Physico-chemical nanomaterials science

Thermogravimetric study of nano SnO_2 precursors

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Proved convenient chemical technique to obtain sensors for nanofilms. One of the principal stages in the liquid phase chemical methods in SnO_2 synthesis for sensors is the decomposition stage of not stable tin compounds, which define the necessity in the search of suitable precursor for nano tin dioxide production. In the suggested technology for SnO_2 film's production based on sol-gel method, the Bis(acetylacetonato)dichlorotin (BADCT) was applied as tin dioxide precursor. The specificity of it's preparation was the using of water as a solvent [1]. The precursor complexes for comparative studies were obtained by two methods, which differ only by the last technological stage: drying process. Complex 1 was air-dried, and the complex 2 was vacuum-dried. It was supposed, that the drying process differences define the preservation (not preservation) of water molecules in the complex which affects the structure of the films obtained.

The precursor complexes were studied by means of thermographic methods (thermogravimetry – TG derivatography - DTG, and differential thermal analysis – DTA), which are effective in investigations of thermal parameters of physico-chemical processes in the mater at the programmable heating. Such a research is needed to consider the decomposition processes in a precursor helping to create a reproducible technology of nanofilms. The films with grain sizes nearly 10-20 nm were obtained from the hydrated precursors (Complex 1). The grain size more than 500 nm in the films were obtained from the anhydrate BADCT (Complex 2). Thus, the use of the hydrated precursor complex aiming the production of nano tin dioxide films with smaller grain size is preferable. This property provides the higher sensitivity of its physical parameters (e.g. conductivity at least) to the environment changes, thus making them to be sensitive transducer for sensors.

1. *B. Ulug, H.M. Türkdemir, A. Ulug, O. Büyükgüngör, M.B. Yücel, V.A. Smyntyna, V.S. Grinevich, L.N. Filevskaya*. Structure, spectroscopic and thermal characterization of bis(acetylacetonato)dichlorotin(IV) synthesized in aqueous solution.// *Ukr. Chem. J.* -2010. **76**.- P. 12-17.