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Electrospun Nanofibers Based on Gallium Oxide: Fabrication and Characterization

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Abstract. Currently, nanofibrous semiconductor materials having large surface area and wide bandgap are in demand for modern technological processes, from fabrication of optoelectronic devices to photocatalytic facilities. Ga_2O_3 is the most suitable semiconductor for such materials due to its unique properties, wide bandgap equal to ~4.8 eV, and high acid resistance. In this study, Ga_2O_3-nanofibers were fabricated by electrospinning technique from the polymer spinning solutions based on polyvinylpyrrolidone. The fabrication procedure consists of two stages: electrospinning of nanofibers loaded with the gallium oxide precursor and annealing of nanofibers obtained for polymer removal and Ga_2O_3 formation. Influence of annealing temperature on the fiber morphology and its optic-electronic properties were demonstrated. Results obtained provide experimental basis for further fabrication of metal-oxide nanofibers, including doped ones, for high effective devices.

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