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VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ, ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ ИНСТИТУТА ХИМИИ НЕФТИ

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FORMATION OF HIERARCHICALLY ORGANIZED ALUMINUM HYDROXIDES DURING WATER OXIDATION OF Al NANOPARTICLES AND THEIR INTERRACTION WITH BIOOBJECTS

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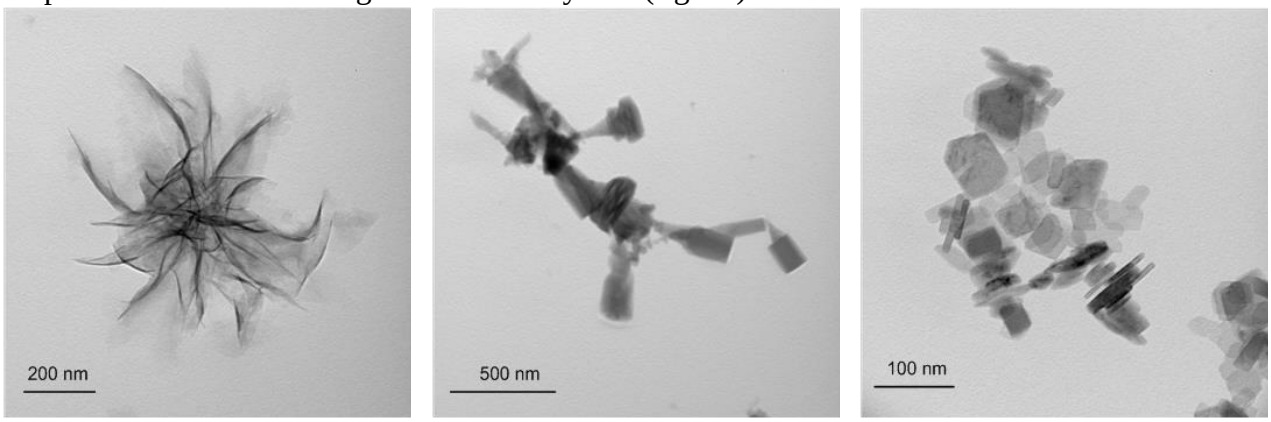
Obtaining new knowledge in the field of interaction of nanostructured materials with biological objects for the development of biomedical materials of directional action is a relevant area of research. One of the objectives of this area is the structure of materials and complex shell structures. In our work, we showed that using AlN/Al nanoparticles obtained by electrical explosion of a wire, it is possible to synthesize nanostructures with different textural characteristics, morphology, and phase composition.

In t he results of water oxidation of AlN/Al nanoparticles at 60 °C, agglomerates up to 1 μm in size, consisting of highly crumpled AlOOH nanosheets 2-5 nm thick are formed (fig. 1a). After water oxidation of AlN/Al nanoparticles under hydrothermal conditions (200 ° C, 6 atm), boehmite nano-plates with a size of 20-100 nm and a thickness of 5-30 nm are formed (fig. 1b). In humid air, Al nanoparticles oxidize to hexagonal rods of bayerite (fig. 1c).



(a) (b) (c)

Fig. 1. TEM-imagies of agglomerates of crumpled AlOOH nanosheets (a), nanoplates of boehmite (b) and hexagonal rods of bayerite (c)

It is shown that the heat treatment of the synthesized nanoplates and hexagonal rods of nanostructures is accompanied not only by phase transitions, but also by a change in textural properties. After calcinations of bayerite nanostructures at 300 ° C, the specific surface area increases from 27 m^2/g to 303 m^2/g. The maximum specific surface area of nanoplates (120 m^2/g) is achieved as a result of calcination at 500 ° C.

In vitro experiments found that all synthesized nanostructures do not have a cytotoxic effect on normal cell lines. At the same time agglomerates of crumpled nanosheets of AlOOH, unlike boehmite nanoplates and bayerite hexagonal rods, effectively suppress the tumor cells viability.

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