UC San Diego

JACOBS SCHOOL OF ENGINEERING
NanoEngineering

UC SAN DIEGO NANOENGINEERING SEMINAR

Wednesday, March 21, 2018

Seminar Presentation: 11:00am – 12:00pm

ASML Conference Center (SME 248)

"Self-Healing Phosphor: New Paradigm for High-Power LED Lighting Application"

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Abstract: Phosphor-converted white light-emitting diodes (pc-WLEDs) are the efficient light source that has multifarious applications in lighting, high-tech displays, and electronic devices. One of the biggest challenge of pc-WLEDs are the thermal quenching (TQ), in which phosphor suffers from emission loss with increasing temperature during high-power LED operation and is an inevitable drawback for any existing phosphor. Here, we present robust and none-TQ WLEDs using various strategies to overcome the TQ and efficiency decrease by means of (1) phosphor-plate with high thermal conductivity by graphene-wrapping, (2) solid-solution phosphors with structural information by diffraction techniques, and (3) a zero-thermal-quenching phosphor. In particular, for the first time, a new blue-emitting phosphor that doesn't exhibit TQ revealing zero-emission loss even up to 250ºC. This phenomena of a zero-thermal quenching, denoted as self-healing phosphor, portrays the ability of phosphor in resurrecting the emission loss and sustaining the luminescence with increasing temperature. This finding would initiate the exploration of many self-healing phosphors with zero-thermal quenching for high-power LED applications.

Biosketch: Dr. Won Bin Im is a Professor in Materials Science and Engineering at the Chonnam National University, South Korea. He received his Ph.D. in Materials Science and Engineering from the KAIST, South Korea in 2007. He joined University of California at Santa Barbara, USA as a postdoctoral researcher (2007–2010). Professor Im has published more than 100 papers and 30 patents. His research group focuses on the areas of crystal chemistry, with an emphasis on how atomic structure dictates the physical properties of functional materials, and expertise in the field of solid-state lightings and energy storage applications.