Contribution ID: **398** Type: **Oral Presentation**

Spectroscopic studies on $In_xGa_{1-x}N$ and $In_xGa_{1-x}N$:Si

Wednesday 9 July 2025 15:20 (20 minutes)

{$In_xGa_{1-x}N$} is a semiconductor widely used in optoelectronics[1]. Significant advancements are being made to semiconducting materials to enhance their properties. One noteworthy approach is doping InGaN with silicon Si. Photoluminescence studies were conducted on samples with 10% In concentration, both with and without silicon (Si) doping. Earlier literature indicates that introducing Si reduces the full width at half maximum (FWHM) of the band-edge emission peaks[2]. The spectra measured for the InGaN:Si samples display sharper peaks than those of pure InGaN, highlighting the potential of InGaN:Si as an ideal candidate for active layers in LEDs and laser diodes, thanks to its high emission efficiency. Additionally, measurements were performed from 10 K to room temperature to investigate the peak position shift as temperature changes. Our findings revealed an S-shape behaviour, indicating the presence of alloy disorder in both materials. Furthermore, the spectra show peaks of deep-level emissions, which were not found in earlier literature on InGaN[3]. An explanation for these emission peaks and their temperature dependence will be discussed.

Refereneces

1. S. Nakamura, Rev. Mod. Phys., 87(4), 2015.
2. S. Nakamura et al., Jpn. J. App. Phys., 32, 1993.
3. S. Nakamura et al, Jpn. J. App. Phys., 31, 1992

Apply for student award at which level:

PhD

Consent on use of personal information: Abstract Submission

Yes, I ACCEPT

Primary author: MPATANI, Ongeziwe (University of the Witwatersrand)

Co-authors: Mr MUTH, Dominik (Department of Physics and Material Sciences Center, Semiconductor Spectroscopy Group, Philipps-Universität Marburg); Dr ADHIKARI, Rajdeep (Institute for Semiconductors and solid-state physics, Johannes Kepler University); Prof. GERHARD, Marina (Department of Physics and Material Sciences Center, Semiconductor Spectroscopy Group, Philipps-Universität Marburg); Prof. BONANNI, Alberta (Institute for Semiconductors and solid-state physics, Johannes Kepler University); Dr MASENDA, Hilary (School of Physics, University of the Witwatersrand)

Presenter: MPATANI, Ongeziwe (University of the Witwatersrand)

Session Classification: Physics of Condensed Matter and Materials

Track Classification: Track A - Physics of Condensed Matter and Materials