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<i>M. Yukikawa, K. Nakamura, N. Kobayashi</i>	
<b>EP1-3 - Invited Three-Particle Electrophoretic Display</b>	1808
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<b>EP1-4L - Multicolor Twisting-Ball Display Without CFA</b>	1811
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### **EP2: FLEXIBLE E-PAPER AND IOT APPLICATION OF E-PAPER**

<b>EP2-1 - Invited High Durable Electrochromic Devices with Plastic Substrates</b>	1813
<i>H. Yaginuma, S. Yamamoto, D. Gotoh, K. Yutani, T. Fukuda, F. Kaneko, M. Inoue, H. Takahashi, Y. Okada, K. Takaaji, T. Yashiro</i>	
<b>EP2-2 - Invited Advances in Flexible Electrophoretic Displays</b>	1817
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<b>EP2-3 - E-Paper as Key Display Technology for Internet of Things (IoT)</b>	1820
<i>K. Blankenbach, A. Marsal, T. Fegert</i>	

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<i>S. Tsuneyasu, K. Ichihara, K. Nakamura, N. Kobayashi</i>	
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<b>EPP1-4L - Experiment of Conductive Particle Actuation Using Capacitive Force : A New Method to Measure Adhesion Force Between Conductive Particles and Micro-Electrodes .....</b>	1845
<i>K. H. Yang, H. W. Yoon, M. Hong</i>	
<b>EPP1-5L - Rewritable Paper Utilizing Kapok Fibers Containing Pressure Sensitive Material .....</b>	1847
<i>S. Kiyama, K. Noda, R. Wada, S. Yoshinari, S. Maeda</i>	
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<i>S. Yoshinari, S. Kiyama, K. Noda, R. Wada, S. Maeda</i>	
<b>EPP1-7L - SnO<sub>2</sub> Electrodes Prepared by Mist Deposition Processes for Ag Deposition-Based Three-Way EC Device .....</b>	1851
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<b>EPP1-8L - Titanium Plate as Rewritable Imaging Media.....</b>	1853
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<b>EPP1-9L - Fabrication of Plastic Cholesteric LCDs for Color e-Paper Applications Using Simplified Processes.....</b>	1855
<i>D.-S. Yoon, S.-J. Lee, H.-S. Yang, G.-H. Kim, H.-J. Hong, Z. Hong, B.-Y. Lee, S.-G. Hyeon, S.-B. Kwon</i>	
<b>EPP1-10L - Evaluation of e-Paper as a Substitution of Paper in Office - Comparison with Paper and PC in a Proofing Task - .....</b>	1857
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<i>W. I. Milne, T. Hallam, G. Duesberg, C. Li, W. Lei, B. P. Wang, M. T. Cole</i>	
<b>MEET1-2 - Invited New Approach for Fabricating High-Brightness GaN LED Microdisplays with High Resolution and Very Small Pixel-Pitch .....</b>	1863
<i>F. Templier, L. Benaisa, I. Degirmencioglu, M. Charles, S. Tirano, A. Daami</i>	
<b>MEET1-3 - Invited A Novel Approach to the Manufacture of Micro-LED Colour Conversion Structures .....</b>	1867
<i>J. Silver, P. G. Harris, G. R. Fern, J. Bonar, G. Valentine, S. Gorton</i>	
<b>MEET1-4 - Invited Passive Matrix Inorganic Displays by Transfer-printing .....</b>	1871
<i>A. J. Trindade, E. Radauscher, S. Bonafede, D. Gomez, T. Moore, C. Prevatte, B. Raymond, B. Fisher, K. Ghosal, A. Fecioru, D. Kneiburg, M. Meitl, C. Bower</i>	

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<b>MEET2-2 - Invited Fabrication of High Performance Electron Beam with Carbon Nanotube Cold Cathode and Its Applications.....</b>	1875
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<b>MEET2-3 - Graphene Protected Ag Nanowires: Blocking of Surface Migration for Thermally Stable and Wide-Range-Wavelength Transparent Flexible Electrodes .....</b>	1879
<i>A. Lee, J. Lee, H. K. Yu</i>	
<b>MEET2-4 - Invited Progress in Electro-Fluidic Displays at South China Normal University .....</b>	1883
<i>B. Tang, Y. Deng, R. A. Hayes, G. F. Zhou</i>	
<b>MEET2-5L - Invited Quantum Rod Film (QRF) Optical Properties and Stability .....</b>	1886
<i>J.S. Niehaus, K. Poulsen, S. Becker, T.M. Jochum, H. Weller</i>	

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<b>MEET3-1 - Invited Plastic Packaging Recycling Using Intelligent Separation Technologies for Materials .....</b>	1888
<i>J. Silver, P. G. Harris, G. R. Fern, E. Kosier, M. Kay, J. Mitchell</i>	
<b>MEET3-2 - Invited Efficient SPICE Model of TFT with Gaussian Density of States .....</b>	1892
<i>Y. Bonnassieux, S. Jung, G. Horowitz</i>	
<b>MEET3-3 - Invited Nanostructured Polymer Particles for Display Applications and Others Prepared by Self-Organization Processes .....</b>	1894
<i>H. Yabu</i>	
<b>MEET3-4 - Plasma Nano Texturing Photo Resistor for Pixel ITO Forming in 3-Mask TFT Process .....</b>	1897
<i>M. Lu, J. Yao, S. Qin, X. Liu, G. Huang, X. Cai, Z. Li</i>	

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<b>MEET4-1 - Invited Tandem QLED with Oxide Charge Generation Junction .....</b>	1901
<i>J. Jang, H.-M. Kim, E. Hwang</i>	
<b>MEET4-2 - Invited Full-Color Patterning of Quantum Dot Displays Based on Transfer Printing and Inkjet Printing .....</b>	1905
<i>J. Han, D. Ko, J. Roh, H. Jung, Y. Lee, J. Sohn, W. K. Bae, C. Lee</i>	
<b>MEET4-3 - Invited Solution-Processable Hybrid Light-Emitting Devices Based on Organic/Inorganic Nanocomposites .....</b>	1909
<i>Y. Liu, F. Li, J. Lin, H. Hu, T. Guo</i>	
<b>MEET4-4 - Invited Quantum Dot Electroluminescence .....</b>	1912
<i>P. Kathirgamanathan, M. Kumaraverl, N. Bramanathan, S. Ravichandran, L. M. Bushby, S. Surendrakumar</i>	

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<i>H. Kim, C. Hotz, E. Lee, Z. Luo, J. Yurek</i>	
<b>MEET5-2 - Invited Heavy Metal-Free Quantum Dots for Consumer Applications.....</b>	1919
<i>N. L. Pickett, N. C. Gresty, I. Naasani</i>	
<b>MEET5-3 - Invited Luminescent Nanocrystals and Devices for Energy-Saving Quality Displays and Lighting .....</b>	1922
<i>K. Wang, X. W. Sun</i>	
<b>MEET5-4 - Invited Optical Characteristics of Quantum Rod Color Pixel Converter Combined with Twisted Nematic LCD.....</b>	1924
<i>M. Hasegawa, Y. Hirayama</i>	

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<b>MEETP1-1 - CsPbBr<sub>3</sub> Based Perovskite Nanocrystals for Light-Emitting Diodes .....</b>	1928
<i>S.-Y. Cho, H.-M. Kim, E. Moyen, J. Jang</i>	
<b>MEETP1-2 - All Solution Processed Charge Generation Junction for Quantum-Dot Light Emitting Diodes.....</b>	1932
<i>E. Hwang, H.-M. Kim, J. Kim, J. Jang</i>	

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<b>MEETP2-1 - Fabrication of Nano-Gap in Thin Metal (Ag, Au, Cu) Film Using Water-Soluble Inorganic Film for Surface-Enhanced Raman Spectroscopy .....</b>	1936
<i>K. Min, W. J. Jeon, H. K. Yu</i>	
<b>MEETP2-2 - Doping Effect on Performance of Solution-Processed Metal Oxide P-N Heterojunction Diodes.....</b>	1940
<i>J. Shin, J. Kim, H.-M. Kim, J. Jang</i>	
<b>MEETP2-3 - Application of Projector Display Technology for Inspection of Hydrogen Production Rate with Designed TiO<sub>2</sub> Electrodes .....</b>	1944
<i>C.-J. Ou, R.-Y. Lan, C.-R. Ho, Y.-S. Hong, Z.-F. Chen, C.-J. Huang</i>	
<b>MEETP2-4 - Update Review on the Application of Information Display Technology for Optogenetics and Cell Illuminating Device .....</b>	1946
<i>C.-J. Ou, M. Y. Cheng, C.-R. Ho, Y.-J. Hsu, C.-J. Huang</i>	
<b>MEETP2-5L - Morphological and Electrical Properties of Nanocrystalline Zinc Oxide Thin Films.....</b>	1948
<i>K. H. Kim, Z. Jin, Y. Yoshihara, Y. Abe, M. Kawamura, T. Kiba</i>	
<b>MEETP2-6L - Rotary-Linear Ultrasonic Motor of the Lead-Free NKN-based Ceramics for Camera Applications.....</b>	1950
<i>C.-M. Weng, S.-Y. Chu, C.-C. Tsai, C.-S. Hong, J. Sheen</i>	
<b>MEETP2-7L - Application of Display Projector as Solar Panel Inspection .....</b>	1952
<i>C.-J. Ou, Z.-Y. Shih, K.-S. Hsu, C.-J. Huang</i>	

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<b>DES1-1 - Invited 10th Anniversary: Display Innovation-Past and Future of the DES-WS - .....</b>	1954
<i>H. Okumura</i>	
<b>DES1-2 - Invited Display Electronic Systems: Augmented Reality in the Next Decade.....</b>	1958
<i>Y. Oyamada</i>	

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<b>DES1-3 - Invited Development of a New Head-Up Display System Using 2D Local Dimming with RGBW Technology .....</b>	1962
<i>K. Sako, N. Takasaki, S. Aoki, T. Yata, T. Harada</i>	
<b>DES1-4 - Invited Three-Dimensional Head-Up Display for Automobiles Using Super Multi-View Display.....</b>	1966
<i>Y. Takaki</i>	

### **DES2: HIGH IMAGE QUALITY TECHNOLOGY**

<b>DES2-1 - Invited Motion-based Verification of Visually Lossless Display Stream Compression for HDR Imagery.....</b>	1969
<i>W. Wang, D. Hoffman, D. Stoltzka, W. Xiong</i>	
<b>DES2-2 - Development of OLED Display Using Adaptive Temporal Aperture Control Driving Methods with Transition Area Insertion.....</b>	1973
<i>T. Usui, Y. Takano, T. Yamamoto</i>	
<b>DES2-3 - Introduction of “Panel Display Enhance” Technology and Its Application on High PPI Display Device.....</b>	1977
<i>Z. Zhang, L. Fang, X. Zhan, C. He, M. Huang, H. Kusanagi, H. Ikeno, L. Wu, X. Zhou, P. Shen, J. Li, C. Tseng</i>	
<b>DES2-4 - 8K Ultra-High-Definition Medical Display System.....</b>	1981
<i>L. Geng, C. Leng, R. Duan, C. Wei</i>	

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<b>PRJ4/DES3-1 - Invited Projection Mapping Technologies for AR.....</b>	1984
<i>D. Iwai</i>	
<b>PRJ4/DES3-2 - Invited Animating Static Objects by Illusion-Based Projection Mapping.....</b>	1987
<i>S. Nishida, T. Kawabe, T. Fukiaige, M. Sawayama</i>	
<b>PRJ4/DES3-3 - Invited 3D Billboards Without Glasses.....</b>	1990
<i>J. Reitterer, F. Fidler, G. Schmid, C. Hambeck, F. S. Julien-Wallsee, W. Leeb, U. Schmid</i>	
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