

# Characterization of ZnO Nanorods grown on GaN using aqueous solution method

Quang Le Hong<sup>1</sup>, Soo Jin Chua<sup>1,2,3</sup>, Kian Ping Loh<sup>5</sup>, Chen Zhen<sup>2</sup>, Carl V. Thompson<sup>1,4</sup> Eugene Fitzgerald<sup>1,4</sup>

1. Singapore-MIT Alliance, Advanced Materials for Micro- and Nano-Systems Programme, 4 Engineering Drive 3, Singapore 117576
2. Institute of Material Research and Engineering, 3 Research Link, Singapore 117602
3. Department of Electrical and Computer Engineering, National University of Singapore, 4 Engineering Drive 3, Singapore 117576
4. Department of Material Science and Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA 02139
5. Chemistry Department, National University of Singapore, 117576

**Abstracts** – Uniformly distributed ZnO nanorods with diameter 70-100 nm and 1-2 $\mu$ m long have been successfully grown at low temperatures on GaN by using the inexpensive aqueous solution method. The formation of the ZnO nanorods and the growth parameters are controlled by reactant concentration, temperature and pH. No catalyst is required. The XRD studies show that the ZnO nanorods are single crystals and that they grow along the c axis of the crystal plane. The room temperature photoluminescence measurements have shown ultraviolet peaks at 388nm with high intensity, which are comparable to those found in high quality ZnO films. The mechanism of the nanorod growth in the aqueous solution is proposed. The dependence of the ZnO nanorods on the growth parameters was also investigated. While changing the growth temperature from 60<sup>o</sup>C to 150<sup>o</sup>C, the morphology of the ZnO nanorods changed from sharp tip (needle shape) to flat tip (rod shape). These kinds of structure are useful in laser and field emission application