

2008 International Conference on Electronic Materials and Packaging

(EMAP 2008)

**Taipei, Taiwan
22 – 24 October 2008**



**IEEE Catalog Number: CFP08506-PRT
ISBN: 978-1-4244-3620-0**

TABLE OF CONTENTS

SESSION 1: ADVANCED MATERIALS & PROCESSING I

The Effects of the Degree of Cure of Anisotropic Conductive Films (ACFs) on the Contraction Stress Build-up of ACFs and ACF Joints Stability for ACF Flip-Chip Interconnection.....	1
<i>Chang-Kyu Chung and Kyung-Wook Paik</i>	
Fluorine Thermal Stability of ZnO:F Films Investigated by Thermal Desorption Spectroscopy	6
<i>Shang-Chou Chang, Tien-Chai Lin, To-Sing Li and Tin-Wei Huang</i>	
New Halogen-Free Laminate for Advanced Package Substrate	10
<i>Takahiro Tanabe , Tetsuro Irino, Kazunaga Sakai, Masahisa Ose</i>	
Alloying Design of Sn-Ag-Cu Solders for the Improvement in Drop Test Performance	14
<i>Li-Wei Lin, Jenn-Ming Song, Yi-Shao Lai, Ying-Ta Chiu and Ning-Cheng Lee</i>	
Interfacial Behavior between Copper Foil and Tin upon Thermal Aging	18
<i>Chiu-Wen Lee, Shih-Ming Kuo and Kwang-Lung Lin</i>	
Fatigue Strength of Electroplated Copper Thin Films under Uni-Axial Stress.....	22
<i>Naokazu Murata, Kinji Tamakawa, Ken Suzuki and Hideo Miura</i>	

SESSION 2: SENSOR & TSV TECHNOLOGIES

Recent Progress in Copper-based Wafer Bonding for 3-D ICs Application.....	26
<i>Chuan Seng Tan</i>	
Flexible Opto-electrical Interconnect Module for Consumer Electronic Application	30
<i>Sheng-Ho Huang, Chun-Hsing Lee, Jen-Hao Yeh, Yuan-Chin Chen, Yu-Ming Huang, Fu-Yi Cheng, Hung-Lien Hu and Mu-Tao Chu</i>	
Parameter Extractions and a New Calibration Methodology For MOSFET Sensors	34
<i>Chun-Pai Tang, Hsien Chung, Yung-Ching Chao and Ben-Je Lwo</i>	
Low-Temperature Fabrication Method of Carbon Nanotubes-Based Gas Sensor	38
<i>Jung-Tang Huang, Chen-Han Lin, Po-Chih Chang</i>	
Low Cost Through Silicon Via Solution Suitable Compatible with Existing Assembly Infrastructure and Suitable for Single Die and Die Stacked Packages	42
<i>G Humpston, B Kidron and M Kriman</i>	
Optical Density Measurement of TFT-LCD by PMT Coupled Monochrome LED	46
<i>Fu-Ming Tzu, Jung-Hua Chou</i>	
Unique Dry Film Solution for Through Silicon Via Process	50
<i>Bin-Hong Tsai, Pedro Jorge, Chester E Balut</i>	
The Contact Stress Analysis of the Ferrule-Hub Assembly used in the Photonic Device Packaging.....	53
<i>Samuel I En Lin and Yu Kai Chen</i>	

SESSION 3: ADVANCED MATERIALS & PROCESSING II

Minor Fe, Co, and Ni Additions to SnAgCu Solders for Retarding Cu₃Sn Growth	57
<i>Y. W. Wang and C. R. Kao</i>	

Lead-free Solder Paste Selection and Solder Joint Reliability for Copper Stud Flip Chip	61
<i>Fon Bih Wen, Shutesh Krishnan, Yo Meng Chan</i>	
A Method of Fabricating MEMS Accelerometers.....	65
<i>S. Chen, H. T. Chien, J. Y. Lin and Y. W. Hsu</i>	
Nanoindentation Analysis of Interfacial IMCs in Electronic Solder Joints	69
<i>Yu-Lin Shen, Jenn-Ming Song and Chien-Wei Su</i>	
Conduction Soldering: Facts, Fiction and Best Practices	72
<i>Paul Wood</i>	
New LTCC Material with High Adhesion and Flexural Strength	76
<i>Minji Ko, SooHyun Lyoo, Jongmyeon Lee and EunTae Park</i>	

SESSION 4: CHIPMOS INDUSTRIAL SESSION

An Accommodative Approach Designed in Heat Dispersion of Fine-Pitch Chip-On-Film Packages for LCD Applications	79
<i>C. I. Tsai, A. H. Liu, S. C. Ho, D. S. Liu, S. S. Yeh and Y. F. Chang</i>	
Effect of Bonding Temperature on Eutectic Interconnections in Chip-On-Film Packages.....	83
<i>De-Shin Liu, Shu-Shen Yeh, Chia-I Tsai, An-Hong Liu and Shu-Ching Ho</i>	
Post-Mold Cure Process Simulation of IC Packaging.....	87
<i>Chi-Hong Shue, Sheng-Jye Hwang, Huei-Huang Lee, Durn-Yuan Huang and Yao-Jung Lee</i>	
RFID Implementation in Inventory Management of Wafer Cassettes and Probe Cards in Wafer Testing Houses	92
<i>Michael Lee, C.F. Huang, An-Hong Liu and Yi-Chang Lee</i>	
Interconnect Reliability Modeling for Lead-Free Fan-Out Chip Scale Package.....	96
<i>Yu-Ren Chen, G. S. Shen, Hung-Chun Yang and Tz-Cheng Chiu</i>	
Mechanical Behavior of Lead-Free Solder Joints under High Speed Shear Test at Different Pad Metallization Substrate	101
<i>C. Y. Lin, Y. R. Chen, G. S. Shen, D. S. Liu, C. Y. Kuo and C. L. Hsu</i>	

SESSION 5: PASSIVE COMPONENTS & INTERCONNECTION TECHNOLOGY

Fabrication and Characterization of Epoxy/ BaTiO₃ Composite Embedded Capacitor for High Frequency Behaviors	105
<i>Jin-Gul Hyun, Kyung-Wook Paik and Jun So Pak</i>	
Variability-aware LTCC Spiral Inductor Synthesis	110
<i>Tuck-Boon Chan and Hsin-Chia Lu</i>	
Design, Fabrication, and Property Measurement of a Zero-Insertion-Force (ZIF) MEMS Connector.....	114
<i>Ben-Hwa Jang, Hsin-Yu Huang, Weileun Fang, and Shin-Way Lin</i>	
High-performance Marchand-type Balun Design and Fabrication using An Integrated Passives Device (IPD) Technology	118
<i>Chien-Hsiang Huang, Tzu-Chiang Wei, Tzzy-Sheng Horng, Sung-Mao Wu, Chen-Chao Wang, Chi-Tsung Chiu and Chih-Pin Hung</i>	
Effect of Alloying W in Ni(5P) Metallization of Solder Joints.....	122
<i>D. M. Jang and Jin Yu</i>	

SESSION 6: MODELING & SIMULATION I

Warpage Measurement and Simulation of Flip-Chip PBGA Package under Thermal Loading	126
<i>M. Y. Tsai and H. Y. Chang</i>	
Mechanical Properties of Intermetallic Compounds Formed at the Interface Between a Tin Bump and an Electroplated Copper Thin Film	130
<i>Seongcheol Jeong, Yuki Sato and Hideo Miura</i>	
Thermal Analysis under Different Packaging Processes for MEMS Device with Diaphragm	134
<i>Cheng-Hsin Chuang, Wen-Hui Li and Sony Lee</i>	
Analysis of Flip-Chip Corner Delamination using 3-D Virtual Crack Closure Technique	138
<i>Tz-Cheng Chiu, Huang-Chun Lin, Hung-Chun Yang</i>	
The High Frequency Parasitic Effect Characterization of Packages with Test Chip Inside	142
<i>Kun-Fu Tseng, Tyler Lee and Ben-Je Lwo</i>	
Effect of Piezoelectric Fan Height on Flow and Heat Transfer for Electronics Cooling Applications	146
<i>M. K. Abdullah, M. Z. Abdullah, S. F. Wong, C. Y. Khor, Y. Ooi, K. A. Ahmad, Z. Mohd Ripin and M. A. Mujeebu</i>	

SESSION 7: ADVANCED MATERIALS & PROCESSING III

The Role of Ni Buffer Layer between InSn Solder and Cu Metallization for Hermetic Wafer Bonding	152
<i>Daquan Yu, Chengkuo Lee and John H Lau</i>	
Microstructure and Mechanical Properties of Sn-Ag-xNi Composite Solder	156
<i>Yang-Hsien Lee</i>	
Mechanical Property Measurement of Nano-Scale Metal Films on the Novel Paddle Cantilever Beams Using Four Step Phase-Shifting Method	160
<i>Yan-Ting Chen, Ya-Chi Cheng, Kuan-Jung Chung and Ming-Tzer Lin</i>	
Influence of Lanthanum Addition on Microstructure and Properties of Sn-3.5Ag Solder System	164
<i>Hwa-Teng Lee, Yin-Fa Chen, Ting-Fu Hong, Yu-Jing Huang</i>	
Size and Substrate Effects on Microstructure and Shear Properties of Solder Joints	168
<i>Gwo-Wei Lee, Jenn-Ming Song, Yi-Shao Lai, Ying-Ta Chiu and Chien-Wei Su</i>	
Effect of In Addition on Sn-Ag-Sb Lead-free Solder System	172
<i>Hwa-Teng Lee, Fok-Foo Lee, Ting-Fu Hong, Hsiao-Wei Chen</i>	
Effect of Lead-free Soldering on Key Material Properties of FR-4 Printed Circuit Board Laminates	176
<i>Ravikumar Sanapala, Bhanu Sood, Diganta Das and Michael Pecht</i>	

SESSION 8: ADVANCED PACKAGING I

Embedded Filter's Temperature Effect Analysis For High Frequency Applications	181
<i>Taeui Kim, Christian Romero Kim, Taesung Jung and Sung Yi Samsung</i>	
The Effects of Die Thickness and Bond Height on Wire Sweep in Multi-Chip Module and 3-Dimensional Packages	185
<i>H.-S. Chen, C.-B. Huang and H.-K. Kung</i>	

Feasibility and Bonding Strength for Gold Stud Bumps Thermosonic Flip-Chip onto Flex Substrates with Nonconductive Pastes	189
<i>Cheng-Li Chuang, Jong-Ning Aoh, Qing-An Liao, Shi-Jie Liao, Guo-Shing Huang</i>	
Development of a Miniature Surface Mount System Using Injection Molding Pantograph Mechanisms	193
<i>Mikio Horie, Yohei Kai and Daiki Kamiya</i>	
Bonding Interface Materials Evolution of Intermediate In/Ag Layers for Low Temperature Fluxless Solder Based MEMS Wafer Level Packaging	197
<i>Chengkuo Lee, Daquan Yu, Aibin Yu, Liling Yan, Haitao Wang and John H Lau</i>	
Interfacial Reactions Between Sn-9Zn+Cu Lead-Free Solders and The Au Substrate.....	201
<i>Wei-kai Liou and Yee-wen Yen</i>	
Fabrication of High Density and High Conplanarity Lead-Free Solder Bump by a Novel Process for Advanced Wafer Level Packaging.....	205
<i>Hou-Jun Hsu, Jung-Tang Huang, Kuo-Yu Lee, Rung-Gen Wu, Pen-Shan Chao, Jean Lin</i>	
Proposal of Area-Arrayed Bump Joint Structures for Minimizing Residual Stress in Stacked Silicon Chips Mounted by Flip Chip Technology	209
<i>Nobuki Ueta, Takuya Sasaki and Hideo Miura</i>	

SESSION 9: MODELING & SIMULATION II

Monitoring of Interface Crack between Solder Ball and Copper Plate Subjected to Cyclic Tensile Loading under Fluctuating Temperature by Direct Current Potential Difference Method	213
<i>Naoya Tada and Yusuke Ezaki</i>	
Drop Impact Reliability of Cu-Zn/Sn-Ag-Cu/Cu-Zn Solder Joints.....	217
<i>Young Min Kim and Young-Ho Kim</i>	
Structural Optimization of Contact Springs of Electrical Connectors Using Response Surface Methodology	220
<i>Kun-Nan Chen, Fu-Tsuen Gau, Cheng-Chin Chu and Hsien-Chie Cheng</i>	
MLP/BP-based MIMO DFEs for Suppressing ISI and ACI to Recover Distorted QPSK Signal in Severe ISI Channels	224
<i>Terng-Ren Hsu, Terng-Yin Hsu, Kuan-Chieh Chao, Shih-Yuan Chiang</i>	
Evaluation of Residual Stress in a Transistor Using Micron Scale Strain Sensors.....	228
<i>Takuya Sasaki, Nobuki Ueta and Hideo Miura</i>	
Reliability and Wear-out Characterization of BGA Production Sockets.....	232
<i>Hou Shu-Jung, Huang Yu-Jung, Chen Ming-Kun and Fu Shen-Li</i>	

SESSION 10: QUALITY & RELIABILITY I

Development of Surface Mount Compatible Reel-to-Reel Assembly Process of LED Arrays for Wide Area General Lighting.....	236
<i>S. W. Ricky Lee, Y. W. Tong, Y. S. Chan, J. C. C. Lo, R. Zhang</i>	
Electromigration Study of Eutectic SnPb Flip-chip Solder Joints on Ceramic Substrates	240
<i>C. K. Lin, Chih Chen, H. M. Yu, J. K. Lan and D. L. Lee</i>	
Kinetic Study of Eutectic Sn-3.5Ag and Electroplated Ni Metallization in Flip-chip Solder Joints	243
<i>Hsiao-Yun Chen and Chih Chen</i>	
Residual Stress Estimation in SiC Wafer using IR Polariscopes.....	249
<i>Kenji Gomia, Kensuke Ichinosea and Yasushi Niitsub</i>	

Thermal Resistance and Reliability of Low-Cost High-Power LED Packages under WHTOL Test	252
<i>C. H. Chen, W. L. Tsai and M. Y. Tsai</i>	

Effect of Transition Metals on the Interfacial Reactions in Electroless Ni(P)-solder Interconnections	258
<i>Yao-Ren Liu, Jenn-Ming Song, Yi-Shao Lai, Ying-Ta Chiu and Wei-Ting Chen</i>	

SESSION 11: QUALITY & RELIABILITY II

Measurement of Temperature Distribution in SnAg3.5 Flip-Chip Solder Joints during Current Stressing using Infrared Microscopy	262
<i>Hsiang-Yao Hsiao and Chih Chen</i>	

Extraction of Micro-contact Properties Using a Novel Micromachined On-chip Apparatus	266
<i>Ben-Hwa Jang, Po-Hsun Tseng, Weileun Fang and Shin-Way Lin</i>	

Development of Evaluation Approach for Delamination Considering Micro-Scale Interfacial Layer Structure between Resin and Silicon	270
<i>Tsubasa Matsumoto, Qiang Yu, Tadahiho Shibutani, Tomio Matsuzaki</i>	

The Microstructure and Fracture Behavior of Sn-3Ag-0.5Cu Solder Joints	274
<i>T. S. Wang, S. C. Liu, Y. L. Huang, K. L. Lin and Y.S. Lai</i>	

Effect of Parametric Randomness on Reliability Analysis of Wafer-Level Chip-Scale Packages	278
<i>Wen-Fang Wu, Teng-Kai Hsu, Chih-Yen Su, Yao-Chung Chen, Yao Hsu</i>	

Development of a Non-Destructive Inspection System for Micro Bump Joints	282
<i>Yuki Sato and Hideo Miura</i>	

Vibration Induced Fatigue Reliability of BGA Packages	286
<i>Yao Hsu, Wei-Kuo Kong, Chih-Yen Su, Wen-Fang Wu, Ming-Wei Liu</i>	

SESSION 12: ADVANCED PACKAGING II

A Novel High Refractive Transparent Material in LED Package Applications	290
<i>Hsun-Tien Li, Chia-Wen Hsu, Kai-Chi Chen</i>	

Wafer to Wafer Bonding Using Electroplated Co-Sn Solder Layer	294
<i>S. H. Kim and Jin Yu</i>	

Tolerance Analysis for Embedded Passive in Organic Substrate	298
<i>Hongwon Kim, Taesung Jung, Taeui Kim, Kyung O. Kim, Sung Yi</i>	

The 3-Axis CMOS-MEMS Accelerometer Include Accelerator Sensing Method of Z-Axis	302
<i>Jung-Tang Huang, Chieh-Han Lee, Chiu-Chin Yang, Kai-Yuan Jeng, Jeng Lin, Kuo-Yu Lee</i>	

A Capacitive Low-g Three-axis Accelerometer	306
<i>Y. W. Hsu, H. T. Chien, C. S. Lin, L. P. Liao, S. Chen, and P. Chang</i>	

Unique Transparent Lens Formation for High Brightness LED by VPES (Vacuum Printing Encapsulation Systems) Process	310
<i>Atsushi Okuno, Yoshiteru Miyawaki, Dongxu Wang, Osamu Tanaka</i>	

Fabrication and Characterization of Passive Devices on Flexible Substrates	314
<i>Pei-Ju Lin, Hung-Ming Chang, Ching-Chien Yuan, Yu-Jung Huang, Lih-Shan Chen, Hsiang-Chen Hsu, Shen-Li Fu</i>	

Author Index