中国科学院半导体研究所

黄昆半导体科学技术论坛

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报告题目： **Enhancement of Light Color Conversion through Nanoscale-cavity Effect in Nitride Light-emitting Devices**

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简历： ： Prof. Yang is Fellow of Optical Society of America (2002) and SPIE (2011), and received Outstanding Research Award of National Science Coucil, Taiwan (2010). He received BS degree from Taiwan University in 1976, and MS and Ph. D degrees from University of Illinois Urbana-Champaign in 1981 and 1984. He was an Assistant Professor from August 1984 – June 1990, and then Associate Professor with Tenure from July 1990 – July 1993, all at Department of Electrical Engineering, The Pennsylvania State University. He has been a professor of the Institute of Photonics and Optoelectronics and Department of Electrical Engineering, Taiwan University, since August 1993, and served as the Chairman of Institute of Photonics and Optoelectronics, Taiwan University, and has become a distinguished professor in the Institute of Photonics and Optoelectronics since August 2013, and the Ming Nien Chair Professor of Taiwan University since January 2020. His research scopes include nitride and oxide semiconductor MOCVD and MBE growths, light-emitting diode, nano-photonics and optoelectronics, plasmonics, and bio-photonics. He published 329 SCI and one SSCI journal papers and over 700 conference papers, including over 130 invited talks at international conferences. He has supervised 41 Ph.D. and over 150 MS theses.
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报告摘要： Light color conversion means the transfer of energy from a higher-energy photon into a lower-energy light through a phosphor. It can be used for white light generation and color display. The nanoscale-cavity effect refers to the near-field version of the Purcell effect, which describes the change of the emission behavior of a light emitter caused by the field scattered back from the surrounding structure. Within a nanoscale cavity, the surrounding structure effect on a light emitter is quite different from that of cavity resonance, which is a far field behavior in a larger cavity. With the development of nano-fabrication technology, nanoscale cavities become quite popular for various applications. At this presentation, we discuss the enhancements of light emission, Förster resonance energy transfer, and surface plasmon coupling in nanoscale cavities for effectively increasing the overall color conversion efficiencies from InGaN/GaN quantum well (QW) into colloidal quantum dot (QD) and from green-emitting QD into red-emitting QD. Two nanoscale cavity geometries are to be discussed, including subsurface GaN porous structure and surface GaN nano-hole. The fabrication techniques of the nanoscale cavities and the methods for inserting QDs and chemically synthesized Ag nanoparticles into the cavities are introduced. The emission behaviors of the used QW and QD are presented.

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地　点：中国科学院半导体研究所学术会议中心

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