FE simulations of piezoelectric properties of nanorods

(Master theses 30hp)

Nanorods have a great potential for light emitting diodes (LEDs) and other applications due to their excellent crystalline and optoelectronic properties. Furthermore, some nanorods have piezoelectric material properties, meaning that mechanical strain generates a piezoelectric field and thus a separation of electric charges within the nanorod. Making use of both semiconductor and piezoelectric properties opens the door for novel devices within piezophototronics, such as strain-engineered LEDs with tunable wavelengths. Conductive atomic force microscopy (C-AFM) has been used to investigate the structure and local conductivity of InGaN nanorods. With a metallic probe tip in the C-AFM, local current-voltage (I-V) profiles can be determined with a spatial resolution of a few nm.

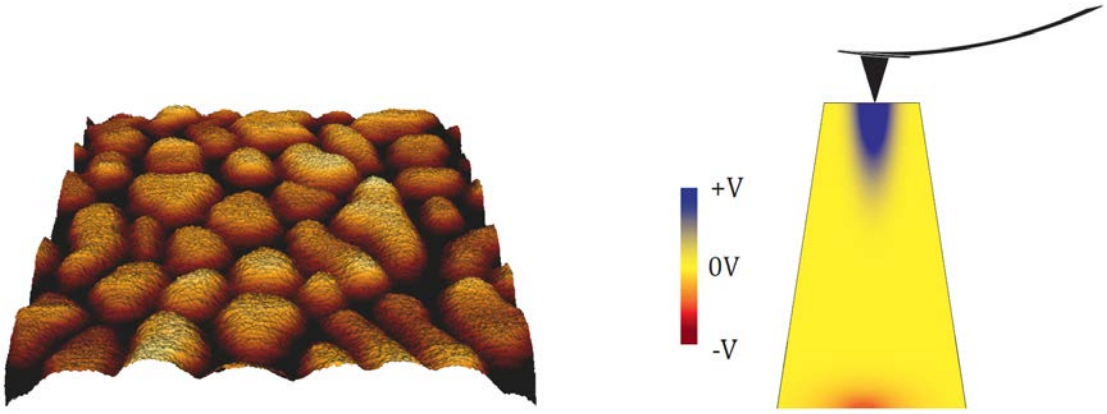

Fig .1 a) InGaN nanorods image b) Cross-section through the nanorod

The proposed master theses project is aimed at development of a Finite Element model for piezoelectric nanorods using FEMLAB, and thereby determine the voltage distribution within the nanorod due to mechanical loading. The obtained numerical results will be directly compared to experimentally obtained results. The work is suitable for 1-2 students from the following programs: engineering physics, engineering mathematics, engineering nanoscience and mechanical engineering.

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