STRUCTURAL INVESTIGATION OF TRIPLE PEROVSKITE $Sr_3Fe_2WO_9$ AND DETERMINATION OF MAGNETIC, DIELECTRIC AND OPTICAL PROPERTIES

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Specific structure of perovskite compounds provides them with various interesting magnetic, dielectric and optical properties. It has become very trendy to alter particle size instead of altering chemical composition since the properties of materials have appeared to be size- and shape-dependent. Triple $Sr_3Fe_2WO_9$ perovskite has been prepared in form of semi-spherical particle agglomerates using a modified aqueous sol–gel citrate route. Synthesis mechanism and redox properties of precursor metal salts in aqueous solution have been studied by electrochemical measurements and UV/VIS absorbance spectroscopy where it has been observed that Fe^{3+} is stable after coordination with ammonia molecules. Structural investigation has been conducted by ambient and *in situ* X-ray powder diffraction (XPRD), X-ray photoelectron spectroscopy (XPS), high resolution transmission electron microscopy (HRTEM), selected area electron diffraction (SAED), thermogravimetric analysis (TGA), Fourier-transform infrared spectroscopy (FTIR) and unpolarized Raman spectroscopy and it has been observed that synthesized compound crystallizes in tetragonal system (space group $I4/m$) with crystallite size of 36 nm and high crystallinity and fully transforms into desired perovskite compound at 1273 K. Magnetic properties have been determined using SQUID measurements and have shown ferrimagnetic ordering at 373 K. Dielectric properties have revealed a proportional increase of dielectric constant with temperature and reverse proportional decrease with frequency. Optical properties have been estimated using Tauc method which revealed band gap values of 2.71 eV for direct band gap and 2.10 eV for indirect band gap. Authors acknowledge Croatian Science Foundation (IP-2016-06-3115) for full financial support.