

Nanocomposites and nanomaterials

Influence of weak pulsed magnetic field on dehydration of zirconia hydroxide

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The area of functional application of nanopowders based on zirconia in electronics, photonics and medicine is expanding every day. Currently synthesis of nanodispersed ZrO₂ powder with a low degree of agglomeration is the actual scientific-technological problems and has a great scientific and practical interest. Its solution may be associated with the development of methods managed exposure to physical and chemical processes for the synthesis of ZrO₂ powders.

An alternative to traditional power types of physical and chemical effects is a weak pulsed magnetic field (PMF). PMF has a selective effect on the system at the level of the magnetic properties of its elements. In case of nanopowders of dielectrics PMF is an interesting means of physical modification of nanoparticles surface due to its high defects [1].

We used unipolar exponentially growing pulses of magnetic field ($H = 10^5$ - 10^6 A / m) with a repetition frequency of 0.5 Hz, 1 Hz, 5 Hz and 10 Hz and fixed duration of leading front (20mks)[2].

Effect of acceleration by PMF of dehydration process of the hydrogel is established. Frequency selectivity effect is set. In particular, it is shown that the rate of dehydration is maximum at the frequency of 1 Hz.

It is shown that the PMF can have a practical use as a high-performance low-cost non-contact operation method for disaggregation of zirconia nanopowders

1. *Alekseenko V.I., Volkova G.K., Danilenko I.A., Konstantinova T.E.* Effect of pulsed magnetic field on the thermal decomposition of zirconia hydroxide // *Inorganic Materials* – 2000.- **36**, N 9.- P. 1087-1091.
2. *Konstantinova T.E., Doroshkevych O.S., Danilenko I.A., Volkova G.K., Glazunova V.A., Ryumshina T.A.* Influence of pulsed magnetic fields on the structure of pyroelectric based on LaBSiO₅ and LaBGeO₅ // *Proceedings of XLIII International conference "Actual problems of strength"*, 27 September - 1 October Vitebsk. - 2004. - P. 191-196.