

Synthesis of CeO₂/Au Fibrous Material

K. Starbova¹, D. Nihtianova², N. Starbov¹

¹Institute for Solid State Physics, Bulgarian Academy of Sciences,
72 Tsarigradsko chaussee Blvd., 1784 Sofia, Bulgaria

²Institute for Mineralogy and Crystallography, Bulgarian Academy of
Sciences, Acad. Georgi Bonchev Str., bl. 107, 1113 Sofia, Bulgaria

Abstract. Electrospinning is applied for fabrication of CeO₂ fibrous material containing nano-sized gold clusters. For that purpose cerium acetate - gold salt – polyethylene oxide assisting polymer blend solution is used and under specific electrospinning conditions as spun non-woven mat was synthesized. Further a developed two step thermal procedure is applied resulting in polymer removal and CeO₂/Au fiber crystallization. Electron optical technique was applied for studying the morphology and phase composition of the fibers thus obtained. Scanning electron micrographs demonstrated that the synthesized CeO₂/Au composite fibers are characterized by diameters within 10-50 nm range. As shown by high resolution transmission electron micrographs and corresponding selected area electron diffraction patterns the composite fibers are built up of CeO₂ grains with mean size of several nanometers. Simultaneously, the Au particles grown during the thermal post-processing are positioned predominantly onto fiber surface, their mean diameter varying between 3 and 40 nm. The results obtained are very encouraging for the development of fibrous CeO₂/Au material for different catalytic applications.