

2016 International Conference on Electronics Packaging (ICEP 2016)

**Hokkaido, Japan
20-22 April 2016**



**IEEE Catalog Number: CFP1689U-POD
ISBN: 978-1-5090-1927-4**

**Copyright © 2016, The Japan Institute of Electronics Packaging
All Rights Reserved**

******This publication is a representation of what appears in the IEEE
Digital Libraries. Some format issues inherent in the e-media version may
also appear in this print version.***

IEEE Catalog Number:	CFP1689U-POD
ISBN (Print-On-Demand):	978-1-5090-1927-4
ISBN (Online):	978-4-904090-17-6

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
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE of CONTENTS

Keynote Lectures

13:50-14:50 Wednesday, April 20

System Scaling for New Era of Automotive Electronics – An Ultimate System Integration Opportunity	Rao R Tummala, Georgia Institute of Technology	–
---	--	---

15:50-16:50 Wednesday, April 20

System Design Challenges for Future Consumer Devices: from Glass to ChromeBooks	Eric Shiu, Google	1
---	-------------------	----------

16:50-17:50 Wednesday, April 20

The Frontiers of Information Technology	Dario Gil, IBM Research	–
---	-------------------------	---

WA1: iMAPS Session

10:30-12:10 Wednesday, April 20

WA1-1 <Session Invited>	What's Driving the Growth in SiP?	Jan Vardaman, TechSearch International / USA	6
WA1-2 <Session Invited>	New Generation Embedded SiP Technology	Chien-Fan Chen, ASE Group / Taiwan	7
WA1-3 <Session Invited>	Beyond cell phones: Issues in Higher Level Integration in High Performance Microwave Devices	Susan Trulli, Raytheon / USA	8
WA1-4	Panel Discussion: What Needs to Be Done for the Next Wave of Market/ Technology Trends for Integrated Packaging		–

WB1: DMR-Mechanical

10:30-12:10 Wednesday, April 20

WB1-1	Investigation of Thermal Cycling Maximum Temperature Effect on Fatigue Life of WLCSP	Min-Hsuan Hsu, Kuo-Ning Chiang, National Tsing Hua Univ. / Taiwan	9
WB1-2	Non-destructive Testing Method for Chip Warpage -Applications of Synchrotron Radiation X-ray	Hsueh-Hsien Hsu ¹ , Chang-Meng Wang ² , Hsin-Yi Lee ³ , Albert T. Wu ¹ , ¹ National Central Univ., ² Shenmao Technology, ³ National Synchrotron Radiation Research Center / Taiwan	15

WC1: RF

10:30-12:10 Wednesday, April 20

WC1-1	Negative Group Delay Characteristics of Embedded Transmission Line with Half-wavelength Type F-SIR Structure	Yoshiki Kayano ¹ , Hiroshi Inoue ² , ¹ Akita Univ., ² The Open Univ. of Japan / Japan	19
WC1-2	A Design Method of Matching Circuits for a Compact Diplexer Using SAW Filters	Shinpei Oshima ¹ , Tomonori Oshima ¹ , Koji Wada ² , ¹ National Institute of Technology, Oyama College, ² The Univ. of Electro-Communications / Japan	23
WC1-3	Ultra Thin Low ESL and Ultra Wide Broadband Silicon Capacitors	Catherine Bunel, Franck Murray, IPDiA / France	27
WC1-4	Transmission Characteristics of Wearable Transmitter and Stationary Receiver through Human Body	Dairoku Muramatsu, Naruto Arai, Ken Sasaki, The Univ. of Tokyo / Japan	31

WD1: Substrate and Interposers

10:30-12:10 Wednesday, April 20

WD1-1	High Performance Insulating Adhesive Film for High-Frequency Applications	Hisao Kondo, Masaki Yoshida, Munetoshi Kusama, Shin Teraki, NAMICS / Japan	35
WD1-2	Challenge to Zero CTE and Small Cure Shrinkage Organic Substrate Core Material for thin CSP Package	Norihiko Sakamoto, Shin Takanezawa, Shinji Tsuchikawa, Masaaki Takekoshi, Kenichi Oohashi, Koji Morita, Hitachi Chemical / Japan	39
WD1-3	Ultra Low Loss Build-up Film for Fine Pitch Applications	Aya Kasahara, Tetsuro Iwakura, Yusuke Kondo, Tetsuro Irino, Hiroshi Shimizu, Hitachi Chemical / Japan	43
WD1-4	Reliability Test for Integrated Glass Interposer	Ching Kuan Lee ¹ , Jen-Chun Wang ¹ , Yu-Min Lin ¹ , Chau-Jie Zhan ¹ , Wen-Wei Shen ¹ , Huan-Chun Fu ¹ , Yuan-Chang Lee ¹ , Chia-Wen Chiang ¹ , Su-Ching Chung ¹ , Su-Mei Chen ¹ , Chia-Wen Fan ¹ , Hsiang-Hung Chang ¹ , Wei-Chung Lo ¹ , Yung Jean Lu ² , ¹ Industrial Technology Research Institute, ² Corning / Taiwan	48

WE1: Optoelectronics

10:30-12:10 Wednesday, April 20

WE1-1 <Session Invited>	Optical Multi-Chip Module for Servers and Cloud	Shigeru Nakagawa, IBM Japan / Japan	-
WE1-2	Effect of Substrate Dimensions and Boundary Conditions on the Heat Spreading of LED Package	Shi-Wei Ricky Lee ¹ , Zhenhuan Tian ¹ , Minshu Zhang ² , An Xie ² , ¹ Hong Kong Univ. of Science and Technology, ² Xia Men Univ. of Technology / Hong Kong	52
WE1-3	Numerical Prediction and Experimental Validation of Multiple Phosphor White LED Spectrum	Jeffery C. C. Lo, S. W. Ricky Lee, Xungao Guo, Huishan Zhao, Hong Kong Univ. of Science and Technology / Hong Kong	57
WE1-4	Study on Current and Junction Temperature Stress Aging Effect for Accelerated aging test of Light Emitting Diodes	Chih-Ju Chan, Feng-Mao Hsu, Yen-Fu Su, Kuo-Ning Chiang, National Tsing Hua Univ. / Taiwan	62

TA1: Edge Devices

9:30-11:10 Thursday, April 21

TA1-1 <Session Invited>	Consumers & Wearables Drive Digital Health in New Directions!	Matthew Hudes, Deloitte / USA	-
TA1-2 <Session Invited>	Advances in Autonomous Driving & V2X Technologies	Dwight Howard, Delphi / USA	-
TA1-3 <Session Invited>	Wearable Electronics & Big Data = High Volume, High Mix Manufacturing!	Charles E. Bauer, TechLead / USA	-
TA1-4 <Session Invited>	Neuromorphic Devices for Cognitive Computing	Yasumitsu Orii, IBM Research Tokyo / Japan	-

TA2: BEOL Session

11:20-13:00 Thursday, April 21

TA2-1 <Session Invited>	Nanocarbon Interconnects: Current status and prospects	Shintaro Sato, Fujitsu Laboratories, National Institute of Advanced Science and Technology / Japan	66
TA2-2	Three-Dimensional Integration Technology of Separate SOI Layers for Photodetectors and Signal Processors of CMOS Image Sensors	Masahide Goto ¹ , Kei Hagiwara ¹ , Yuki Honda ¹ , Masakazu Nanba ¹ , Yoshinori Iguchi ¹ , Takuya Saraya ² , Masaharu Kobayashi ² , Eiji Higurashi ² , Hiroshi Toshiyoshi ² , Toshiro Hiramoto ² , ¹ NHK Science and Technology Research Laboratories, ² The Univ. of Tokyo / Japan	70
TA2-3	Electrical Characteristics of Bumpless Interconnects for Through Silicon Via (TSV) and Wafer-On-Wafer (WOW) Integration	Y.S. Kim ^{1,2} , S. Kodama ^{1,2} , N. Maeda ^{1,2} , K. Fujimoto ^{1,3} , Y. Mizushima ^{1,4} , A. Kawai ² , T.C. Hsu ⁵ , P. Tzeng ⁵ , T.K. Ku ⁵ , T. Ohba ¹ , ¹ Tokyo Institute of Technology, ² DISCO, ³ Dai Nippon Printing, ⁴ Fujitsu Laboratories / Japan, ⁵ Industrial Technology Research Institute / Taiwan	74
TA2-4	Application Dependency of 3-D Integrated Hybrid Solid-State Drive System with Through-Silicon Via Technology	Yusuke Sugiyama, Tomoaki Yamada, Chihiro Matsui, Takahiro Onagi, Ken Takeuchi, Chuo Univ. / Japan	79

TA3: iNEMI Session

14:00-15:40 Thursday, April 21

TA3-1 <Session Invited>	An Overview of the Photonics Systems Manufacturing Consortium - A participant in the Americal Institute for Manufacturing-Integrated Photonics Institute	Richard F. Otte ³ , Robert Pfahl ¹ , Lionel Kimerling ² , Bill Bottoms ⁴ , John MacWilliams ⁵ , Rich Grzybowski ⁶ , Randolph Kirchain ² , Elsa Olivetti ² , ¹ iNEMI, ² Massachusetts Institute of Technology Cambridge Massachusetts, ³ Promex Industries, ⁴ Third Millennium Test Solutions, ⁵ Bishop & Associates, ⁶ Macom / USA	83
TA3-2	Recent Trends of Packaging Warpage and Measurement Metrologies	Wei Keat Loh ¹ , Ron Kulterman ² , Haley Fu ³ , Masahiro Tsuriya ³ , ¹ Intel Technology / Malaysia, ² Flextronics / USA, ³ iNEMI / China, Japan	89
TA3-3	How the Mold Compound Thermal Expansion Overrides the Solder Composition Choice in Board Level Reliability Performance	B. Vandeveld ¹ , L. Degrendele ² , M. Cauwe ² , B. Allaert ³ , R. Lauwaert ⁴ , G. Willems ¹ , ¹ Imec, ² Imec CMST, ³ Connect Group, ⁴ Interflux Electronics / Belgium	94
TA3-4	Framework for Implementing Material Alternatives Assessment	Haley Fu ¹ , Stephen Tisdale ² , Mark Schaffer ¹ , ¹ International Electronics Manufacturing Initiative, ² Intel / USA	99

TA4: Taiwan Session

16:40-18:45 Thursday, April 21

TA4-1 <Session Invited>	Heterogeneous Integration: sensors and computing platform	Wei-Chung Lo ¹ , Shen-Li Fu ² , ¹ Industrial Technology Research Institute, ² I-Shou Univ. / Taiwan	N/A
TA4-2 <Session Invited>	Innovated 20"x20" Panel Size Glass Manufacturing Technology for SiP Application	Yu-Hua Chen, Yu-Chung Hsieh, Wei-Di Lin, Chun-Hsien Chien, Unimicron Technology / Taiwan	-
TA4-3 <Session Invited>	Development of 3D IC Technologies for Heterogeneous Integration and Neural Sensing Applications	Kuan-Neng Chen, National Chiao Tung Univ. / Taiwan	-
TA4-4 <Session Invited>	Mechanical Properties of Intermetallics in Solder Joints	C. R. Kao, National Taiwan Univ. / Taiwan	-
TA4-5 <Session Invited>	Advanced Design for Optical Devices' Thermal Fluid Coupling Dissipating	Chung-Ting Wang ¹ , Ping-Feng Yang ¹ , Chi-Hui Chien ² , Wei-Chi Lee ² , Ying-Xu Lu ² , Bo-Syun Chen ² , Yu-Yan Chen ² , ¹ Advanced Semiconductor Engineering, ² National Sun Yat-Sen Univ. / Taiwan	106

TB1: Printed Electronics-1

9:30-11:10 Thursday, April 21

TB1-1 <Session Invited> 50min.	Printing Technology for Electronics	Tadahiro Furukawa, Yamagata Univ. / Japan	111
TB1-2 <Session Invited> 50min.	Multi-functional Printing	Steve E. Ready, Xerox Palo Alto Research Center / USA	N/A

TB2: Printed Electronics-2

11:20-13:00 Thursday, April 21

TB2-1 <Session Invited>	Printable and Ultra-flexible Temperature Sensor Based on Polymer	Tomoyuki Yokota, Takao Someya, The Univ. of Tokyo / Japan	N/A
TB2-2 <Session Invited>	High Stability of Silver Nanowire Based Electrodes for Bio-sensors	Teppei Araki, Shusuke Yoshimoto, Takafumi Uemura, Masaya Kondo, Tsuyoshi Sekitani, Osaka Univ. / Japan	-
TB2-3 <Session Invited>	Practical Use of a Gravure Offset Printing Technology in the Printed Electronics	Kenta Hiramatsu, Toshiya Miyaji, SCREEN Holdings / Japan	119
TB2-4 <Session Invited>	High Resolution Printing Processes with High Throughput, Enhanced Step Coverage, and High Design Flexibility	Yasuyuki Kusaka, Hirobumi Ushijima, National Institute of Advanced Science and Technology / Japan	120

TB3: Printed Electronics-3

14:00-15:40 Thursday, April 21

TB3-1 <Session Invited>	Novel Wiring Structure for 3D-Conformable Devices	Susumu Sawada, Yoshihiro Tomita, Koichi Hirano, Hiromi Morita, Takashi Ichiryu, Masanori Nomura, Koji Kawakita, Panasonic / Japan	124
TB3-2 <Session Invited>	Direct Electrode Patterning on Layered GaN on Sapphire Substrate by Using Needle-type Dispenser System of Ag Nanoinks	Yukiyasu Kashiwagi ¹ , Masashi Saitoh ¹ , Takahiro Hasegawa ¹ , Kimihiro Matsukawa ¹ , Tasuku Shigemune ² , Atsushi Koizumi ² , Takanori Kojima ² , Yasufumi Fujiwara ² , Hiroshi Kakiuchi ³ , Nobuyoshi Aoyagi ³ , Yukio Yoshida ³ , Masami Nakamoto ¹ , ¹ Osaka Municipal Technical Research Institute, ² Osaka Univ., ³ Daiken Chemical / Japan	129
TB3-3	The Secret of Cool Plasma Sintering for Low-temperature Bulk Formation from Copper Nanoparticles	Naoki Shirakawa, National Institute of Advanced Industrial Science and Technology / Japan	133
TB3-4 <Session Invited>	Variation in electrical conductivity of stretchable printed wires and electrodes due to fatigue damage in several situations	Masahiro Inoue, Yasunori Tada, Yosuke Itabashi, Ryo Kimura, Shuhei Taya, Gunma Univ. / Japan	137

TB4: Printed Electronics-4

16:40-18:45 Thursday, April 21

TB4-1	Effect of Process Parameters on Hard Coating Film Characteristics in Roll-to-Roll Printing Process System	Dongseok Shin, Sang Myung Lee, Ilgu Yun, Yonsei Univ. / Korea	141
TB4-2	Characterization Methodology of Transparent Hard Coating Film on Transparent Substrates using Capacitance-Voltage Measurement	Sang Myung Lee, Dongseok Shin, Ilgu Yun, Yonsei Univ. / Korea	145
TB4-3	Reliability Design on Wearable Device for Initial Osteoarthritis (OA) on Knee Joints	Hsiang-Chen Hsu, Pin-Chieh Wang, Jia-Jung Wang, Shen-Li Fu, I-Shou Univ. / Taiwan	149
TB4-4	Low Temperature Interconnect Fabrication on PDMS Polymeric Substrates using Ag Nanoparticles and Submicron Particles	Sin-Yong Liang ¹ , Yu-Siang Fang ¹ , Po-Hao Chiang ¹ , Jenn-Ming Song ¹ , Lung-Tai Chen ² , ¹ National Chung Hsing Univ., ² Industrial Technology Research Institute / Taiwan	154

TC1: Thermal Management-1

9:30-11:10 Thursday, April 21

TC1-1	Finned Heat Sinks for Cooling Outdoor Electronics under Natural Convection	Lian-Tuu Yeh, Thermal Consultant / USA	N/A
TC1-2	Thermal Performance Evaluation of Dual-side Cooling for a Three-dimensional (3D) Chip Stack : Additional cooling from the laminate (substrate) side	Keiji Matsumoto, Hiroyuki Mori, Yasumitsu Orii, IBM Research-Tokyo / Japan	163
TC1-3	Immersion Cooling of Electronics utilizing Lotus-type Porous Copper	Kazuhisa Yuki ¹ , Tomohiro Hara ¹ , Soichiro Ikezawa ¹ , Kentaro Anju ¹ , Koichi Suzuki ¹ , Tetsuro Ogushi ² , Takuya Ide ³ , Masaaki Murakami ³ , ¹ Tokyo Univ. of Science-Yamaguchi, ² Hiroshima International Univ., ³ Lotus Alloy / Japan	169
TC1-4	Evaluation of Pressure Drop Characteristics around Axial Cooling Fans with Electrical Components	Takashi Fukue ¹ , Koichi Hirose ¹ , Tomoyuki Hatakeyama ² , Masaru Ishizuka ² , Katsuhiro Koizumi ³ , ¹ Iwate Univ., ² Toyama Prefectural Univ., ³ Cosel / Japan	173

TC2: Thermal Management-2

11:20-13:00 Thursday, April 21

TC2-1	Accurate Thermal Boundary Condition to Predict Hot Spot Temperature using Electro-Thermal Analysis	Risako Kibushi, Tomoyuki Hatakeyama, Shinji Nakagawa, Masaru Ishizuka, Toyama Prefectural Univ. / Japan	179
TC2-2	Thermal Analysis of a Battery in an Electronic Device for an Outdoor Application	Nitesh Kumar Sardana, Ritwik Alok Pattnayak, Susyamala Pavan Kumar Busam, Chandan Kumar Ghosh, Laxmidhar Biswal, Robert Bosch Engineering and Business Solutions / India	184
TC2-3	Study of Relationship between Copper Patterns and Temperature Rise of Printed Circuit Board for Small Surface Mount Electronic Devices using Constriction Thermal Resistance	Yoshinori Aruga ¹ , Koichi Hirasawa ¹ , Hirotohi Aoki ¹ , Yasushi Ohashi ¹ , Tomoyuki Hatakeyama ² , Shinji Nakagawa ² , Masaru Ishizuka ² , ¹ KOA, ² Toyama Prefectural Univ. / Japan	190
TC2-4	Fundamental Study on Simplified Temperature Prediction Method for LED	Akira Horii, Tomoyuki Hatakeyama, Risako Kibushi, Masaru Ishizuka, Toyama Prefectural Univ. / Japan	195

TC3: Thermal Management-3

14:00-15:40 Thursday, April 21

TC3-1	Thermal Characterization of Capacitors	Zoltan Sarkany ^{1,2} , Gabor Farkas ^{1,2} , Marta Rencz ^{1,2} , ¹ Mentor Graphics, ² Budapest Univ. of Technology and Economics / Hungary	200
TC3-2	Approaches for Improving Peak Temperature Detection Capability of Infrared Thermograph	Koichi Hirasawa ¹ , Yoshinori Aruga ¹ , Yasushi Ohashi ¹ , Hirotoshi Aoki ¹ , Toshio Tomimura ² , ¹ KOA, ² Kumamoto Univ. / Japan	204
TC3-3	Basic Study on Reduction of Measurement Time for Evaluating Thermophysical Properties of Insulation Heat Dissipation Sheet based on Quasi-Steady State Measurement	Jumpei Hatakeyama, Koichi Hirose, Michimasa Uchidate, Takashi Fukue, Iwate Univ. / Japan	209
TC3-4	Thermal Resistance Evaluation by High-temperature Transient Thermal Analysis Method for SiC Power Modules	Fumiki Kato, Hiroshi Nakagawa, Hiroshi Yamaguchi, Hiroshi Sato, National Institute of Advanced Industrial Science and Technology / Japan	214

TC4: Interconnection-1

16:40-18:45 Thursday, April 21

TC4-1	Mechanical Properties of SnAgCu-SnBi Composition Compositoid Solder Joints using Bending Test	Fengjiang Wang ^{1,2} , Ying Huang ¹ , Chengchao Du ¹ , ¹ Jiangsu Univ. of Science and Technology, ² Harbin Institute of Technology / China	N/A
TC4-2	Influence of Bi additions on the Distinct β Sn Grain Structure of Sn-0.7Cu-0.05Ni-xBi (x = 0-4wt%)	Sergey Belyakov ¹ , Takatoshi Nishimura ² , Keith Sweatman ² , Kazuhiro Nogita ³ , Christopher Gourlay ¹ , ¹ Imperial College London / UK, ² Nihon Superior / Japan, ³ Univ. of Queensland / Australia	222
TC4-3	Interaction between Micro Cu Bumps and Substrate with Thin Ni/Thick Au SF in TCNCP FC Packaging	Weihong Zhang, Lingling Ji, Zhimin Liu, Tonglong Zhang, Nantong Fujitsu Microelectronics / China	226
TC4-4	Mechanical Fatigue Assessment of SAC305 Solder Joints under Harmonic Vibrations	Jean-Baptiste Libot ^{1,2} , Lionel Arnaud ¹ , Olivier Dalverny ¹ , Joel Alexis ¹ , Philippe Milesi ² , Frédéric Dulondel ² , ¹ Univ. of Toulouse, ² SAFRAN Sagem / France	231

TD1: Advanced Packaging-1

9:30-11:10 Thursday, April 21

TD1-1 <Session Invited>	FO-WLP as a Disruptive Technology and the Impact on the Industry Infrastructure	Jan Vardaman, TechSearch International / USA	-
TD1-2	A Cost Analysis of RDL-first and Mold-first Fan-out Wafer Level Packaging	Amy Palesko Lujan, SavanSys Solutions / USA	237
TD1-3	Compression Molding Solutions for Various High end Package and Cost Savings for Standard Package Applications	Muneo Miura, TOWA / Japan	243

TD2: Advanced Packaging-2

11:20-13:00 Thursday, April 21

TD2-1	Reliable 4 Million Micro Bumps at 7.6-um Pitch Interconnection Technology for 3D Stacked 16 Million Pixel Image Sensor	Yoshiaki Takemoto, Naohiro Takazawa, Mitsuhiro Tsukimura, Haruhisa Saito, Toru Kondo, Hideki Kato, Jun Aoki, Kenji Kobayashi, Shunsuke Suzuki, Yuichi Gomi, Seisuke Matsuda, Yoshitaka Tadaki, Olympus / Japan	248
TD2-2	Electromigration in Microbumps with Cu-Sn Intermetallic Compounds	Yi-Cheng Chu ¹ , Chau-Jie Zhan ¹ , Han-Wen Lin ² , Yu-wei Huang ² , Chih Chen ¹ , ¹ National Chiao Tung Univ., ² Industrial Technology Research Institute / Taiwan	252
TD2-3	Effects of Solder Wettability of Resist Materials on Solder Filling with Injection Molded Solder (IMS) Technology	Toyohiro Aoki, Takashi Hisada, Eiji Nakamura, Hiroyuki Mori, Yasumitsu Orii, IBM Japan / Japan	256
TD2-4	Fine Pitch Micro-Bump forming by Printing	Hiroaki Ikeda ^{1,2} , Shigenobu Sekine ¹ , Ryuji Kimura ¹ , Koichi Shimokawa ¹ , Keiji Okada ¹ , Hiroaki Shindo ¹ , Tatsuya Ooi ¹ , Rei Tamaki ¹ , Makoto Nagata ² , ¹ Napra, ² Kobe Univ. / Japan	260

TD3: 3DIC Packaging-1

14:00-15:40 Thursday, April 21

TD3-1	Back-Via 3D Integration Technologies by Temporary Bonding with Thermoplastic Adhesives and Visible-Laser Debonding	Mariappan Murugesan ¹ , Takafumi Fukushima ¹ , Jicheol Bea ¹ , Hiroyuki Hashimoto ¹ , Sanghoon Lee ^{1,2} , Makoto Motoyoshi ^{1,2} , Tetsu Tanaka ¹ , Kangwook Lee ¹ , Mitsumasa Koyanagi ¹ , ¹ Tohoku Univ., ² Tohoku-MicroTec / Japan	265
TD3-2	Investigation on Microstructure and Resistivity in Cu-TSVs for 3D Packaging	Akira Satou ^{1,2} , Hiroyuki Kadota ² , Takashi Inami ¹ , Masahiko Itou ¹ , Jin Onuki ¹ , ¹ Ibaraki Univ., ² Hitachi Power Solutions / Japan	270
TD3-3	No Pumping at 450°C with Electrodeposited Copper TSV	Kazuo Kondo, Fine Feature Electrodeposition Research Center / Japan	274
TD3-4	Bonding Condition Design Methodology using Sn-Ag Thin Film for 3DIC	Yoshiharu Iwata, Naoki Narita, Takumi Shigemoto, Kiyoto Yoneta, Takahiro Yamamoto, Ryohei Satoh, Osaka Univ. / Japan	278

TD4: 3DIC Packaging-2

16:40-18:45 Thursday, April 21

TD4-1	Characterization of Elastic-Plastic Properties of Intermetallic Compounds	Ruei-You Hong ¹ , Hsien-Chie Cheng ² , Hsuan-Chi Hu ¹ , Wen-Hwa Chen ¹ , ¹ National Tsing Hua Univ., ² Feng Chia Univ. / Taiwan	282
TD4-2	Morphological Evolution Induced by Volume Shrinkage in Micro Joints	Hong-Wei Yang, C. Robert Kao, National Taiwan Univ. / Taiwan	286
TD4-3	Electrochemical Corrosion of Interconnect Materials by Residual Reductants	Ming-Yan Lai ¹ , Jenn-Ming Song ¹ , Jing-Yuan Lin ² , ¹ National Chung Hsing Univ., ² Industrial Technology Research Institute / Taiwan	290
TD4-4	Evaluation of Strength Test of Cu TSV Chips Using Acoustic Emission Method	F.C. Lu ¹ , H.T. Keng ¹ , H.Y. Liu ¹ , M.Y. Tsai ¹ , P.C. Lin ² , ¹ Chang Gung Univ., ² Nanya Technology / Taiwan	294

TE1: Materials and Process-1

9:30-11:10 Thursday, April 21

TE1-1	Direct Bonding and Debonding of Glass Wafers for Handling of Ultra-thin glass sheets	Kai Takeuchi, Masahisa Fujino, Tadatomo Suga, The Univ. of Tokyo / Japan	298
TE1-2	Low Temperature direct Bonding of PEEK and Pt through VUV/FAB Surface Treatments	Weixin Fu ¹ , Akitsu Shigetou ² , Shuichi Shoji ¹ , Jun Mizuno ¹ , ¹ Waseda Univ., ² National Institute for Materials Science / Japan	302
TE1-3	Low Temperature Bonding using Microscale Cu Particles Coated with Thin Sn Layers at 200°C	Xiangdong Liu, Siliang He, Hiroshi Nishikawa, Osaka Univ. / Japan	306
TE1-4	Room Temperature Bonding of Polymethylglutarimide for Layer Transfer Method	Takashi Matsumae, Tadatomo Suga, The Univ. of Tokyo / Japan	310

TE2: Materials and Process-2

11:20-13:00 Thursday, April 21

TE2-1	Low Temperature Sintering of Silver Nanoparticle Paste for Electronic Packaging	Hongqiang Zhang ¹ , Guisheng Zou ¹ , Lei Liu ¹ , Aiping Wu ¹ , Y. Norman Zhou ^{1,2} , ¹ Tsinghua Univ. / China, ² Univ. of Waterloo / Canada	314
TE2-2	Development of a Ag/glass Die Attach Adhesive for High Power and High Use Temperature Applications	Maciej Patelka, Noriyuki Sakai, Cathy Trumble, NAMICS North American R&D Center / USA	318
TE2-3	On-Demand Gold Laser-Plating onto Stainless Steel for Electrical Contacts	Mitsugu Yamaguchi ¹ , Nobuyuki Miyagi ² , Mamoru Mita ³ , Kazuhiko Yamasaki ¹ , Katsuhiko Maekawa ¹ , ¹ Ibaraki Univ., ² Ibaraki Giken, ³ M&M Research Laboratory / Japan	323
TE2-4	Self-Healing Stretchable Wiring Using Conductive Magnetic Powder	Shinya Toda, Kensuke Kanda, Takayuki Fujita, Kazusuke Maenaka, Univ. of Hyogo / Japan	329

TE3: Materials and Process-3

14:00-15:40 Thursday, April 21

TE3-1	Study on the Mitigation Solder of the External Stress Type Whisker	Hiroyuki Iwamoto, Osamu Muneata, Kaichi Tsuruta, Senju Metal Industry / Japan	333
TE3-2	Front-side Metallization of Silane-compound-modified Si by Electroless deposition of Ni(P) and Interfacial Characterizations	Kuei-Chang Lai ¹ , Pei-Yu Wu ¹ , Tzu-Chien Wei ² , Tseng-Chieh Pan ² , Chih-Ming Chen ¹ , ¹ National Chung Hsing Univ., ² National Tsing-Hua Univ. Taiwan / Taiwan	337
TE3-3	Fine Line/Space IC Substrate Made by Selectively Fully Additive Process	Shin-Hua Chao, Chao-Fu Weng, Advanced Semiconductor Engineering / Taiwan	341

TE4: Materials and Process-4

16:40-18:45 Thursday, April 21

TE4-1 <Session Invited>	Using FEA to Determine Test Speed for High Speed Shear Test on BGA based on Field Conditions	Cheryl Selvanayagam, Advanced Micro Devices / Singapore	345
TE4-2	Resolution of Contamination on Controller IC Bond Pads for High Pb Multi-Stack MCM Clip QFN	Lorraine R. Duldulao, Ruby Ann M. Camenforte, Roxanna S. Caguioa, Jason B. Colte, Texas Instruments / Philippines	350
TE4-3	Resolving Key Manufacturing Challenges in Flip Chip QFN Package	James Raymond Baello, Jason Colte, Robinson Quiazon, Texas Instruments / Philippines	354
TE4-4	Effect of Co Addition on Interface Reaction between Sn-Ag-Cu Solder and Cu Substrate	Jianxin Wang ^{1,2} , Yun Zhou ¹ , Taikun Fan ¹ , Qing Zhu ¹ , ¹ Jiangsu Univ. of Science and Technology, ² Nanjing Univ. of Aeronautics and Astronautics / China	N/A
TE4-5	First-principles Density Function Calculations of Physical Properties of Triclinic Cu ₇ In ₃	Ching-Feng Yu ¹ , Hsien-Chie Cheng ² , Wen-Hwa Chen ¹ , ¹ National Tsing Hua Univ., ² Feng Chia Univ. / Taiwan	362

FA2: Korea Session

11:20-13:00 Friday, April 22

FA2-1 <Session Invited>	Preparation and Properties of Passivation Layers for Thin Film Solar Cells	Ho Jung Chang, Sang Hee Lee, Byung Min Park, Sae Chan Mun, Jae Jin Jung, Jaeho Pyee, Dankook Univ. / Korea	-
FA2-2 <Session Invited>	Electrochemical Evaluation of Copper Etchant to Avoid the Galvanic Etching in Cu/Au Pads	Jae-Ho Lee ¹ , Jong-Chan Choi ¹ , Jinuk Lee ² , ¹ Hongik Univ., ² Samsung Electro-Mechanics / Korea	-
FA2-3 <Session Invited>	Effect of environment on direct bonding at room temperature: Origin of solid adhesion under inhomogeneous medium	Doo-In Kim, Taehoon Kim, Myung Yung Jeong, Pusan National Univ. / Korea	-
FA2-4 <Session Invited>	Plasma assisted low temperature Cu-Cu bonding for 3D IC	Sungdong Kim, Seoul National Univ. of Science and Technology / Korea	-

FA3: Korea Session

14:00-16:05 Friday, April 22

FA3-1 <Session Invited>	Stretchable Interconnection Formed with Metal Films on Polydimethylsiloxane Substrates for Stretchable Device Applications	Tae Sung Oh, Donghyun Park, Dae Ung Park, Kee-Sun Han, Soo Jin Shin, Hyun-Ah Oh, Hongik Univ. / Korea	-
FA3-2 <Session Invited>	Mechanical Reliability of Advanced Thin Films for Flexible Devices	Taek-Soo Kim, KAIST / Korea	-
FA3-3 <Session Invited>	Module packaging effects on MEMS sensor performance	Yeong K Kim ¹ , Hyun Jin Kang ¹ , Joon Ki Kim ² , ¹ Inha Univ., ² Korea Institute of Industrial Technology / Korea	-

FB1: Power Electronics Integration-1

9:30-11:10 Friday, April 22

FB1-1 <Session Invited>	Design and Integration of a 10 kV Silicon Carbide (SiC) MOSFET Power Module	Christina Dimarino, Virginia Tech / USA	-
FB1-2	Additive Manufacturing of Magnetic Components for Power Electronics Integration	Yi Yan ¹ , Khai.D.T. Ngo ¹ , Yunhui Mei ² , Guo-Quan Lu ^{1,2} , ¹ Virginia Tech / USA, ² Tianjin Univ. / China	368
FB1-3	Power Cycling Test and Failure Mode Analysis of High-power Module	Li-Ling Liao ^{1,2} , Chun-Kai Liu ¹ , Kuo-Ning Chiang ² , ¹ Industrial Technology Research Institute, ² National Tsing Hua Univ. / Taiwan	372
FB1-4	Investigation of Connecting Techniques for High Temperature Application on Power Modules	Fumiyoshi Kawashiro ^{1,2} , Yoshiki Endo ¹ , Tatsuo Tonedachi ¹ , Hiroshi Nishikawa ² , ¹ Toshiba Corporation Semiconductor & Storage Products, ² Osaka Univ. / Japan	378

FB2: Power Electronics Integration-2

11:20-13:00 Friday, April 22

FB2-1	Reliability of Pressureless Sintered Nanosilver for Attaching IGBT Devices	Shancan Fu, Yijing Xie, Yunhui Mei, Tianjin Univ. / China	382
FB2-2	Double-sided Joining IGBT Devices by Pressureless Sintering of Nanosilver Paste	Haidong Yan, Shancan Fu, Yunhui Mei, Tianjin Univ. / China	386
FB2-3	Bonding Process without Pressure using a Chestnut-burr-like Particle Paste for Power Electronics	Myong-Hoon Roh ¹ , Hiroshi Nishikawa ¹ , Seiichiro Tsutsumi ¹ , Naruhiko Nishiwaki ² , Keiichi Ito ² , Koji Ishikawa ² , Akihiro Katsuya ² , Nobuo Kamada ³ , Mutsuo Saito ³ , ¹ Osaka Univ., ² NHK SPRING, ³ KAKEN TECH / Japan	391

FB3: Power Electronics Integration-3

14:00-16:05 Friday, April 22

FB3-1	Thermo-mechanical Reliability of High-temperature Power Modules with Metal-ceramic Substrates and Sintered Silver Joints	Shan Gao ¹ , Seiya Yuki ^{1,2} , Hideyo Osanai ² , Weizhen Sun ¹ , Khai D. Ngo ¹ , Guo-Quan Lu ¹ , ¹ Virginia Tech / USA, ² DOWA Metaltech / Japan	395
FB3-2	Thermal Cycling Lifetime Estimation of Sintered Metal Die Attachment	Tomohisa Suzuki ¹ , Yusuke Yasuda ¹ , Takeshi Terasaki ¹ , Toshiaki Morita ¹ , Yuki Kawana ² , Dai Ishikawa ² , Masato Nishimura ² , Hideo Nakako ² , Kazuhiko Kurafuchi ² , ¹ Hitachi, ² Hitachi Chemical / Japan	400
FB3-3	Higher Thermal Cycling Reliability of Power Semiconductor Module for Power Converters	Akira Morozumi ¹ , Hiroaki Hokazono ¹ , Yoshitaka Nishimura ¹ , Yoshiharu Kariya ² , Eiji Mochizuki ¹ , Yoshikazu Takahashi ¹ , ¹ Fuji Electric, ² Shibaura Institute of Technology / Japan	405
FB3-4	Thermal Compression Bonding for Power IC Attachment Using Pure Zn	Chih-Hao Fan, Ting-Jui Wu, Jenn-Ming Song, National Chung Hsing Univ. / Taiwan	411

FC1: N-MEMS-1

9:30-11:10 Friday, April 22

FC1-1	Design of Electromagnetic Induction Type MEMS Motor with Multilayer Ceramic Three-Dimensional Coil	M. Takato, Y. Yokozeki, K. Mishima, Y. Han, K. Saito, F. Uchikoba, Nihon Univ. / Japan	415
FC1-2	Development of Metal-Bonded Langevin Transducer using LiNbO ₃	Hiroshi Ito, Hikaru Jimbo, Koichi Shiotani, Nagahide Sakai, Olympus / Japan	420
FC1-3	Bare Chip Mount of Neural Networks IC on MEMS Microrobot	Yuxuan Han, Kazuki Sugita, Daisuke Tanaka, Minami Takato, Ken Saito, Fumio Uchikoba, Nihon Univ. / Japan	424
FC1-4	Development of Electromagnetic Induction Type MEMS Air Turbine Generator with Ball Bearing	K. Mishima, Y. Yokozeki, Y. Han, M. Takato, K. Saito, F. Uchikoba, Nihon Univ. / Japan	430

FC2: N-MEMS-2

11:20-13:00 Friday, April 22

FC2-1	Neural Networks IC for Locomotion Rhythm Generator Emulating Living Organism	Daisuke Tanaka, Kazuki Sugita, Yuxuan Han, Minami Takato, Fumio Uchikoba, Ken Saito, Nihon Univ. / Japan	434
FC2-2	Room-temperature Wafer Bonding using Smooth Gold Thin Films for Wafer-level MEMS Packaging	Yutaka Kunimune ¹ , Ken Okumura ¹ , Eiji Higurashi ¹ , Tadatomo Suga ¹ , Kei Hagiwara ² , ¹ The Univ. of Tokyo, ² NHK Science and Technology Research Laboratories / Japan	439
FC2-3	ST-quartz/LiTaO ₃ Direct Bonding Using SiO ₂ Amorphous Layers with VUV/O ₃ Pre-treatment for a Novel 5G Surface Acoustic Wave Device	Haruka Suzuki, Hiroyuki Kuwae, Akiko Okada, Bo Ma, Shuichi Shoji, Jun Mizuno, Waseda Univ. / Japan	443
FC2-4	VUV/O ₃ Assisted Single Crystal Quartz Bonding with Amorphous SiO ₂ Intermediate Layer for Manufacturing Optical Low Pass Filter	Ma Bo, Hiroyuki Kuwae, Akiko Okada, Weixin Fu, Shuichi Shoji, Jun Mizuno, Waseda Univ. / Japan	447

FC3: DMR-Electrical

14:00-16:05 Friday, April 22

FC3-1	A Built-in Electrical Test Circuit for Detecting Open Leads in Assembled PCB Circuits	Takumi Miyabe ¹ , Masaki Hashizume ¹ , Hiroyuki Yotsuyanagi ¹ , Shyue-Kung Lu ² , Zvi Roth ³ , ¹ Tokushima Univ. / Japan, ² National Taiwan Univ. of Science and Technology / Taiwan, ³ Florida Atlantic Univ. / USA	451
FC3-2	Study on Electrical Characteristics of Micron-order Wiring with Nano-scale Conductive Metal Particle	Masaya Tanaka, Tsuyoshi Tsunoda, and Shuji Sagara, Dai Nippon Printing / Japan	456
FC3-3	Transmission Model of Human Body Communication Incorporating Size and Distance between the Two Electrodes of a Transmitter	Naruto Arai, Dairoku Muramatsu, Ken Sasaki, The Univ. of Tokyo / Japan	461

FD1: Interconnection-2

9:30-11:10 Friday, April 22

FD1-1	Stress Evaluation of Flip Chip Bonding Die by Thermal Compression Bonding using Raman Spectroscopy	Mototaka Ito, Tomoyuki Uchida, Ryuichi Sugie, Toray Research Center / Japan	465
FD1-2	Evaluation of Relationship between Residual Stress of ICs and Package Warpage Caused by Flip-Chip Bonding	Toshio Enami ¹ , Osamu Horiuchi ² , Young-Gun Han ² , Hajime Tomokage ² , ¹ Sekisui Chemical, ² Fukuoka Univ. / Japan	469
FD1-3	Novel Processing Scheme for Embedding and Interconnection of Ultra-thin IC Devices in Flexible Chip Foil Packages and Recurrent Bending Reliability Analysis	Christof Landesberger ¹ , Nagarajan Palavesam ^{1,2} , Waltraud Hell ¹ , Andreas Drost ¹ , Robert Faul ¹ , Horst Gieser ¹ , Detlef Bonfert ¹ , Karlheinz Bock ² , Christoph Kutter ¹ , ¹ Fraunhofer Research Institution for Microsystems and Solid State Technologies, ² Technische Universität Dresden / Germany	473
FD1-4	A Novel Approach for Forming Ductile Cu-to-Cu Interconnection	Che-yu Yeh, Yi-kai Kuo, Shih-kang Lin, National Cheng Kung Univ. / Taiwan	479

FD2: Interconnection-3

11:20-13:00 Friday, April 22

FD2-1 <Session Invited>	Ultra Thermal Stable Cu-to-Cu Interconnection	Shih-kang Lin, Che-yu Yeh, Mei-jun Wang, Hao-miao Chang, National Cheng Kung Univ. / Taiwan	-
FD2-2	Advanced Cu-Cu Thermocompression Bonding Methodology for Future 3DICs	Hajime Mitsuishi ¹ , Takashi Tsuto ¹ , Masashi Okada ¹ , Isao Sugaya ¹ , Kaoru Ohmori ¹ , Minoru Fukuda ¹ , Kazuya Okamoto ^{1,2} , ¹ Nikon, ² Osaka Univ. / Japan	485
FD2-3	Influence of Pretreatment on Copper Direct Bonding	Po-Hao Chiang, Jenn-Ming Song, National Chung Hsing Univ. / Taiwan	489
FD2-4	Bonding of Copper Pillars Using Electroless Ni Plating	Sean Yang, Han-Tang Hong, Yan-Bin Chen, C. Robert Kao, National Taiwan Univ. / Taiwan	493

FD3: Interconnection-4

14:00-16:05 Friday, April 22

FD3-1	The Corrosion Behavior of Ag Alloy Wire Bond on Al Pad in Molding Compounds of Various Chlorine Contents under Biased-HAST	Ying-Ta Chiu ¹ , Tzu-Hsing Chiang ¹ , Ping-Feng Yang ¹ , Louie Huang ¹ , Chih-Pin Hung ¹ , Shoji Uegaki ² , Kwang-Lung Lin ³ , ¹ ASE Group / Taiwan, ² ASE Group / Japan, ³ National Cheng Kung Univ. / Taiwan	497
FD3-2	Effect of Ag-4Pd Alloy Bonding Wire Properties and Structure on Bond Strengths and Reliability	Jun Cao ^{1,2} , JunLing Fan ³ , WenBin Gao ¹ , ¹ HeNan Polytechnic Univ., ² HeNan YOUK Electronic Material, ³ Jiaozuo Univ. / China	502
FD3-3	Relationship between Mechanical and Electrical Properties of Cu Wire and Al Pad Bonding	Yuji Ishida ¹ , Kenji Sunahara ² , ¹ Yaskawa Electric, ² Fukuoka Institute of Technology / Japan	508
FD3-4	Enabling Cu Wire in 3D Stack Package	Ruby Ann M. Camenforte ¹ , Ray Fredric de Asis ¹ , Mahmud Chowdhury ² , ¹ Texas Instruments / Philippines, ² Texas Instruments / USA	512

FE1: Materials and Process-5

9:30-11:10 Friday, April 22

FE1-1	Warpage Characterization Analysis for Embedded Package Technology	Tang-Yuan Chen, Meng Kai-Shih, Ming-Hung Chen, Wei-Chung Chen, Shoji Uegaki, Chin-Li Kao, Ping-Feng Yang, Chin-Pin Hung, Advanced Semiconductor Engineering / Taiwan	518
FE1-2	Development of a Simple Cup Method for Water Vapor Transmission Rate Measurements under High-temperature Condition	Shinya Iizuka ¹ , Kazuhide Murata ¹ , Masahiro Sekine ^{1,2} , Chiaki Sato ³ , ¹ Saitama Industrial Technology Center, ² Waseda Univ., ³ Tokyo Institute of Technology / Japan	522
FE1-3	Novel Copper Surface Preparation Processes for Copper Alloy Lead Frame Lamination Pretreatment in Embedded Packaging Device	Wei-Chung Chen, Chiu-Wen Lee, Lu-Fu Lin, Yen-Fu Liu, Hau Cheng, Te-Jung Hsu, Kun-Ting Tsai, Ming-Hung Chen, Tang-Yuan Chen, Pin-Feng Yang, Shoji Uegaki, Chih-Pin Hung, Advanced Semiconductor Engineering / Taiwan	526

FE2: Materials and Process-6

11:20-13:00 Friday, April 22

FE2-1	Partial Discharges in Ceramic Substrates - Correlation of Electric Field Strength Simulations with Phase Resolved Partial Discharge Measurements	Christoph Friedrich Bayer, Uwe Waltrich, Amal Soueidan, Eberhard Baer, Andreas Schletz, Fraunhofer Institute for Integrated Systems and Device Technology / Germany	530
FE2-2	Enhancement of the Partial Discharge Inception Voltage of Ceramic Substrates for Power Modules by Trench Coating	Uwe Waltrich ¹ , Christoph Friedrich Bayer ¹ , Martin Reger ² , Andreas Meyer ² , Xinhe Tang ² , Andreas Schletz ¹ , ¹ Fraunhofer Institute for Integrated Systems and Device Technology, ² Rogers Germany / Germany	536
FE2-3	Study on Effect of Thermo-Structural loading on the PCB during Selective Soldering Process using Finite Element Analysis	Subraya Krishna Bhat ¹ , Raghavendra Deshpande ² , Peter Beck ³ , Sudarshan Hegde ² , Y.S. Upadhyaya ¹ , Chandan Kumar Ghosh ² , ¹ Manipal Univ., ² Robert Bosch Engineering and Business Solutions / India, ³ Robert Bosch / Hungary	542
FE2-4	Viscoelastic Analysis of Multistage Stacked Via Structure in Build-up Substrate	Hideaki Nagaoka, Tomoyuki Akahoshi, Masaharu Furuyama, Daisuke Mizutani, Fujitsu Laboratories / Japan	548

FE3: Materials and Process-7

14:00-16:05 Friday, April 22

FE3-1	Epoxy Molding Compound for Fingerprint Sensor	Junichi Tabei, Hideaki Sasajima, Takeshi Mori, Sumitomo Bakelite / Japan	553
FE3-2	The Novel Liquid Molding Compound for Fan-out Wafer Level Package	Katsushi Kan ¹ , Yosuke Oi ¹ , Yasuhito Fujii ¹ , Masato Miwa ² , Michiyasu Sugahara ² , ¹ Nagase ChemteX, ² Nagase & / Japan	557
FE3-3	Ultra Thick Photo Resist for FO-WLP	Keiichi Satou, Makoto Katsurayama, Akito Hiro, Hirokazu Sakakibara, Kenji Okamoto, Kouichi Hasegawa, JSR / Japan	562
FE3-4	Investigation of Electrochromic Properties of Novel Tungsten Trioxide Nano-structure Preparation Using Hydrothermal Process	Jia-Cian Hsieh, Wen-Jen Liu, I-Shou Univ. / Taiwan	567

Poster Session

P01	Electrical Analysis of Low Distortion Transmission Design and Stacking TSVs on Silicon Interposer	Chih-Wen Kuo ¹ , Hung-Chun Kuo ¹ , Chen-Chao Wang ² , ¹ National Sun Yat-sen Univ., ² Advanced Semiconductor Engineering / Taiwan	573
P02	Photolithography Study for Advanced Packaging Technologies	Hiromi Suda, Masaki Mizutani, Shin-Ichiro Hirai, Ken-Ichiro Mori, Seiya Miura, CANON / Japan	577
P03	Robust Packaging Solutions through Innovative Designs in Clip-QFN	Roxanna Samson-Caguioa, Ruby Ann Merto-Camenforte, Lorraine Duldulao, Texas Instruments Philippines / Philippines	N/A
P04	Print Lead QFN Package	Ping Wu, Peng Liu, Bo Zhao, QingChun He, George Ye, Freescale Semiconductor / China	N/A
P05	New Process Flow to Make QFN Package with Stand-off	Ping Wu, Peng Liu, Bo Zhao, QingChun He, George Ye, Freescale Semiconductor / China	N/A
P06	Through Mold Via (TMV) by Gas-Aided Laser	Hsiang-Chen Hsu ¹ , Shih-Jeh Wu ¹ , Wen-Fei Lin ¹ , Chi-Shiung Hsi ² , Hsing-Yi Pao ² , Pin-Chieh Wang ¹ , ¹ I-Shou Univ., ² National United Univ. / Taiwan	593
P07	Automatic Alignment System for Wafer Based on Machine Vision	Hailong Liao, Dasong Ge, Junhui Li, Wenhui Zhu, Central South Univ. / China	N/A
P08	Study of QFP E-pad Package VS. PCB Land Pattern Design Soldering and Reliability	Pai-Chou Liu, Sung-Mao Wu, National Univ. of Kaohsiung / Taiwan	N/A
P09	Novel PC Miniature Board	Chan Kim Lee, Wee Hoe, Say Thong Tan, Siang Yeong Tan, Choy Mei Yeow, Chow Soon Lim, Khai Ern See, Intel Malaysia / Malaysia	607
P10	Investigation on Graphene/Ag Nano-Particles Composite Ink for Flexible Electronics	Hu He, Zhuo Chen, Yanni Li, Fuliang Wang, Wenhui Zhu, Central South Univ. / China	N/A
P11	A Novel High Electrically Conductive Silver Paste	Jia-Min Lin, Wei-Nung Chen, Chiao-Yang Lin, Ching-Fen Lin, Jiin-Chyuan Chang, Solar Applied Materials Technology / Taiwan	615
P12	Large Area Direct Transfer Technique for Graphene onto Substrates using Self-Assembly Monolayer	Masahisa Fujino, Kentro Abe, Tadatomu Suga, Univ. Tokyo / Japan	619
P13	The Advantages of Slow Cure NCP in Flip Chip Package	Yoshihide Fukuhara, Masaaki Hoshiyama, Toshikazu Hocchi, Yuusuke Kamata, Hisotatsu Ikarasi, Ruka Iwaya, NAMICS / Japan	623
P14	Effects of Additive Formula and Plating Current Density on the Interfacial Reactions between Sn and Cu Electroplated Layer	Hsuan Lee, Wei-Ping Dow, Chih-Ming Chen, National Chung Hsing Univ. / Taiwan	627

P15	Comparison of Thermal Stress Concentration and Profile between Power Cycling Test and Thermal Cycling Test for Power Device Heat Dissipation Structures using Ag Sintering Chip-attachment	Kensuke Osonoe ¹ , Takahiro Asai ¹ , Masaaki Aoki ^{1,2} , Hitoshi Kida ² , Nobuhiko Nakano ¹ , ¹ Keio Univ., ² Alent Japan / Japan	631
P16	Thermal Deformation Measurement for High-power Light Emitting Diodes using Digital Image Correlation Method with Spectrograph Technique	Hideyuki Taguchi ¹ , Kenichi Ikeda ¹ , Katsuya Morino ¹ , Shugo Miyake ² , ¹ Kobelco Research Institute, ² Kobe City College of Technology / Japan	635
P17	Heat Transfer Analysis in the Thermal Compression Bonding for CoW Process	Noboru Asahi, Masatsugu Nimura, Toray Engineering / Japan	640
P18	System Power Integrity and Radiation Analysis of Packaging by CMOS Inverter	Pei-Chen Kuo, Yu-Yung Wu, Sung-Mao Wu, National Univ. of Kaohsiung / Taiwan	644
P19	Importance of Switched-Mode Power Supply IC Model for Conductive EMI Noise Simulation	Asuma Imamura ¹ , Mitsuharu Umekawa ² , ¹ ROHM, ² Keysight Technologies Japan / Japan	648
P20	Development of Low-power and Ultra-small Wireless Sensor Nodes for Bio-logical Information Monitoring	Koichi Serizawa ^{1,2} , Jian Lu ¹ , Hiroyuki Kuwabara ^{1,2} , Lan Zhang ¹ , Ryoichi Maeda ¹ , Masanori Hayase ² , ¹ National Institute of Advanced Industrial Science and Technology, ² Tokyo Univ. of Science Japan	652
P21	Electromagnetic Characteristics of Body Area Network Using Magnetically-Coupled Wearable Coils Worn on Bent Arm	Yusuke Fujita ¹ , Fukuro Koshiji ¹ , Kohji Koshiji ² , ¹ Tokyo Polytechnic Univ., ² Tokyo Univ. of Science / Japan	656
P22	Broadband Antenna with Asymmetrical Radiating Elements for Cognitive Radio System	Tomohiro Yamada ¹ , Shota Zempo ¹ , Fukuro Koshiji ¹ , Kohji Koshiji ² , ¹ Tokyo Polytechnic Univ., ² Tokyo Univ. of Science / Japan	660
P23	Study of Dye Sensitized Solar Cell Application of TiO ₂ Films by Atmospheric Pressure Plasma Deposition Method	Wei-Chun Chou, Wen-Jen Liu, I-Shou Univ. / Taiwan	664
P24	Study of Dye Sensitized Solar Cell Application of TiO ₂ Nanostructured Films Synthesis by Hydrothermal Process	Ming-Hung Chung, Wen-Jen Liu, I-Shou Univ. / Taiwan	669
P25	Preparation and Characterization of Biomimetic Superhydrophobic Expanded Graphite /Carbon Nanotube /Polymer Composites	Chih-Feng Wang, Wen-Ning Wang, Sheng-Yi Yang, Liang-Ting Chen, Hsin-Yi Tsai, I-Shou Univ. / Taiwan	673
P26	Fabrication of Biomimetic Superhydrophobic Surfaces through a One Step Solution-immersion Process on Galvanized Iron Substrates	Chih-Feng Wang, Li-Zhen Huang, Liang-Ting Chen, Sheng-Yi Yang, Chiung-Chih Shih, I-Shou Univ. / Taiwan	677
P27	Preparation of Fluorescent Ceramic Nanofibers by Electrospinning and Heat Treatment	Chun-Liang Chang, Jui-Wen Liang, Wei Chen, Sheng-Li Fu, I-Shou Univ. / Taiwan	681

P28	Exploring Optical Characteristics of Carbon-doped TiO ₂ Nanofibers by Electrospinning and Heat Treatment with Different Atmospheres	Yu-Min Chen, Cho-Liang Chung, Sheng-Hung Shin, Sheng-Li Fu, I-Shou Univ. / Taiwan	685
P29	A comparison study of electromigration in In-48Sn solder interconnects with Cu and Au/Ni/Cu pads	Yi Li ¹ , Y.C. Chan ¹ , Fengshun Wu ² , ¹ City Univ. of Hong Kong / Hong Kong, ² Huazhong Univ. of Science and Technology / China	689