

## Special Section on InterPACK 2013

InterPACK is the premier international forum for the exchange of state-of-the-art knowledge in research, development, manufacturing, and applications of electronic packaging, MEMS, and NEMS. It is the flagship conference of the ASME Electronic and Photonic Packaging Division. InterPACK 2013 had an outstanding technical program featuring more than 200 technical presentations in 47 technical sessions. These sessions were organized by nine Technical Track Committees comprised of leading researchers and engineers from industrial companies, government laboratories, and academic institutions throughout the world. The nine tracks are: (1) advanced packaging, (2) electrical, (3) emerging technologies, (4) modeling and simulation, (5) multiphysics based reliability, (6) MEMS and NEMS, (7) materials and processes, (8) thermal management, and (9) data centers and energy efficient electronic systems. At the end of the conference, each track chair was invited to recommend two papers from their track for this special section. All the recommended papers are again reviewed and some of them are selected for publication in this special section.

This volume is comprised of 15 manuscripts broadly categorized into three primary areas: (1) thermal management, (2) applied mechanics, and (3) emerging technologies. These papers exemplify the analysis and exploration of computational models and experiments as well as novel materials and processes to provide invaluable insights into the problems studied and offer design recommendations.

The thermal management papers cover the design of the cooling devices such as thermoelectric modules and heat pipes, characterization techniques using novel sensors, advanced package designs such as 3D packaging with through silicon vias, and cooling designs for lighting systems and water conditioners for supercomputers. The paper on thermoelectric modules by Ranjan et al. presented a novel shape of the leads of thermoelectric coolers that are in the form of a trapezoid. Shirazy et al. studied the effect of meniscus recession on the effective pore radius and capillary pumping of copper metal foams. Taylor and Garimella presented a sensor to characterize dielectric thermal interface materials at bond line thicknesses less than 100  $\mu\text{m}$  based on the detection of regions of contrasting electric permittivity. Petroski developed new designs to increase the power limits of the light emitting diode (LED) bulbs to 75 and 100 W by including cylindrical LED layout and light guide with a chimney. Ellsworth et al. presented the water cooling of a IBM supercomputer with no requirement for room air conditioning.

The papers in the area of applied mechanics discuss constitutive models for solder materials, experimental techniques to measure strains and stresses, and reliability of electronics in shock and impact tests. Neilsen and Vianco develop a constitutive model that unifies creep and plasticity for eutectic SnPb and Pb-free

solders and implemented to evaluate damage evolution. Hempel et al. investigate critical assembly and packaging issues to use surface acoustic wave strain sensors for structural integration. Meguid et al. studied the behavior of a typical electronic board assembly subjected to severe shock loads and the means using bilayer potting to protect the electronics. Lall and Lowe evaluated different prognostic health management algorithms based on the Kalman filter, extended Kalman filter, and particle filter. Jaeger et al. presented four-wire resistance characterization with only in-plane shear stress or the difference of the in-plane normal stresses on (100) silicon measured by van der Pauw stress sensors.

Four papers are included in this edition that focus on the emerging technologies. Brunschwiler et al. investigate enhanced electrical and thermal interconnects by applying a nanoparticle suspension to realize self-assembling of nanoparticles by capillary bridging. Sasagawa et al. characterize atomic density reduction occurring at the center of multiwalled carbon nanotubes under different current densities. Xu et al. presented a computational modeling study for a hybrid concentrating photovoltaic system with thermoelectric modules that can be useful, economic, and clean, especially as global warming and air pollution have become serious issues in recent years. Teshima et al. demonstrated an alternative bonding technique using through-hole anodic aluminum oxide with copper nanowires fabricated in ordered pores.

This fine collection of papers will be an excellent resource for the ASME *Journal of Electronic Packaging* readers and subscribers and will help in stimulating new ideas and further their research in this vibrant and multidisciplinary field. Special thanks to the contributors and reviewers of the journal for their trust, patience, and timely revisions.

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