

Nanocomposites and nanomaterials

Interface and its role in forming of structure and properties of zirconia nanosystems

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Zirconia nanosystems are promise materials for application in industry, medicine etc. As specific feature of nanosized materials is the crucial effect the interface on their structural, electronic and other properties. In case zirconia nanosystems formation of nanoparticles takes place thorough interface controlling processes such as dehydration, dehydrogenization, destruction, crystallization and growth during of heat-treatment process. In this connection, interface may be effective key for controlling properties of nanosystems.

The wide spectrum of materials from pure zirconia to complex systems based on zirconia has been analyzed in this work. It was discussed influence on structural and electronic properties zirconia introduction in interface the different kinds of anions, cations of d-, f-elements and their complexes, and also polymeric molecules. It was shown that for pure zirconia the nature of anionic impurities which introduce in interface was predetermined the stock of electrons from interface to either cationic or anionic sublattices at oxide nanoparticles forming and such materials show different paramagnetic, radical and acid-basic activity.

The features of interconnection interface and volume in complex systems based on zirconia were investigated. The possible ways of reorganization of complexes of d-,f-elements in interface during pressure or temperature actions were estimated. Based on understanding of role of interface in forming structure and properties complex nanosystems based on zirconia the mechanisms of forming of these systems and its properties are discussed.

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