

Challenges of GaN Power IC Technology

GUEST SPEAKER

Prof. Kevin J. Chen

Electronic and Computer Engineering
The Hong Kong University of Science and Technology

When: **19th July 2011, 10.00 a.m. to 11.00 a.m.**

Where: **Institute of Microelectronics, Singapore**
11 Science Park Road Singapore Science Park II Singapore 117685

Abstract

Wide-bandgap GaN-based semiconductor materials are attracting considerable attention as the preferred material for next-generation power electronics applications, owing to their superior properties including high breakdown electric-field, high carrier density, high electron saturation velocity. GaN power devices can be operated at high voltage and current levels with high switching frequencies, and their inherent high-temperature operating capability could significantly reduce the burden on expensive cooling systems. In a complete power management system, besides the core power components (i.e. switches and rectifiers), intelligent control units are also needed to achieve precise adjustment of the output signal for different loading conditions. At the same time, robust sensing and protection blocks are needed to protect the high-performance power devices against over-temperature, over-current and over-voltage conditions. It is thus desirable to develop power IC technology with which on-chip power conditioning and protection circuits can be implemented to provide optimized performance, increased functionality and enhanced reliability. In this short course, a comprehensive discussion will be given on the development of device technologies for implementing GaN power ICs using the low-cost and highly scalable GaN-on-Si platform. Challenging issues in device technology and their impacts on the power ICs will be presented.

About the Speaker



Prof. Chen received the B.S. degree from Peking University in 1988 and the PhD degree from University of Maryland, College Park, USA in 1993. From 1994 to 1995, he was a research engineer in NTT LSI laboratories, Atsugi, Japan, engaging in the research and development of functional quantum effect devices and heterojunction FET's. From 1996 to 1998, he was an assistant professor in the Department of Electronic Engineering, City University of Hong Kong. Dr. Chen then joined the Wireless Semiconductor Division of Agilent Technologies, Inc., in 1999 working on RF power amplifiers used in dual-band GSM/DCS wireless handsets. In 2000, Dr. Chen joined Hong Kong University of Science and Technology (HKUST), where he is currently an associate professor in the Department of Electronic and Computer Engineering. At HKUST, he has carried out research in wide bandgap III-nitride devices, silicon-based microwave passive components and 3D through-silicon-via interconnects technology, GaN-based MEMS devices, and multi-band reconfigurable microwave filters. Currently, his group is focused on developing GaN device technologies for power management and high-temperature electronics applications.

