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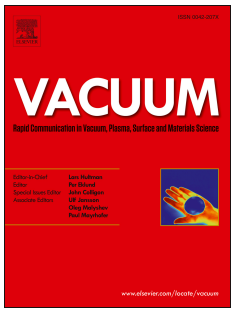

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Properties of InGaN/GaN MQW LEDs grown by MOCVD with and without hydrogen carrier gas

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Abstract

Two types of 3-period $In_{14}Ga_{86}N$/GaN multiple quantum well light-emitting diodes (LEDs) were studied, differing only in the conditions under which their p-GaN layers were grown by metalorganic chemical vapor deposition. The p-GaN of one type of LED was grown with a carrier gas mixture of N_2/H_2. A carrier gas of only N_2 was used to grow the p-GaN of the second type of LED at a relatively elevated temperature, making the entire structure grown in pure N_2 alone. Subsequently the growth, fabrication and characterization of each type of LED were methodologically studied. Based on the XRD analysis, the thickness of the well, barrier and In composition of the LED structures were estimated to be 2.5 nm, 8.5 nm and x=14%, respectively. Finally, the electroluminescence output of these devices was evaluated at a current of 20 mA at room temperature. It was observed that the LED structure grown with nitrogen-only carrier gas had approximately 25% superior electroluminescence.