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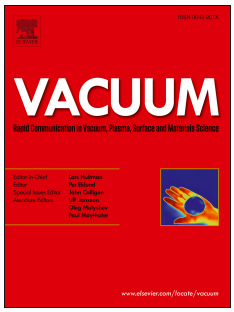

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Li-doped ZnO nanostructures for the Organic Light Emitting Diode application

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Abstract

ZnO and Li-doped ZnO nanoparticles have been synthesized by a simple wet chemical method for its potential application in Organic Light Emitting Diodes (OLED). Studied have been undertaken for structural as well as optical properties of ZnO after Li doping with various concentrations. Field Emission Scanning Electron Microscopy indicated the nanodots structure has formed. X-ray Diffraction reveals the pure hexagonal phase of the wurtzite structure. UV-Visible suggested the exciton characteristic at room temperature while Photoluminescence spectra reveal two different regions (ultraviolet and blue). Synthesized materials have been blended with Poly [9, 9-dioctylfluorenyl-2,7-diyl] (PFO) and prototype OLED has been fabricated using these materials as an emissive layer. Electroluminescence spectra show prominent blue emission at 435 nm at 8V. Current-Voltage (I-V) curve reveal that the turn-on voltages reduce as compared with pristine PFO device.

Key Words: Zinc Oxide, Lithium Doping, OLED, Low Turn-on Voltage,

Introduction

Zinc Oxide (ZnO) is a known promising material for semiconductor device applications [1–3] due to its direct and wide band gap in the near-UV spectral region [4–5], and a large free exciton binding energy [4–5] so that excitonic emission processes can persist at, even above, room temperature [5, 6]. It has been reported that ZnO crystallizes have same wurtzite structure as of GaN [5], which is a well know blue light emitting materials and awarded with the noble prize for the blue light emitting diode. ZnO properties have been studied since the beginning of semiconductor electronics [7], but the