

## **Embedded IC and Passive Technology for Wireless Communication Applications**



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### **Abstract :**

The continuous miniaturization of the electronics sets new requires for the substrates, component packages and assembly technologies. Traditionally the passive and active components are mounted on the surface of the PCB using the surface mounting assembly technology. With this traditional technology, it is difficult to increase the packaging density further more. To meet the demand for higher integration, the interest toward passive and active component embedding has been increasing during the past few years. One of the main reasons for the growing interest toward embedded active components, in addition to demand for higher packaging density, is the need for better electrical performance of the component assemblies.

In this presentation, a new manufacturing process to embed active and passive components inside organic substrate for wireless communication applications will be presented.

### **Speaker's Biography :**

Dr. Sung Yi holds an associate professor position at the Mechanical and Material Engineering Department of the Portland State University, USA. He received B.S. in Mechanical Engineering from Hanyang University, Korea, M.Sc. from University of Washington, Seattle, and Ph.D. from University of Illinois at Urbana-Champaign. From March 2006 to January 2009, he was a vice president at Manufacturing Engineering, R&D Institute, Samsung Electro-Mechanics Co., LTD, Suwon-City, Gyunggi-Do, Korea. He was a faculty member and Head of Engineering Mechanics Division, School of Mechanical and Production Engineering, Nanyang Technological University (NTU), Singapore from 1995 to 2002. He was also a Singapore-MIT Alliance Fellow from 1998 to 2002.

In Samsung Electro-Mechanics, he has been privileged to build a brand new microelectronic packaging team. The mission of the Packaging Team is generating creative microelectronics packaging technology and providing total packaging solutions for all products. The team is focusing on core future technology and it's incubation. This approach makes the company have more aggressive R&D culture. During three years, he and his team developed several advanced electronic and MEMS packaging technologies including embedding active devices and passives into organic substrates, the world's smallest saw filter using wafer level packaging, ALOX high thermal

dissipation substrate technology for power devices and LED devices, 3-D advanced packaging technology, etc. The embedding ICs into substrate technology and wafer level packaging technology received the Samsung Technology awards in 2009 and 2011, respectively.

Dr. Yi has published more than 180 papers in various journals and conference proceedings and his work has been well accepted by the industry and academic community. He is the first one who formulated based on coupling hygro-thermo-viscoelastic physics and solved the pop-corn problem which is one of the most critical reliability problems in plastic IC packages. He and his students also developed the 3-D Moire system to measure 3-D deformation in IC packages. He co-developed the "Yi-Hilton model" to describe the chemo-thermo-viscoelastic behavior for thermosetting polymers during curing. He also co-created a new technical term "piezoelectro-hygro-thermo-viscoelasticity" for PVDF smart materials and successfully formulated the variational principle for piezo-electro-hygro-thermo-viscoelastic materials. In addition, he proposed a new constitutive model for solders including effects of grain sizes or phase sizes and the evolution of internal stresses.

He is an editorial advisory board member for the Journals of Soldering and Surface Mount Technology. He served as an editorial board member for the Journal of Finite Elements in Analysis and Design from 2000 to 2004. He also served as an associate editor for ASME: Journal of Electronic Packaging. He has been served as an international advisory committee member for various international conferences and symposiums. He received the Jefferson Goblet Paper Award at the 32<sup>nd</sup> SDM Conference in 1991 and the Roger A. Strehlow Memorial Award from UIUC in 1992, respectively. He also received a Hedong Technology award in 2007. He is a member of Tau Beta Pi, Sigma Xi, and Sigma Gamma Tau.