

Preparation of uranium oxide nanofibers via electrospinning

Vojtěch Kundrát¹; Zdeněk Moravec¹; Aleš Paták²; Jiří Pinkas¹

1 Department of Chemistry, Faculty of Science, Masaryk University, Brno, Czech Republic

2 Institute of Scientific Instruments, The Czech Academy of Sciences, Brno, Czech Republic

The goal of this work was to prepare nanofibrous oxides of uranium. Two approaches were chosen based on different composition of electrospinning solutions and different inorganic precursors. Electrospinning was performed from aqueous and organic solvent based solutions. Uranyl nitrate and 2,4-pentandionate were used as precursors. Electrospun fibers were prepared in laboratory and pilot plant scales (Nanospider technology). Different underlay materials were studied for collection of prepared nanofibers. The study focused also on finding a proper temperature of nanofibrous composite calcinations. Nanofibrous uranium oxides were prepared with mean diameter under 50 nm. Nanofibrous triuranium octaoxide was reduced in hydrogen atmosphere and this reaction provided nanofibrous uranium oxides with a lower oxygen content. Produced materials were analyzed by electron microscopy, scanning transmission electron microscopy and powder X-ray diffraction. Potential application is in heterogeneous catalysis and as a precursor of nanoscopic sintered ceramics.

References:

Kundrát, V.; (2016) Diploma thesis