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Roles of Fluorine Ions in GaN Transistors

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<http://www.phy.pku.edu.cn/events/icmp09s>

Prof. Jing Chen (陈敬教授)

Prof. Chen received the B.S. degree from Peking University in 1988. Through the CUSPEA program, he obtained a 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 (HFET'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 wireless handsets. Dr. Chen joined Hong Kong University of Science and Technology in Nov. 2000, 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 interconnects technology, GaN-based MEMS devices, and multi-band microwave filters design. Currently, his group is focused on developing GaN device technologies for high-frequency, high power and high-temperature electronics applications. Prof. Chen has authored or co-authored more than 200 publications in international technical journals and conference proceedings. Prof. Chen is a senior member of IEEE and a distinguished lecturer of IEEE Electron Device Society.

Abstract

It has been recently discovered that the fluorine ions incorporated in wide bandgap GaN and related materials bring a significant benefit to device applications: the robust control of threshold voltage in GaN transistors. This technology is playing a critical role in advancing GaN power amplifiers, power switches and GaN digital/analog integrated circuits. In this talk, I will give a comprehensive presentation on the processing technologies, underlying physics and device applications. The future prospects of the GaN electronics will also be discussed.

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