Department of **Materials Science & Engineering** seminar series 2019

Development of Long Wavelength InGaN Light Emitters: Optical Investigations at the Atomic Level

Speaker: Chung Jing Yang

Department of Materials Science and Engineering, Engineering, NUS, Singapore

Date: **24th Oct 2019, Thursday**
Time: **3:00 to 3:30 pm**
Venue: **EA-06-03**

Abstract

While blue-emitting InGaN-based LEDs have met with much commercial success, current technologies for white light applications still rely on the coating of phosphor materials for colour conversion, resulting in Stokes shift losses and shortened lifespan. Thus, the development of long wavelength InGaN quantum wells (QWs) would enable fully solid-state white light devices based purely on Group-III-nitrides with high luminous efficiencies to be possible, with major implications for reduced worldwide energy consumption. To make steps in addressing issues such as internal piezoelectric fields and electrically-active defect formation, aberration-corrected scanning transmission electron microscopy, alongside correlative techniques, were utilized to probe the atomic and optical properties of InGaN QWs in various long wavelength devices. Studying the identity of newly formed QW defects shed light on their origin, eventually enabling the growth of defect-free yellow-emitting LEDs. Additionally, developments in an original nanotextured InGaN structure grown monolithically from overlapping V-pits, allowed for substantial emission red-shifts due to the higher indium incorporation at specific vertices formed. These studies help to further enhance our understanding in the optical properties of different QW features and various types of crystallographic defects, providing insights on future three-dimensional nanostructures for efficient phosphor-free white light LEDs.

Jing Yang received his Bachelor's Degree in Materials Science and Engineering from the National University of Singapore. He is currently a PhD candidate in MSE under the supervision of Prof. Stephen Pennycook and Prof. Silvija Gradečak, and is part of the Low Energy Electronic Systems IRG in SMART. His current research involves the use of electron microscopy in the development of new and efficient Group-III-nitride optoelectronics integrated into silicon platforms.

ALL ARE WELCOME!

Host: A/P Xue Junmin