

**MD.115.**

**Title**                   **Procedures for obtaining of semiconductors based on GaN:Mg**

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**Description**  
**EN**

The process according to the invention consists in obtaining GaN nanoparticles and nanoparticles with p-conductivity by means of chemical reactions of a chemical compound used as the source of gallium atoms and magnesium acetate  $Mg(CH_3COO)_2$ , or acetate tetrahydrate of magnesium  $(CH_3COO)_2 \cdot 4H_2O$  – as a source of magnesium atoms in the hydrothermal process, at the same time the concentration of the doping element being of (0.4-2.0)% wt. The GaN nanoparticles and nano-microwires with p-type conductivity with high crystallinity and dimensionality at nano-micrometric

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level with intense radiative properties having the maximum emission band located at 380 nm. The GaN nanocrystals obtained in this process, in the test result indicated the concentration of gaps in the material of  $5.10^{15} \text{ cm}^{-3}$  at  $T = 300 \text{ K}$ . Mg-doped GaN nanocrystals are obtained by nitriding in 0.3 L/min in ammonia stream ( $\text{NH}_3$ ) of the powdered  $\text{Ga}_2\text{O}_3$  precursor, maintained at  $t = 800\text{-}1000^\circ\text{C}$ , for 4 hours in a horizontal furnace. Mg doping is performed by mixing the stoichiometric compositions of the oxides of  $\text{Ga}_2\text{O}_3$  and  $\text{MgO}$  in powder form, where after nitridation  $\text{Ga}_{1-x}\text{Mg}_x\text{N}$  is formed (where  $x=0; 0.5; 1.0; 2.0\%$  at). As a result, p-type conductivity GaN powder was synthesized with 0-2% at. Mg concentration and nanocrystallite size of 100-200 nm. The reaction of formation of GaN nanoparticles by the nitridization process can be described as follows:

