



A TECHNIQUE FOR INVESTIGATION OF THE THERMAL FIELD DURING THE HYDROTHERMAL SYNTHESIS OF NANOPARTICLES IN AN AUTOCLAVE WITH OPTICAL ACCESS

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Visualization method(s): holographic interferometry

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ABSTRACT: The hydrothermal synthesis is one of the most effective methods of obtaining nanoparticles. This method allows to produce nanoparticles with various composition and morphology, characterized by a narrow size distribution. The efficiency of the nanoparticles synthesis under hydrothermal conditions is determined, in particular, by the spatio-temporal characteristics of the temperature in the autoclave. The team of authors has at its disposal a unique autoclave with sapphire windows for the studying the process of nanoparticles synthesis using optical radiation. At this moment, there is no technique for investigating such systems and processes by optical methods.

A prototype of the interferometer was constructed and experiments on model objects (lamellar nanoparticles AlOOH) were carried out. The mathematical model of free convection in the modeled object was developed. A comparison of experimental and theoretical studies of the temperature field in the layers of different thickness and liquids with different concentrations of nanoparticles was made. The satisfactory agreement between theory and experiment was obtained. Recommendations on conducting experiments related to the study of the process of hydrothermal synthesis of nanoparticles were developed.

References

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