SYNTHESIS AND CHARACTERIZATION OF YTTRIA NANOPOWDERS PRODUCED BY COPRECIPITATION PROCESS FOLLOWED BY HEAT TREATMENT

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Abstract

Yttria nanopowders have been synthesized by coprecipitation process. Yttria powder (99.99%, Molycorp) was dissolved in high-purity nitric acid, and then ammonia water was added to the yttrium nitrate. Precursor of Y$_2$O$_3$ was synthesized by using ammonia as precipitant and yttrium nitrate as the starting salt. The precipitate slurry was filtrated and washed with deionized water to remove the impurity. After washing, the precipitate slurry was dried at 60 °C for 6 h. The dried cake was heated at selected temperatures to obtain yttria powders, that are 500 °C, 600 °C, 700 °C, 800 °C and 900 °C. Thermal decomposition behavior of the yttrium precipitate precursor was analyzed by DTA–TGA. The spectra of the coprecipitation yttria powders were examined using a FTIR. Phase identification and analysis were performed via X-ray diffractometry (XRD). Nanocrystalline yttria powders [23(4) nm in average size for refinement with Rietica and 16(2) nm in average size for refinement with MAUD] was obtained by heating the precursor above 600 °C for 2 h. The variance decreases with the increase of calcination temperatures. This mean that the size distribution tends to boarden.

Keyword: coprecipitation, nanoparticles, yttria.