Laser ablative synthesis of ZnS nanomaterials in an air atmosphere using an electrostatic field and liquid media

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The paper presents the analysis and characterization of nanomaterials based on zinc sulfide synthesized as a result of laser ablation treatment in a liquid medium and an air atmosphere. The obtained samples were studied by Raman spectroscopy and X-ray diffraction. The nanoparticle size was measured by dynamic light scattering.

When conducting experiments on laser ablation treatment of ZnS in an air atmosphere using an electrostatic field, special equipment was used in the form of a platform with a cathode and an anode, to which a high voltage source was connected.

Under the action of focused laser radiation, a laser erosion plume is formed, the presence of an electrostatic field contributes to the removal and deflection of the flow of ablated particles from the area of propagation of laser radiation and the erosion plume. As a result, ablation products leave the laser beam propagation zone, do not fall under repeated exposure to laser radiation, an increase in the efficiency of ablation treatment is observed, the probability of coagulation of ablation products caused by the action of a plasma torch decreases. The deposition of particles in this case occurs directly on the surface of the silicon plate, which was attached to the cathode.

In the synthesis of nanomaterials based on zinc sulfide by laser ablation in air using an electrostatic field, the predicted deposition of ablation products directly onto the substrate surface was carried out. According to the results of X-ray structural analysis of synthesized nanomaterials, it was found that in the case of laser ablation in ethanol, as well as laser ablation in air using an electrostatic field, a transformation of the crystal lattice and a transition from the structural phase of sphalerite to the structural phase of wurtzite is observed.

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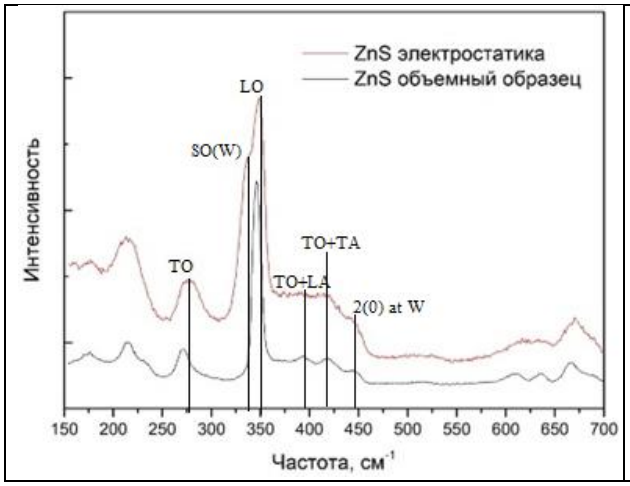

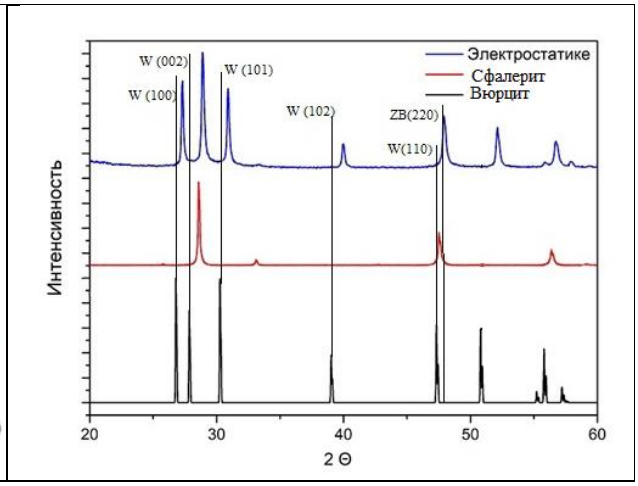

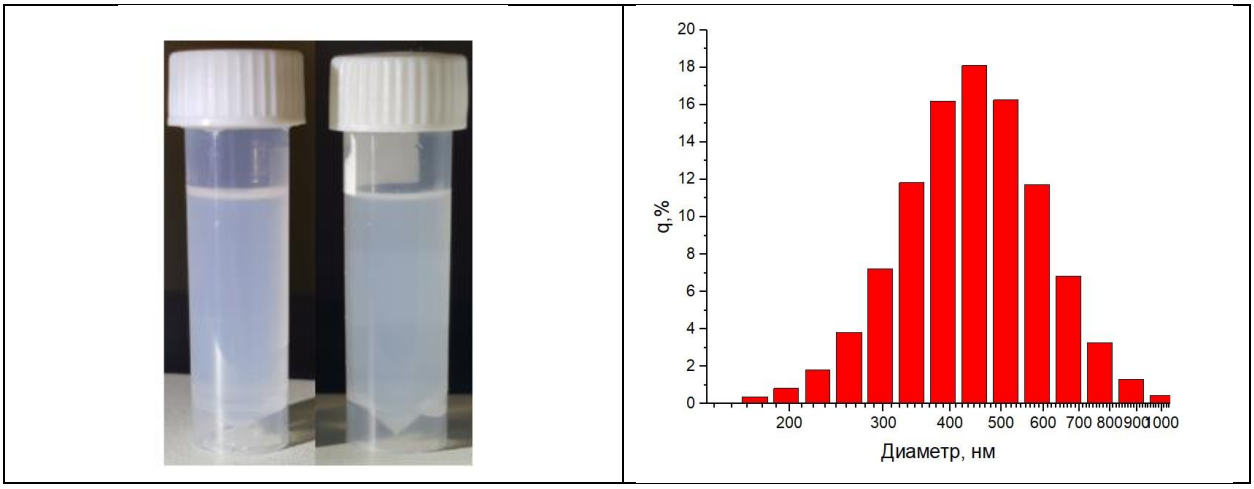
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