

Section of Nanocomposites and Nanomaterials

THE COMBINED NANO-SIZED OXIDE MATERIALS

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There are in modern technologies combined nanostructured oxide materials widely using. The purpose of work given consists in nanomaterials preparation, based on SiO₂ containing ZnO in nanostate.

There was ZnO prepared in the way of Zn(Acrylic)₂ (zinc acrylate) pyrolysis. It is recognized, using DTGA technique, that full salt pyrolysis having place at temperature of 450 ° C reaching to. There was phase content of samples determined using X-ray phase analysis technique, according to JPDS card library. There was ZnO crystallite middle size determined, using Schärer equation together with technique automatized.

One shown, that ZnO obtained with pyrolysis of virgin Zn(Acrylate)₂, is nanocrystalline and crystallite –sized of 30 nm approximately. For preparation of combined nanostructured and nanosized oxide material of ZnO/SiO₂, there were an pyrogenic silica of S_{spec}=320 m²/g, impregnated with acetone solution of zinc acrylate and then yielding to pyrolysis. There were mechanical mixtures of Zn(Acrylic)₂/SiO₂ obtained, at the same equation of components for comparison, like for impregnated ones. There were such conditions of pyrolysis and annealing: 450° C during 5 h. There was Zn(Acrylate)₂ content in virgin compositions of 1- 40% mass.

It is established, that crystalline ZnO with X-ray phase analysis is not fixing, at low content of Zn(Acrylate)₂ (1,0 – 8,0 % mass.) in the impregnated samples. It is shown, using DTGA technique, at Zn(Acrylic)₂ content of 5% mass. and higher, in range of 180 – 260° C, there is polymerization of salt going by twin link of Zn(Acrylate)₂ (there is presence of intensive and narrow exothermal peak at 215 °C). This is circumstance testifying for, here is no continuous or island layer of SiO₂ surface, when neighbor molecules can interact by twin link, at low content of acrylate.

Here is crystallization of zinc oxide at more higher content of Zn(Acrylate)₂, beginning from 10% mass., because of conditions given can realize volume structure, transforming at the annealing to crystalline one.