Mariko Udono, *Keio University*
Yasuhiro Koike, *Keio University*

P-68: **Proposal of Novel Polymer Materials with No Birefringence over Wide Temperature Range** (Page 1600)
Kohei Watanabe, *Keio University*
Kobayashi Yuma, *Keio University*

Yasuhiro Koike, *Keio University*

P-69: **Analysis of Light Transmittance of Rugged LCDs in Random-Vibration Environment** (Page 1603)
Qibin Feng, *Hefei University of Technology*
Kai Su, *School of Instrument Science and Opto-electronics Engineering*
Ziang Hu, *School of Instrument Science and Opto-electronics Engineering*
Zi Wang, *Hefei University of Technology*
Guoqiang Lyu, *School of Instrument Science and Opto-electronics Engineering*

3D Displays

P-70: **Elimination of Double Images and Stray Light in a Light-Field Virtual-Reality Near-to-Eye Display** (Page 1607)
Hung-Ta Chien, *Coretronic Corporation*
Hsin-Hsing Lo, *Coretronic Corporation*
Chuan-Chung Chang, *Coretronic Corporation*
Fu-Ming Chuang, *Coretronic Corporation*

P-71: **Concept of Stereoscopic Full-Screen Resolution Flicker-Free Imaging of Two Three-Dimensional Scenes Simultaneously for Two Observers Using a Single 120-Hz Amplitude-Polarization Imager** (Page 1611)
Vasily A. Ezhov, *Prokhorov General Physics Institute of the Russian Academy of Sciences*

P-72: **An Autostereoscopic Display with a Deep Viewing Zone Using Time-Multiplexed Directional Backlight** (Page 1615)
Garimagai Borjigin, *University of Tsukuba*
Hideki Kakeya, *University of Tsukuba*

P-73: **Depth-Enhanced Integral Imaging Display System Based on Transmissive Mirror Device** (Page 1619)
Hui Ren, *Sichuan University*
Han-Le Zhang, *Sichuan University*
Yan Xing, *Beihang University*
Qiong-Hua Wang, *Beihang University*

P-74: **Aerial Signage Formed with AIRR and DS3D Display** (Page 1623)
Daiki Nishimura, *Utsunomiya University*
Masayuki Shinohara, *OMRON Corp*
Hirotsugu Yamamoto, *Utsunomiya University & JST, ACCEL*

P-75: **Tabletop Integral Imaging 3D Display with Annular Viewing Zone** (Page 1627)
Yan Xing, *Beihang University*
Qiong-Hua Wang, *Beihang University*
Yun-Peng Xia, *Sichuan University*
Shuang Li, *Sichuan University*
Hui Ren, *Sichuan University*

AR/VR

P-76: **Object Distance Adjustment and Location Technology in VR** (Page 1631)
Liu Yuhong, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Li Ke, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Ma Zhanshan, *Beijing BOE Optoelectronics Technology Co., Ltd.*

Jing Haoran, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Ge Zheng, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Peng Jinbao, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Wang Xuefeng, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Zhang Hao, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Tian Wenhong, *Beijing BOE Optoelectronics Technology Co., Ltd.*
Chen Lili, *Beijing BOE Optoelectronics Technology Co., Ltd.*

P-203: ***Late-News-Poster:*** **Impact of Optical and Surface Qualities of High-Refractive-Index Glass Wafer on Performance of AR/MR Glasses** (Page 1634)
Shin-ichi Amma, *AGC, Inc.*
Akira Shibata, *AGC, Inc.*
Tomohiro Shibuya, *AGC, Inc.*
Toshiya Yonehara, *AGC Electronics Co., Ltd.*
Motoshi Nakayama, *AGC Electronics Co., Ltd.*
Shinji Ueki, *AGC, Inc. Electronics Company*
Jin Uemura, *AGC, Inc. Electronics Company*
Teruo Fujiwara, *AGC, Inc. Electronics Company*
Nobuhiko Takeshita, *AGC, Inc. Electronics Company*

P-204: ***Late-News-Poster:*** **Stereoscopic AR Displays – Towards Solid-State Multi-Focal Architecture** (Page 1638)
Krišs Osmanis, *LightSpace Technologies*
Roberts Zabels, *LightSpace Technologies*
Ainar Ozols, *EuroLCDs*
Martinš Narels, *LightSpace Technologies*
Ilmars Osmanis, *LightSpace Technologies*

Backlights

P-77: **Angular Profile Shaping Film for LCD Backlight with Large Viewing Direction** (Page 1642)
Ssu-Tuan Huang, *National Chiao Tung University*
Cheng-Ta Mu, *National Chiao Tung University*
Yen-Yu Chou, *Epoch Chemtronics Corporation*
Guu-Huann Liu, *Epoch Chemtronics Corporation*
Cheng-Huan Chen, *National Chiao Tung University*

P-205: ***Late-News-Poster:*** **Head-Mounted Display with Aspherical Phase Plates to Reduce Visual Fatigue** (Page 1645)
Ryota Iida, *Tokyo University of Agriculture and Technology*
Yasushi Miyajima, *Itoh Optical Industrial Co., Ltd.*
Kazutoshi Kato, *Itoh Optical Industrial Co., Ltd.*
Yasuhiro Takaki, *Tokyo University of Agriculture and Technology*

P-206: ***Late-News-Poster:*** **Lattice Patterned Micro Lens Array (MLA) Optical Films for Mini-LED Back Light Units (BLUs)** (Page 1649)
Bing Shen, *Bright View Technologies*
Jennifer Aspell, *Bright View Technologies*
Thomas Rinehart, *Bright View Technologies*
Katie Patel, *Bright View Technologies*
Matthew Pope, *Bright View Technologies*
Kenneth Walker, *Bright View Technologies*

Emerging Technologies and Applications

P-209: Mohammad M. Afandi, *Pukyong National University*
Jongho Ryu, *Pukyong National University*
Sunghoon Lee, *Pukyong National University*
Jongsu Kim, *Pukyong National University*

Late-News-Poster: **3D Projection Display Based on Up-conversion Liquid Materials** (Page 1685)

P-210: Hongyue Gao, *Shanghai University*
Shili Ding, *Shanghai University*
Jicheng Liu, *Shanghai University*
Jiahao Luo, *Shanghai University*
Zehang Dai, *Shanghai University*
Suna Li, *Shanghai University*
Huilin Fang, *Shanghai University*
Xiaoxi Cheng, *Shanghai University*

Emissive, Micro-LED and Quantum Dot Display

P-85: **Development of High-yield Laser Lift-off Process for Micro LED Display** (Page 1688)
Jiye Xia, *Tsinghua University & Visionox Technology, Inc.*
Gaina Zhao, *Visionox Technology, Inc.*
Zhibo Yao, *Tsinghua University & Visionox Technology, Inc.*
Xiaobiao Dong, *Visionox Technology, Inc.*
Cuicui Sheng, *Visionox Technology, Inc.*
Zhisheng Li, *Visionox Technology, Inc.*
Xuan Cao, *Visionox Technology, Inc.*
Chenggong Wang, *Visionox Technology, Inc.*
Lian Duan, *Tsinghua University*

P-86: **Electrospinning of Perovskite Crystals with Strong Emission and Improved Electrical Conductivity** (Page 1691)
Yani Chen, *Peking University Shenzhen Graduate School & TCL China Star Optoelectronics Technology Co., Ltd*
Jinjie Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*

P-87: **A Scheme to Manufacture a High-Color-Purity Quantum-Dot Display** (Page 1695)
Chang-Chih Huang, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Chaoqun Yang, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Jiuhui Zhu, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Chih-Yuan Hou, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Guopeng Li, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Guanghui Liu, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Jianfeng Yuan, *Wuhan China Star Optoelectronics Technology Co., Ltd.*
Zhifu Li, *Wuhan China Star Optoelectronics Technology Co., Ltd.*

P-88: **Measurement and Analysis of Current Efficiency of Blue and Green Micro-LED Arrays with Different LED Chip Sizes** (Page 1699)
Enqing Guo, *Visionox Technology, Inc.*
Wenya Tian, *Visionox Technology, Inc.*
Qing Li, *Visionox Technology, Inc.*
Yan Wang, *Visionox Technology, Inc.*
Chenggong Wang, *Visionox Technology, Inc.*

P-89: **Ink Formulation and Film Photo-Stability of Quantum Dot Color Converters for MicroLED Applications** (Page 1703)
Chih-Jung Chen, *Taiwan Nanocrystals Co., Ltd.*
Tsung-Hsing Chiang, *Taiwan Nanocrystals Co., Ltd.*

Simon Jones, *Helio Display Materials*

Inkjet Printed $CsPbBr_3$ Quantum Dots for Full-Color Display (Page 1733)
Miao Duan, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yongwei Wu, *Peking University*
Yongming Yin, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-98: Jing Geng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Jun Hou, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Size and Temperature Effects of Ideality Factor in GaN/InGaN Multiple Quantum Wells Micro Light-Emitting Diodes (MicroLEDs) (Page 1735)
Yibo Liu, *Hong Kong University of Science and Technology*
Ke Zhang, *Hong Kong University of Science and Technology*
P-99: Joe Chan, *Hong Kong University of Science and Technology*
Sze-Yan Yeung, *Hong Kong University of Science and Technology*
Zhaojun Liu, *Southern University of Science and Technology*
Hoi-Sing Kwok, *Hong Kong University of Science and Technology*

Enhanced Luminescence by Multi 'A' Site Cations Strategy and Potassium Doping for Solution-Processed Perovskite Light-Emitting Diodes (Page 1739)
Yongwei Wu, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Zhiping Hu, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Zhilong Xin, *Peking University*
Guang Yang, *Peking University*
Pei Jiang, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-100: Miao Duan, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yongming Yin, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Bo He, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shujhih Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hang Zhou, *Peking University*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shengdong Zhang, *Peking University*

In-situ Fabrication Strategy of Perovskite Quantum Dots for Novel Display Technology (Page 1743)
Zelong Bai, *Beijing Institute of Technology*
Jing Li, *Zhijing Nanotech Co., Ltd.*
Tao Zhang, *Beijing Institute of Technology*
P-101: Fei Li, *Beijing Institute of Technology*
Ruikuo Liu, *Zhijing Nanotech Co., Ltd.*
Shize Qiu, *Zhijing Nanotech Co., Ltd.*
Rongjian Zhang, *Zhijing Nanotech Co., Ltd.*
Haizheng Zhong, *Beijing Institute of Technology*

Photo-aligned Quantum Rods with T-Shaped Ligands Based on Liquid-Crystal Polymer Matrix (Page 1745)
Chengbin Kang, *The Hong Kong University of Science and Technology*
Maksym F. Prodanov, *The Hong Kong University of Science and Technology*
P-104: Swadesh Kumar Gupta, *The Hong Kong University of Science and Technology*
Yiyang Gao, *The Hong Kong University of Science and Technology*
Valerii Vladimirovich Vashchenko, *The Hong Kong University of Science and Technology*
Abhishek Kumar Srivastava, *The Hong Kong University of Science and Technology*

Bright, Large-Pixel, Flexible Quantum-Dot Light-Emitting Diodes for Photomedicine (Page 1748)
M Alejandro Triana, *University of Central Florida*

P-105:
Shin-Tson Wu, *University of Central Florida*
Yajie Dong, *University of Central Florida*

Highly Luminescent Blue Light-Emitting Diodes Based on Quasi-2D Multi-Cation Perovskites (Page 1752)
Yongwei Wu, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Zhengyu Feng, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Guang Yang, *Peking University*
Pei Jiang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bo He, *TCL China Star Optoelectronics Technology Co., Ltd.*

P-106:
Miao Duan, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yongming Yin, *Peking University*
Shujhih Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hang Zhou, *Peking University*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shengdong Zhang, *Peking University*

Inkjet Printed Uniform Quantum Dots as Color Conversion for Active Matrix Micro-LED Display (Page 1755)
Zhiping Hu, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Yongwei Wu, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Bo He, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yongming Yin, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*

P-107:
Wenxiang Peng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yong Fan, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shu-jhih Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Hang Zhou, *Peking University Shenzhen Graduate School*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Stable Thermal Distribution of Flexible Transparent InGaN/GaN Multiple Quantum Wells Micro-LED Arrays (Page 1758)
Bo Lu, *Southern University of Science and Technology*
Yan Wang, *Southern University of Science and Technology*

P-108:
Chuanbiao Liu, *Southern University of Science and Technology*
Chin-Wei Sher, *Hong Kong University of Science and Technology*
Hao-Chung Kuo, *National Chiao Tung University*
Byung-Ryool Hyun, *Southern University of Science and Technology*
Zhaojun Liu, *Southern University of Science and Technology*

Temperature-dependent Forward Voltage of AlGaInP-based Red Micro-LEDs (Page 1761)
Yan Wang, *Southern University of Science and Technology*
Bo Lu, *Southern University of Science and Technology*
Chuan Biao Liu, *Southern University of Science and Technology*

P-109:
Chin Wei Sher, *Hong Kong University of Science and Technology*
Hao Chung Kuo, *National Chiao Tung University*
Byung Ryool Hyun, *Southern University of Science and Technology*
Zhao Jun Liu, *Southern University of Science and Technology*

Investigation of Bowing Effect of 4'' Epitaxial Wafer and Reliability of GaN-based Micro-LED Devices (Page 1764)
Ke Zhang, *Hong Kong University of Science and Technology & Southern University of Science and Technology*
Yibo Liu, *Hong Kong University of Science and Technology*

P-110:
Ka-wah Chan, *Hong Kong University of Science and Technology*
Sze-Yan Yeung, *Hong Kong University of Science and Technology*
Xiaowei Sun, *Southern University of Science and Technology*

Zhaojun Liu, *Hong Kong University of Science and Technology & Southern University of Science and Technology*
Hoi-Sing Kwok, *Hong Kong University of Science and Technology*

Red, Green, and Blue Quantum Rod Based Electroluminescent Light-Emitting Diodes (Page 1768)
Kumar Mallem, *The Hong Kong University of Science and Technology*
Maksym F. Prodanov, *The Hong Kong University of Science and Technology*
P-111: Swadesh Kumar Guptha, *The Hong Kong University of Science and Technology*
Bryan Siu Ting Tam, *The Hong Kong University of Science and Technology*
Valerii V. Vashchenko, *The Hong Kong University of Science and Technology*
Abhishek K. Srivastava, *The Hong Kong University of Science and Technology*

Stabilization of Perovskite Quantum Dots in Polymer Matrix in Thin Porous Film for Display Technology (Page 1771)
Yiyang Gao, *The Hong Kong University of Science and Technology*
Maksym F. Prodanov, *The Hong Kong University of Science and Technology*
P-112: Swadesh K. Gupta, *The Hong Kong University of Science and Technology*
Chengbin Kang, *The Hong Kong University of Science and Technology*
Valerii V. Vashchenko, *The Hong Kong University of Science and Technology*
Abhishek K. Srivastava, *The Hong Kong University of Science and Technology*

In Situ Fabrication of Organic-Inorganic Perovskite Polymer Composite Films for Ultrawide Color Gamut LCD display (Page 1775)
Xiang Li, *Shenzhen Planck Innovation Technologies Pte. Ltd. & Southern University of Science and Technology*
XiangWei Qu, *Southern University of Science and Technology*
P-113: Zuoliang Wen, *Southern University of Science and Technology & National University of Singapore*
Bing Xu, *Shenzhen Planck Innovation Technologies Pte. Ltd. & Southern University of Science and Technology*
Kai Wang, *Southern University of Science and Technology*
Xiao Wei Sun, *Southern University of Science and Technology*

***Late-News-Poster:* Quantum Dot Patterns in Molecularly Ordered Matrix for Emissive Displays with Wide Color Gamut** (Page 1779)
P-211: Sujie Kang, *Seoul National University*
Sin-Hyung Lee, *Seoul National University*
Sin-Doo Lee, *Seoul National University*

***Late-News-Poster:* Study on the Ideal Structural Change of Perovskite LEDs for Enhanced Performances by Using Different Perovskite Composition** (Page 1783)
P-212: Jungwon Kim, *Kyung Hee University*
Min Chul Suh, *Kyung Hee University*

***Late-News-Poster:* Electroluminescence of Oxide Phosphor in Metal-Oxide-Semiconductor Structure** (Page 1787)
Taewook Kang, *Pukyong National University*
Jehong Park, *Pukyong National University*
P-213: Boowon Park, *Pukyong National University*
Jimin Lim, *Pukyong National University*
Hyunwoo Kang, *Pukyong National University*
Hyundon Jeong, *Pukyong National University*
Jongsu Kim, *Pukyong National University*

***Late-News-Poster:* Development of Ce^{3+} Activated Yellow-Orange Nitride Phosphor for Various Applications** (Page 1790)
P-214: Yuhei Inata, *Mitsubishi Chemical Corporation*
Shiho Takashina, *Mitsubishi Chemical Corporation*

Flexible Displays and E-Paper

P-114: **A Protection Structure of the Foldable Display for Preventing the Macro-Cracks** (Page 1801)
Yingteng Zhai, *Tianma Microelectronics Co., Ltd.*
Zhe Li, *Tianma Microelectronics Co., Ltd.*
Quanpeng Yu, *Tianma Microelectronics Co., Ltd.*

P-115: **Research on Waviness Improvement for Foldable Display and Relevant Ultra-Thin Metal Plate Modeling Process** (Page 1805)
Haoran Wang, *BOE Display Technology Co., Ltd.*
Baoming Cai, *BOE Display Technology Co., Ltd.*
Shuang Du, *BOE Display Technology Co., Ltd.*
Shiming Shi, *BOE Display Technology Co., Ltd.*
Yongxiang Shi, *BOE Display Technology Co., Ltd.*
Xiongnan Zhang, *BOE Display Technology Co., Ltd.*
Yunjin Liu, *BOE Display Technology Co., Ltd.*

P-116: **Soft and Reconfigurable Wearable LED Display Using Soft Modular Blocks** (Page 1808)
Jaeyoung Yoon, *Seoul National University*
Yongtaek Hong, *Seoul National University*

P-117: **FLI Structure for R1 Foldable AMOLED Display** (Page 1811)
Chuan X. Xu, *BOE Technology Group Co., LTD.*
Shi Shu, *BOE Technology Group Co., LTD.*
Qi Yao, *BOE Technology Group Co., LTD.*
Guang C. Yuan, *BOE Technology Group Co., LTD.*
Hui L. Wu, *BOE Technology Group Co., LTD.*
Shuang Sun, *BOE Technology Group Co., LTD.*
Zhao Li, *BOE Technology Group Co., LTD.*
Jin X. Xue, *BOE Technology Group Co., LTD.*
Tie S. Wang, *BOE Technology Group Co., LTD.*
Hai T. Huang, *BOE Technology Group Co., LTD.*
Dong H. Wang, *BOE Technology Group Co., LTD.*

P-118: **Optimization of Folding Process for Flexible Electronic Device** (Page 1815)
Ko Chin Chung, *AU Optronics Corp.*
Zi Shuo Huang, *AU Optronics Corp.*
Yu Zhi Yu, *AU Optronics Corp.*
Yan Hui Lai, *AU Optronics Corp.*
Wan Tsang Wang, *AU Optronics Corp.*

P-119: **Modeling of Mechanical Effects in Flexible Display** (Page 1818)
Zhen-Peng Chen, *Shenzhen Royole Technologies Co., Ltd.*
Shan-Shan Li, *Shenzhen Royole Technologies Co., Ltd.*
Shuai Wang, *Shenzhen Royole Technologies Co., Ltd.*
Bong-Geum Lee, *Shenzhen Royole Technologies Co., Ltd.*
Ze Yuan, *Royole Corporation*
Xiaojun Yu, *Royole Corporation*

P-120: **High-Mobility IGZO Thin-Film Transistors Fabricated on a Flexible PET Monofilament Fiber for Wearable Display** (Page 1822)
Chan Young Kim, *Korea Advanced Institute of Science and Technology (KAIST)*
Jun Hong Park, *Korea Advanced Institute of Science and Technology (KAIST)*
Sang-Hee Ko Park, *Korea Advanced Institute of Science and Technology (KAIST)*
Kyung Cheol Choi, *Korea Advanced Institute of Science and Technology (KAIST)*

P-121: **Solution-Processed Organic-Inorganic Hybrid-Perovskite TFTs with Excellent Ambient Air Stability** (Page 1825)
Farjana Haque, *Kyung Hee University*
Mallory Mativenga, *Kyung Hee University*

P-122: **Mechanical Bending Test of High-Mobility ZnO TFTs on PI Substrate by Spray Pyrolysis** (Page 1829)
Jewel Kumer Saha, *Kyung Hee University & Jagannath University*
Ravindra Naik Bukke, *Kyung Hee University*
Md. Mehedi Hasan, *Kyung Hee University*
Youn Goo Kim, *Kyung Hee University*
Md Mobaidul Islam, *Kyung Hee University*
Narendra Naik Mude, *Kyung Hee University*
Mohammad Masum Billah, *Kyung Hee University*
Suhui Lee, *Kyung Hee University*
Jin Jang, *Kyung Hee University*

P-123: **Tiled Display on a Textile Base** (Page 1833)
Irina Kiryuschev, *Irus Optomechanics, Ltd.*
Semyon Konstein, *Sborka Laboratory LLC*

P-124: **A 17.3-inch WQHD Top-Emission Foldable AMOLED Display with Outstanding Optical Performance and Visual Effects** (Page 1836)
Bing Zhang, *BOE Technology Group Co., Ltd.*
Puyu Qi, *BOE Technology Group Co., Ltd.*
Zhongliu Yang, *BOE Technology Group Co., Ltd.*
Zhengde Lai, *BOE Technology Group Co., Ltd.*
Zhongjie Wang, *BOE Technology Group Co., Ltd.*
Suncun Li, *BOE Technology Group Co., Ltd.*
Xuan Luo, *BOE Technology Group Co., Ltd.*
Ping Luo, *BOE Technology Group Co., Ltd.*
Mengyue Fan, *BOE Technology Group Co., Ltd.*
Zhiqiang Wang, *BOE Technology Group Co., Ltd.*
Ziliang Xue, *BOE Technology Group Co., Ltd.*
Fan Peng, *BOE Technology Group Co., Ltd.*
Youxiong Feng, *BOE Technology Group Co., Ltd.*

P-125: **Influence of Line Shape on the Durability of Bending Lines on Flexible OLED Panels** (Page 1840)
Lin Dou Chen, *Wuhan Tianma Microelectronics Co., Ltd.*
Tao Peng, *Wuhan Tianma Microelectronics Co., Ltd.*
Yu Fang Ma, *Wuhan Tianma Microelectronics Co., Ltd.*
Qing Han, *Wuhan Tianma Microelectronics Co., Ltd.*
Guanzhen Peng, *Wuhan Tianma Microelectronics Co., Ltd.*

P-216: ***Late-News-Poster:*** **Ultra-Thin Graphene Oxide Encapsulation Film for Flexible OLED Displays via Self-Assembly Coating Process** (Page 1843)
Woo-Jin Lee, *Hongik University*
Yong-Seog Kim, *Hongik University*

Fingerprint Sensing Displays

P-128: **High-SNR Fingerprinting Structure with Switchable Backlight for Liquid-Crystal Displays** (Page 1847)
Kai Huang, *Shanghai Jiao Tong University*
Jiangang Lu, *Shanghai Jiao Tong University*

Operating Frequency and Sensitivity Prediction of In-Display Ultrasonic Fingerprint Sensing Systems (Page 1851)
Hyun Sung Park, *Samsung Display Co., Ltd.*
Hyundo Shin, *Samsung Display Co., Ltd.*
P-129: Jisoo Kim, *Samsung Display Co., Ltd.*
Yudeok Seo, *Samsung Display Co., Ltd.*
Dongjin Seo, *Samsung Display Co., Ltd.*
Yongjo Kim, *Samsung Display Co., Ltd.*

A Full Screen Biometric Identification Approach for OLED Displays by Using Near-Infrared OLED (Page 1855)
P-130: Chihao Lin, *National Chiao Tung University*
Karim S. Karim, *University of Waterloo*
Ya-Hsiang Tai, *National Chiao Tung University*

Force, Stylus and Haptics

P-126: **Surveys on the Stylus Technologies for Capacitive-Type Touch Systems** (Page 1859)
Jae-Sung An, *Delft University of Technology*
Young-Ho Jung, *Samsung Electronics Co., Ltd.*

Multi-touch Tactile Display with Segmented Electrode Structure and Driving Method for Presenting Tactile Free-shape Localized Textures (Page 1863)
Shin Takeuchi, *Tianma Japan, Ltd.*
P-127: Hiroshi Haga, *Tianma Japan, Ltd.*
Takuya Asai, *Tianma Japan, Ltd.*
Harue Sasaki, *Tianma Japan, Ltd.*
Koji Shigemura, *Tianma Japan, Ltd.*

Late-News-Poster: **Convolutional Neural Network-based Multi-touch Detection Technique on Learning from Class-imbalanced Dataset** (Page 1867)
Hyeon-Seok Yoon, *Sogang University*
Saehyun Ahn, *Sogang University*
P-217: Keon-Woo Kang, *Sogang University*
Il-ho Lee, *Samsung Display Co.*
Sang-jin Park, *Samsung Display Co.*
Yun-a Ma, *Samsung Display Co.*
Suk-Ju Kang, *Sogang University*

Late-News-Poster: **On the Scalability of On-Cell Touch for Flexible AMOLEDs** (Page 1871)
Wenbing Hu, *Royole Corporation*
Jiahao Kang, *Royole Corporation*
Haojun Luo, *Royole Corporation*
Shaowen Wang, *Royole Corporation*
P-218: Jian-Lei Zhu, *Shenzhen Royole Technologies Co., Ltd.*
Ze-Ning Jiang, *Shenzhen Royole Technologies Co., Ltd.*
Jian-Peng Li, *Shenzhen Royole Technologies Co., Ltd.*
Bong-Geum Lee, *Shenzhen Royole Technologies Co., Ltd.*
Ze Yuan, *Royole Corporation & Shenzhen Royole Technologies Co., Ltd.*
Xiaojun Yu, *Royole Corporation & Shenzhen Royole Technologies Co., Ltd.*

Late-News-Poster: **SDSWave: A Novel Ultrasonic Touch and Force-Sensing Technology** (Page 1875)
P-219: Samuel Sheng, *Sentons USA, Inc.*
Lapoe Lynn, *Sentons USA, Inc.*
Shih-Ming Shih, *Sentons USA, Inc.*

Seeing Through the Display

P-131: **A Design of Under-screen Face Recognition based on Screen Miniature Blind Apertures** (Page 1878)
Hao Zhang, *BOE Technology Group Co., Ltd.*
Libin Liu, *BOE Technology Group Co., Ltd.*
Zhenzhen Li, *BOE Technology Group Co., Ltd.*
Wenxiu Zhu, *BOE Technology Group Co., Ltd.*
Yuhan Qian, *BOE Technology Group Co., Ltd.*
Shiming Shi, *BOE Technology Group Co., Ltd.*
Dawei Wang, *BOE Technology Group Co., Ltd.*

An Under-Display Camera Optical Structure for Full-Screen LCD (Page 1881)
Hailiang Wang, *Xiamen Tianma Microelectronics Co., Ltd.*
Yan Lin, *Xiamen Tianma Microelectronics Co., Ltd.*
Yaying Li, *Xiamen Tianma Microelectronics Co., Ltd.*
Yan Yang, *Xiamen Tianma Microelectronics Co., Ltd.*
P-132: Ting Zhou, *Xiamen Tianma Microelectronics Co., Ltd.*
Ruxing Chen, *Xiamen Tianma Microelectronics Co., Ltd.*
Yihua Zhu, *Xiamen Tianma Microelectronics Co., Ltd.*
Binbin Chen, *Xiamen Tianma Microelectronics Co., Ltd.*
Junyi Li, *Xiamen Tianma Microelectronics Co., Ltd.*

Advances in Lighting Optics and Design

P-134: **Optical Design of Encapsulation for High EQE and Color Purity in OLEDs** (Page 1883)
Jun Yong Kim, *Kyungpook National University*
Kangwoo Jin, *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*
Jinhee Park, *Daegu Gyeongbuk Institute of Science and Technology (DGIST)*
Yun Seon Do, *Kyungpook National University*

Halide Perovskite-polymer Composite Films for the Two-color White OLED Displays (Page 1887)
P-135: Hyun Gi Kim, *Kyunghee University*
Hae Sook Kim, *Kyunghee University*
Sung Soo Kim, *Kyunghee University*

Bistable LCDs

P-136: **A Low Voltage, Switchable, Bistable-Twist-Nematic Display** (Page 1889)
Pengcheng Liu, *Hong Kong University of Science and Technology*
Man Chun Tseng, *Hong Kong University of Science and Technology*
Fion Sze Yan Yeung, *Hong Kong University of Science and Technology*
Hoi Sing Kwok, *Hong Kong University of Science and Technology*

Developing Fast Bistable FLC Mixtures (Page 1893)
William N. Thurmes, *Miyota Development Center of America, Inc.*
Michelle G. Livingston, *Miyota Development Center of America, Inc.*
P-137: Christopher J. Gabriel, *Miyota Development Center of America, Inc.*
Cory S. Pecinovsky, *Lightwave Logic, Inc.*
R. Scott Hathcock, *Miyota Development Center of America, Inc.*

Fast Response LCDs

P-138: **Fringe-Field Effect of Ferroelectric Liquid-Crystal Study Using Electrode Pattern for High Pixel Density Displays** (Page 1897)
Zhibo Sun, *Hong Kong University of Science and Technology*
Zhengnan Yuan, *Hong Kong University of Science and Technology*
Runxiao Shi, *Hong Kong University of Science and Technology*
Hoi-Sing Kwok, *Hong Kong University of Science and Technology*
A. K. Srivastava, *Hong Kong University of Science and Technology*

Double-side In-plane-switching Electrode Blue-phase Liquid Crystal Display with Permittivity Protrusion (Page 1901)
Li-Lan Tian, *Sichuan University*
Fan Chu, *Sichuan University*
P-139: Rui Li, *Sichuan University*
Xiao-Qing Gu, *Sichuan University*
Xiang-Xu Zhou, *Sichuan University*
Qiong-Hua Wang, *Beihang University*

Image Performance Improvement

P-140: **Evaluate and Improve Color Washout and Color Shift of VA LCD** (Page 1904)
Chun-Chi Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yan-Xue Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yue-Cu Lin, *TCL China Star Optoelectronics Technology Co., Ltd.*
Wei-Wei Zheng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Gang Yu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chung-Yi Chiu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Bin Zhao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Color Washout Improvement of VA-Mode LCDs (Page 1908)
Yani Chen, *Peking University & TCL China Star Optoelectronics Technology Co., Ltd.*
Jinjie Wang, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-141: Jing Zhu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Weina Yong, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shengdong Zhang, *Peking University*

Moire Analysis and Quantification in Oblique View (Page 1912)
Qian Jia, *BOE Technology Group Co., Ltd.*
Jaegeon You, *BOE Technology Group Co., Ltd.*
Xinxing Wang, *BOE Technology Group Co., Ltd.*
Kuanjun Peng, *BOE Technology Group Co., Ltd.*
P-142: Yingtao Wang, *BOE Technology Group Co., Ltd.*
Xuefei Sun, *BOE Technology Group Co., Ltd.*
Honghui Lin, *BOE Technology Group Co., Ltd.*
Liyan Liu, *BOE Technology Group Co., Ltd.*

A Novel Pixel Structure Design-MIS (Main In Sub) Pixel (Page 1915)
Kaili Qu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yoonsung Um, *TCL China Star Optoelectronics Technology Co., Ltd.*
Sikun Hao, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-143: Ziqi Liu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chuwei Liang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Lintao Liu, *TCL China Star Optoelectronics Technology Co., Ltd.*
Ting Li, *TCL China Star Optoelectronics Technology Co., Ltd.*

Effects of Dielectric Anisotropy and Electrode Structure on the Performance of VA-FFS LC Mode (Page 1918)
Wing-Kit Choi, *National Taiwan University*
P-144: Chih-Wei Hsu, *National Taiwan University*
Chia-Hsiang Tung, *National Taiwan University*
Bo-Kai Tseng, *National Taiwan University*

A New Optical Concept for High Duty Cycle Vertical Alignment Liquid Crystal Displays (Page 1922)
Zirong Wu, *Shenzhen AV-Display Co., Ltd.*
P-145: Congxin Chen, *Tsinghua University*
Zuzheng Zhao, *Tsinghua University*

Late-News-Poster: **Ultra-High-Resolution ADS TV** (Page N/A)
Hui Zhang, *BOE Technology Group Co., Ltd.*
Hongrun Wang, *BOE Technology Group Co., Ltd.*
Liwei Liu, *BOE Technology Group Co., Ltd.*
P-220: Changfeng Li, *BOE Technology Group Co., Ltd.*
Yunsik Im, *BOE Technology Group Co., Ltd.*
Xiaochuan Chen, *BOE Technology Group Co., Ltd.*
Xue Dong, *BOE Technology Group Co., Ltd.*

LC Photonics

P-146: **Electrically Tunable Bandpass Filter with Narrow Bandwidth of 27 nm** (Page 1930)
Ramesh Manda, *Jeonbuk National University*
Srinivas Pagidi, *Jeonbuk National University*
Yunjin Heo, *Jeonbuk National University*
Sub Shin Hoon, *Jeonbuk National University & LG Display Co., Ltd*
Hong Gwon Lee, *Jeonbuk National University*
Hyoung Soo Park, *Jeonbuk National University*
Daun Mun, *Jeonbuk National University*
Young Jin Lim, *Jeonbuk National University*
Seung Hee Lee, *Jeonbuk National University*

Multi-phase and Multi-pitch Twist Structure Liquid Crystals with Polymer Template (Page 1934)
P-147: Tengfei Huang, *Shanghai Jiao Tong University*
Jiangang Lu, *Shanghai Jiao Tong University*

Investigation of Photoluminescence and Birefringence of Nanoparticles Dispersed Nematic Liquid Crystal and its Application towards Liquid Crystal Display and Optoelectronic Devices (Page 1938)
P-148: Govind Pathak, *Centre for Nano and Soft Matter Sciences*
Veena Prasad, *Centre for Nano and Soft Matter Sciences*
Gurumurthy Hegde, *Centre for Nano-Materials and Displays*

Enhanced Electro-Optic Performances of the Optically Isotropic Liquid Crystal Displays Utilizing PEDOT: PSS (Page 1941)
Srinivas Pagidi, *Jeonbuk National University*
Ramesh Manda, *Jeonbuk National University*
P-149: Junhyeok Lee, *Jeonbuk National University*
Hong Gwon Lee, *Jeonbuk National University*
Young Jin Lim, *Jeonbuk National University*
Seung Hee Lee, *Jeonbuk National University*

LCD Modelling

Liquid Crystal Alignment

Stabilization of Perovskite Quantum Dots in Polymer Matrix in Thin Porous Film for Display Technology (Page 1971)
Yiyang Gao, *Hong Kong University of Science and Technology*
Maksym F. Prodanov, *Hong Kong University of Science and Technology*
P-155: Swadesh K. Gupta, *Hong Kong University of Science and Technology*
Chengbin Kang, *Hong Kong University of Science and Technology*
Valerii V. Vashchenko, *Hong Kong University of Science and Technology*
Abhishek K. Srivastava, *Hong Kong University of Science and Technology*

Distinguished Poster: **Curved Vertical-Alignment Liquid-Crystal Display with Uniform Brightness: from Pixel Design to Verification** (Page 1975)
Jie Cao, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Jianhong Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Peng Du, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
P-156: Jianjian Ying, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Tien-Chun Huang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Lixuan Chen, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Bin Zhao, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*
Xin Zhang, *Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.*

Rational Analysis of Self-Alignment Force of Reactive Additive Monomer with Multiple Methods (Page 1979)
Yu Zhang, *Peking University*
Song Lan, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-157: Te-Jen Tseng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chung-Ching Hsieh, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Shengdong Zhang, *Peking University*

Generation of Pretilt Angle and an Alignment Layer Utilizing Binary Mixture in PI-less Vertical Alignment Mode (Page 1982)
Gwan Yong Lee, *Jeonbuk National University*
Jun Hyeok Lee, *Jeonbuk National University*
P-158: Seong Min Song, *Jeonbuk National University*
Ramesh Manda, *Jeonbuk National University*
Young Jin Lim, *Jeonbuk National University*
Seung Hee Lee, *Jeonbuk National University*

Transmittance Improvement

P-159: **The Transmittance Improved of Polymer Stabilized Vertical Alignment Liquid Crystal Displays by Chiral Doping** (Page 1986)
Xingwu Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Mei Chen, *Peking University Shenzhen Graduate School and TCL China Star Optoelectronics Technology Co., Ltd.*
Qi Song, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yinfeng Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Te-Jen Tseng, *TCL China Star Optoelectronics Technology Co., Ltd.*
Chung-Ching Hsieh, *TCL China Star Optoelectronics Technology Co., Ltd.*
Juncheng Xiao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Dongze Li, *TCL China Star Optoelectronics Technology Co., Ltd.*
Lixuan Chen, *TCL China Star Optoelectronics Technology Co., Ltd.*
Xin Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*

Curing Mechanism and Optimal Solution for Interior Disclination in Ultrahigh-definition

2-domain VA LCD (Page 1990)
Yinfeng Zhang, *Peking University and TCL China Star Optoelectronics Technology Co., Ltd.*
Wu Cao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Qi Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
P-160: Yihe Zhang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Zhijun Huang, *TCL China Star Optoelectronics Technology Co., Ltd.*
Yunglun Lin, *TCL China Star Optoelectronics Technology Co., Ltd.*
Juncheng Xiao, *TCL China Star Optoelectronics Technology Co., Ltd.*
Min Zhang, *Peking University*

A Novel Approach for Highly Efficient LCD by Optimizing Thin Films (Page 1994)
Fangzhen Zhang, *BOE Technology Group Co., LTD.*
Lubin Shi, *BOE Technology Group Co., LTD.*
Xiaolong Li, *BOE Technology Group Co., LTD.*
Yujie Liu, *BOE Technology Group Co., LTD.*
P-161: Jipeng Song, *BOE Technology Group Co., LTD.*
Kuanjun Peng, *BOE Technology Group Co., LTD.*
Kai Guo, *BOE Technology Group Co., LTD.*
Jintao Peng, *BOE Technology Group Co., LTD.*
Bin Qin, *BOE Technology Group Co., LTD.*
Xiaochuan Chen, *BOE Technology Group Co., LTD.*

***Late-News-Poster:* High-Transmittance ADS TV Technology with Negative Liquid Crystal Based on Rubbing Process** (Page 1998)
Dan Wang, *BOE Technology Group Co., Ltd.*
Yajun Li, *BOE Technology Group Co., Ltd.*
Yangcan Shen, *BOE Technology Group Co., Ltd.*
P-224: Hongming Zhan, *BOE Technology Group Co., Ltd.*
Yinhu Huang, *BOE Technology Group Co., Ltd.*
Baoqiang Wang, *BOE Technology Group Co., Ltd.*
Zhangtao Wang, *BOE Technology Group Co., Ltd.*
Hailin Xue, *BOE Technology Group Co., Ltd.*
Xibin Shao, *BOE Technology Group Co., Ltd.*

OLEDs

P-162: **Improvement of Hole Injection in OLED Devices through Fluorine Plasma** (Page 2001)
Eun-Hyung Lee, *LG Display Co., Ltd.*
Song-Yi Jeong, *LG Display Co., Ltd.*
Kwang-Jong Kim, *LG Display Co., Ltd.*
Sung-Ji Yoon, *LG Display Co., Ltd.*
Soo-Won Hwang, *LG Display Co., Ltd.*
Sun-Kap Kwon, *LG Display Co., Ltd.*
Heui-Dong Lee, *LG Display Co., Ltd.*
Ji-Ho Baek, *LG Display Co., Ltd.*
Hyun-Chul Choi, *LG Display Co., Ltd.*
In-Byeong Kang, *LG Display Co., Ltd.*

P-163: **The Optimization of Various Range Voltage in OLED According to Energy Level And Mobility Respectively** (Page 2125)
Lei Chen, *BOE Technology Group Co., Ltd*
Congcong Jia, *BOE Technology Group Co., Ltd*
Zhengyin Xu, *BOE Technology Group Co., Ltd*
Xiaojin Zhang, *BOE Technology Group Co., Ltd*
Kun Ma, *BOE Technology Group Co., Ltd*
Dan Wang, *BOE Technology Group Co., Ltd*

P-179:
Won Jae Chung, *Sungkyunkwan University*
Jun Yeob Lee, *Sungkyunkwan University*

P-180:
Efficient Blue Phosphorescent Organic Light-Emitting Diode with Extremely High External Quantum Efficiency (Page 2054)
Won Jae Chung, *Sungkyunkwan University*
Rena Zaen, *Kangwon National University*
Ki-Min Park, *Kangwon National University*
Kyung Hyung Lee, *Sungkyunkwan University*
Jun Yeob Lee, *Sungkyunkwan University*
Youngjin Kang, *Kangwon National University*

P-181:
Efficient Thermally Activated Delayed Fluorescence Sensitizer of Hyperfluorescence OLED by Adding Blocking Group (Page 2058)
Sung Joon Yoon, *Sungkyunkwan University*
Won Jae Chung, *Sungkyunkwan University*
Jun Yeob Lee, *Sungkyunkwan University*

P-182:
A Numerical Analysis of Current Efficiency Hump at Low Grey in OLED Devices (Page 2061)
Hyung Uk Cho, *Samsung Display*
Bo Woon Kim, *Samsung Display*
Jun Young Lee, *Samsung Display*
Young Mi Cho, *Samsung Display*
Seung In Baek, *Samsung Display*
Yong Jo Kim, *Samsung Display*

P-183:
Development of Highly Efficient Long Wavelength Thermally Activated Delayed Fluorescent Organic Light-Emitting Diodes Using an Auxiliary Acceptor as Reverse Intersystem Crossing Promoter (Page 2063)
Shantaram Sahadu Kothavale, *Sungkyunkwan University*
Won Jae Chung, *Sungkyunkwan University*
Jun Yeob Lee, *Sungkyunkwan University*

P-184:
Distinguished Poster: **Coupled 3D Master Equation and 1D Drift-Diffusion Approach for Advanced OLED Modeling** (Page 2067)
Simon Zeder, *ETH Zurich and Fluxim AG*
Christoph Kirsch, *Zurich University of Applied Sciences*
Urs Aeberhard, *Fluxim AG*
Balthasar Blülle, *Fluxim AG*
Sandra Jenatsch, *Fluxim AG*
Beat Ruhstaller, *Fluxim AG and Zurich University of Applied Sciences*

P-185:
Flexible Organic Light-Emitting Diodes with Improved Outcoupling Efficiency (Page 2071)
Changyeong Jeong, *University of Michigan*
Yong-Bum Park, *University of Michigan*
L. Jay Guo, *University of Michigan*

P-187:
Micro-Patternable AgNW-PEDOT:PSS Hybrid Electrodes for All-Solution-Processed Polymer Light-Emitting Diodes (Page 2075)
Geonhee Kim, *Seoul National University*
Jongjang Park, *Seoul National University*
Jinsu Yoon, *Seoul National University*
Seunghwan Lee, *Seoul National University*
Yongtaek Hong, *Seoul National University*

Effect of Double-Layered Bank Structure on Hole-Injection Properties in Inkjet-Printed OLED

Applying Nanostructured Reflective Anode (Page 2104)
Nam Su Kim, *Kyung Hee University*
P-229: Jae Ho Song, *Kyung Hee University*
Dae Young Kim, *Kyung Hee University*
Min Chul Suh, *Kyung Hee University*

Late-News-Poster: **Evaluations of Lithium-Fluoride Behavior in OLEDs by Means of Cyclic-Displacement Current-Measurement Method** (Page 2107)
Masaru Inoue, *TOYOTech LLC*
Yoshiyuki Kaneko, *TOYO Corporation*
Hiroshi Fujimoto, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) &*
P-230: *Kyushu University*
HIroshi Miyazaki, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) & Kyushu University*
Chihaya Adachi, *Fukuoka i3-Center for Organic Photonics and Electronics Research (i3-opera) & Kyushu University*

Late-News-Poster: **Color-Shift Improvement of AMOLED Device with Color Filter** (Page 2111)
Xuan Zhao, *Visionox*
P-233: Jinlei Huang, *Visionox*
Zhixiang Wang, *Visionox*
Insun Hwang, *Visionox*

Printed Displays

P-189: ***Late-News-Poster:*** **In SituSelective UV-O_3-Based Facile Patterning Method of Random SWCNT Networks for Solution-Processed SWCNT TFT and Circuit Application** (Page 2113)
Hyeonggyu Kim, *Seoul National University*
Seunghwan Lee, *Seoul National University*
Jiseok Seo, *Seoul National University*
Taehoon Kim, *Seoul National University*
Yongtaek Hong, *Seoul National University*

Late-News-Poster: **Micrometer-Scale Patterning of Self-Assembled SWCNT Films and Thin-Film Transistors Using Patterned PLL Layer** (Page 2117)
Boik Park, *Seoul National University*
Jongsu Jang, *Seoul National University*
P-190: Hyeonggyu Kim, *Seoul National University*
Jiseok Seo, *Seoul National University*
Hyunjun Yoo, *Seoul National University*
Taehoon Kim, *Seoul National University*
Yongtaek Hong, *Seoul National University*