

## **Characterization of GaN thin films and Eu-doped GaN nanowires and nanoparticles produced on the basis of Ga<sub>2</sub>O<sub>3</sub> nanomaterial**

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Due to advantageous properties such as wide bandgap, pronounced chemical and thermal stability, gallium nitride is currently considered as one of the most important semiconductor materials for practical applications [1]. We present results of preparation of Eu doped GaN nanoparticles and nanowires by using Ga<sub>2</sub>O<sub>3</sub> as source nanomaterial. Monoclinic Ga<sub>2</sub>O<sub>3</sub> nanoparticles and nanowires have been prepared by hydrothermal growth with high purity Ga(NO<sub>3</sub>)<sub>3</sub> · 9H<sub>2</sub>O and 1M precursors [2]. The geometrical parameters of the nanomaterial were found to be determined by the duration of the hydrothermal process, Ga<sub>2</sub>O<sub>3</sub> nanoparticles or nanowires being produced. The hydrothermal process lasts for 5 to 24 hours at the temperature of 220°C. The Ga<sub>2</sub>O<sub>3</sub> nanomaterial is transformed unto GaN nanoparticles and nanowires by nitridation in a flow of NH<sub>3</sub> and H<sub>2</sub>. The photoluminescence properties of Eu doped Ga<sub>2</sub>O<sub>3</sub> and GaN nanomaterial were investigated under laser excitation. The photoluminescence proprieties of GaN films obtained by magnetron sputtering were compared with those of GaN nanowires and nanoparticles. The produced material was also investigated by means of XRD analysis, Raman scattering and Fourier transform infrared (FTIR) spectroscopy.

References:

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[2] E. Rusu, V. Ursaki, S. Raevschi, P. Vlazan /*Preparation and characterization of Ga<sub>2</sub>O<sub>3</sub> and GaN nanoparticles* //Proc. of SPIE Vol. 9258, 92581U-5 · © 2015 SPIE