



Department of
Mechanical Engineering
The University of Hong Kong



SEMINAR

Efficient Alignment of GaN Nanorod LEDs via Insulator-based Dielectrophoresis

Date: 3 August, 2023 (Thursday)
Time: 4:00 p.m. (Hong Kong Time)
Venue: Room 7-35, Haking Wong Building
HKU

Speaker: Prof. In-Hwan Lee
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Korea University
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Abstract:

GaN-based nanorod LEDs (NRL) show promise for high efficiency and high-resolution display applications. In order to use individual NRL as a light source, it is necessary to separate them from the substrate and assemble them in a desired position on the electrode that is patterned on back panel. Dielectrophoresis (DEP) is commonly used for assembly of nanostructures, but electrode-based DEP (eDEP) has low alignment accuracy and can cause damage to the electrodes because they come into direct contact with the solvent. In this study, we introduce insulator-based DEP (iDEP) structure, with an insulator layer placed between the electrode and the solvent. This novel structure enables manipulation of the electric field to achieve precise alignment of NRL within a specific region. We observe a significantly improved alignment yield of NRL using iDEP to 91.9%, compared to the yield of 45.5% observed with eDEP. Furthermore, we show the potential for NRL as display pixels by performing a pixelation process, enabling more precise and controlled alignment of NRL in pixel region. Our results demonstrate the high potential of iDEP for the precise alignment of NRL and its potential application in display technology.

Biography:

In-Hwan Lee is a Professor of the Department of Materials Science and Engineering at Korea University in Korea. He received his Bachelor's (1991), Master's (1993), and Ph.D. degrees (1997) at Korea University, and conducted postdoctoral research at Northwestern University. Prior to joining Korea University, he worked as an Assistant, Associate, and Full Professor at Chonbuk National University (2002 - 2017). His research interests include 1) InGaN-based micro and nanorod LEDs for display applications, 2) Optoelectronic devices covering full visible spectrum by employing III-nitrides, 3) Exploration of novel properties from optoelectronic materials by using nanotechnology, 4) Thin film deposition by kinetically enhanced adatom migration, and 5) Photocatalysts for water splitting and CO₂ reduction. He has published more than 310 SCI papers and 35 patents.

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. J.T. Kim at 3917 2631.