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IEEE Components, Packaging and Manufacturing Technology Society Phoenix Chapter

Wednesday, November 16th, 2016 at 5:30 PM

2.5D and 3D IC Technology for Electronic Microsystems: Design Considerations and Experimental Demonstrations

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ABSTRACT

This presentation will address innovative interconnection and integration technologies for electronic microsystems. First, we discuss a highly scaled through-silicon via (TSV) technology for fine-grain heterogeneous electronic integration; we demonstrate TSVs with diameter of less than 1-micron for a wide range of applications. Next, we present innovative thermal solutions for 2.5D and 3D integration platforms using microfluidic cooling; the performance of a 28 nm CMOS FPGA with monolithic microfluidic cooling is demonstrated. Moreover, we analyze the thermal implication of silicon bridge technology in 2.5D systems. We also describe innovative 'thermal isolation' technologies in which thermal coupling between 3D IC stacks is minimized using an air-gap isolation and mechanically flexible interconnects. Lastly, an innovative sacrificial micro-fabricated self-alignment technology is also discussed as part of this application (sub-1 micron alignment accuracy is demonstrated without the use of a flip-chip bonder).

BIOGRAPHY

Dr. Muhannad Bakir is a Professor in the School of Electrical and Computer Engineering at Georgia Tech. His areas of interest include three-dimensional (3D) electronic system integration, advanced cooling and power delivery for 3D systems, biosensors and their integration with CMOS circuitry, and nanofabrication technology. Dr. Bakir is the recipient of the 2013 Intel Early Career Faculty Honor Award, 2012 DARPA Young Faculty Award, and 2011 IEEE CPMT Society Outstanding Young Engineer Award. In 2015, Dr. Bakir was elected by the IEEE CPMT Society to serve as a Distinguished Lecturer for a four-year term. Dr. Bakir and his research group have received more than twenty conference and student paper awards including five from the IEEE Electronic Components and Technology Conference (ECTC), four from the IEEE International Interconnect Technology Conference (IITC), and one from the IEEE Custom Integrated Circuits Conference (CICC). Dr. Bakir's group was awarded the 2014 Best Paper of the IEEE Transactions on Components Packaging and Manufacturing Technology in the area of advanced packaging. Dr. Bakir is an Editor of *IEEE Transactions on Electron Devices* and an Associate Editor of *IEEE Transactions on Components, Packaging and Manufacturing Technology*.

Date: Wednesday, November 16th, 2016

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Agenda: 5:30–6:00 PM: Social/Refreshments, 6:00–7:00 PM: Presentation, 7:00 PM: Dinner
(Pizza and Soda will be provided by the IEEE Phoenix Section CPMT Society Chapter)

IEEE members and non-members are all welcome to attend. The presentation promptly starts at 6:00 PM.

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