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WATER RADIOLYSIS: THE MAIN ROLE OF NANO-ZrO2 IN WATER SEPARATION

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Abstract

In recent years, the physical and chemical effects of nano-dimensional systems, as well as their unusual properties, have increased interest in the study of these systems and the application of nano oxides in the field of radiation technology has intensive nature. The study of processes such as measurement effects in various compounds with functional properties and their solid solutions, changes in the size of crystallites as a result of external influences, amorphization is one of the main directions of condensed matter physics and inorganic chemistry. As a result of the acquisition of nanomaterials and the expansion of their application, the measurement effects have become even more relevant [1-3].

Scientific studies have shown that the conversion of exothermic heterogeneous electrochemical energy into electrical energy through the interaction of the ZrO2 + 3mol% Y2O3 nanoscale system is one of the ways to obtain electricity. is studied using it in theoretical calculations [2].

It should be noted that another case was recently discovered. It was found that there is an ionic bond on the nanoscale surfaces, where the energy of the whole depends on the curvature of the surface. This new phenomenon is called nanofraction, in principle, allows to control the location of the density of surface conditions in the forbidden zone and optimizes the effects discussed in the study [3].

When water molecules are adsorbed on the surface of the oxide, they are located on the surface of the surface acceptor centers. The process can be schematically shown as follows:

n-ZrO2+ H2O→ (n-ZrO2 –H2Oads.) → (L-H2O)

(L-H2O) + e →(L- H2O)*→L+H+OH

(L-H2O) + ex →(L- H2O)*→L+H+OH

H+H→H2

OH+OH→H2O2

H+H2Oads.→H2+OH

OH+H2Oads.→HO2+H2

Lads.-surface acceptor centers, L-H2O – unbalanced charge carriers and adsorbed complex interacting with excited states. The decomposition products of water are divided into surface fragments [4].

Thus, during heterogeneous radiolysis of water in the presence of nanoxides, some of the unbalanced charge carriers are involved in the decomposition of water, while others are adsorbed by the contact medium. In ZrO2 + 3mol% Y2O3 nanoparticle systems, a second type of phase transition was identified during the adsorption process. The tetragonal-monoclinic phase is observed in the adsorbed system of water molecules. The atmospheric moisture visible in this system causes a certain amount of monoclinic phase in the ZrO2 nanoparticles, and therefore nanoparticles with different energies are formed in the system.

Biography

PhD. Gunel T. Imanova is working in the area of Physical and Physical Chemistry with the main emphasis on separation science (Chromatography), radiation materials science and hydrogen generation. Currently, she is working at the Institute of Radiation Problems, Azerbaijan, Baku. She has published more than 60 research/review articles in international and national scientific journals and conferences. She is an editorial member of the Journal of Advanced Biotechnology and Bioengineering and Current Chromatography.

Publication of speakers

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