32: Single-wire LED emitting strong blue light grown by metal-organic vapor phase-epitaxy

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III-nitride semiconductors (GaN, InN, AlN) are nowadays widely studied to fabricate optoelectronic devices such as light emitting diodes (LED), lasers, photodetectors and photovoltaic cells. Semiconductor nanowires (NWs) have gained much attention due to their high quality of crystalline structure due to the strain relaxation. In addition, the nanowire geometry allows to get promising optical properties such as efficient light guiding.

In the laboratory, we have developed original growth methods to get **catalyst-free GaN nanowires** on sapphire substrates by MOVPE (metal-organic vapor phase epitaxy) [1,2] with diameter about 500 - 800 nm and a length controlled by the growth time (until 400 µm). In this practical, **we propose to fabricate single-wire LED emitting strong blue light at room temperature** [3]. Firstly, n-doped GaN wires with a length of 10-20 µm are grown and then coated by five $In_xGa_{1-x}N$/GaN multiquantum wells with p-doped GaN shell. Secondly, the wires were dispersed and contacted using conductive tips for the device characterizations.

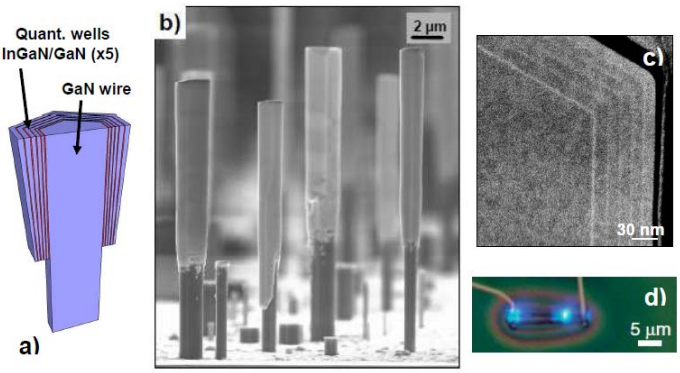

Figure 1. Growth of radial InGaN/GaN heterostructures around GaN wires (Fig. a, b and c). Fabrication of nanoLED with strong blue electroluminescence (Fig. d)

High resolution scanning electron microscopy (SEM) will be used to observe the wire morphology (shape, size and height) and electroluminescence measurements will also be performed to get optical properties of such NWs. The potential applications of nitride NWs based devices is will be presented and discussed for the future [4,5].

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