Morphology, XRD and EDX study of screen-printed thick films based on SnO_2 / Te nanocomposites

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Nanocomposites of tellurium and tin dioxide have been synthesized via solvothermal recrystallization of polycrystalline tellurium powder, followed by Te reduction in the presence of a tin chloride solution. Thick (~15 μm) solid films based on these composites have been fabricated using the screen-printed technique. The surface morphology of the films was investigated using the scanning electron microscope (SEM VEGA TESCAN TS 5130 MM) coupled with energy-dispersive X-ray spectroscope (EDX, INCA OXFORD instruments) but XRD has been applied for their structural characterization. It has been established that composites consist of fluffy structures of tiny agglomerates of the nanodimensional irregular blocks of 100 - 200 nm comprising about 39 at.% Te and 6,0 at.% Sn (Fig.1).

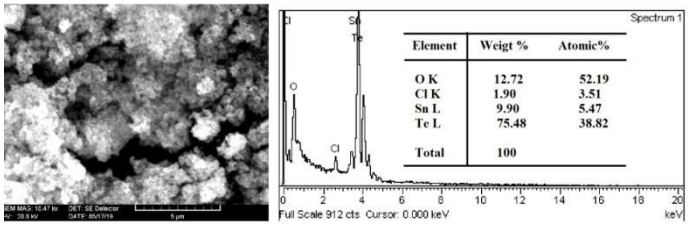

Fig. 1.SEM image and EDX pattern of SnO_2 / Te thick films

Compositional and phase analysis of the fabricated nanocomposite thin films examined by XRD appeared to be entirely consistent with EDX analysis. All of the diffraction peaks in XRD pattern have been readily indexed to the hexagonal phase of tellurium with lattice constants of a = 4.46 Å and c = 5.94 Å [1] along with polycrystalline tin dioxide with predominant orientation of the crystals (110) [2]. It is expected that the synthesized in this work SnO_2 / Te nanocomposites will be of interest to produce functional films to be used in chemical transducers.

[1]. F. Liang , H. Qian. Synthesis of tellurium nanowires and their transport property// Materials Chemistry and Physics. – 2009. – V. 113. – p. 523 – 526.

[2]. JCPDS 36-1452 (Te); 41-1445 (SnO_2).