

SILVER NANOWIRES SYNTHESIS IN THE PVP-SILVER-CHLORIDE SYSTEM

Radu Banica^{1,2*}, Radu Baies^{1,2}, Daniel Ursu¹, Maria Poienar¹, Terezia Nyari^{1,2}

¹ University “Politehnica” of Timisoara, Piata Victoriei 2, 300006 Timisoara, Romania

² National Institute for Research and Development in Electrochemistry and Condensed Matter, Str. Plautius Andronescu 1, 300224 Timisoara, Romania, Tel. 0256494413

*E-mail: radu.banica@yahoo.com

Keywords

Silver nanostructures, silver nanoparticles, transparent conductive electrode, solar cell.

Abstract

Metallic nanowires and nanorods are extensively studied due to their optical properties and multiple applications in flexible electronics and solar cells.

A method used for the synthesis of one-dimensional (1D) silver nanoparticles is the reduction of silver ions in ethylene glycol in the presence of surfactants. If the surfactant used is polyvinylpyrrolidone (PVP), the PVP:Ag molar ratio and Cl⁻ ion concentration in the system have been shown to be essential for obtaining a reaction product rich in nanowires [1 -3]. In this study, the Ag⁺:PVP and Ag⁺:Cl⁻ ratios were varied. Also, the precursors were injected into the balloon at different speeds to control the aspect ratio of the obtained silver nanowires.

The obtained silver nanostructures were characterized by UV-Vis spectroscopy, scanning electron microscopy, X-ray diffraction and energy dispersive X-ray analysis. Thermogravimetric study was also conducted to evaluate the resistance to oxidation of the obtained silver nanowires. In the temperature range 20-1000°C a total loss of mass under 2.8% was observed. Exothermic peak present in DTA curve highlights the oxidation of PVP surfactant adsorbed on the metal surface in the temperature range 360-410 °C.

Acknowledgements: This work was supported by a grant of the Ministry of National Education, CNCS – UEFISCDI, project number [PN-II-ID-PCE-2012-4-0398](#).