

WO₃/WO_x COMPOSITES FORMATION BY SOL-GEL METHOD

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Among many others non-stoichiometric metal oxides [1] tungsten oxide (WO_x) is a wide band-gap n-type transition metal oxide with wide-ranging applications. Its electronic bandgap (E_g), highly depends on oxide composition and its crystallite size [2]. These and other WO_x characteristics are applicable in many fields such as lithium-ion batteries [3], solar energy conversion system [4], catalysis [5], surface enhanced Raman spectroscopy [2], and volatile organic compounds sensors [6].

This study is focused on the synthesis of WO₃/WO_x based nanostructures by simple sol-gel synthesis seeking to prepare composites with extended characteristics in comparison with regular WO₃ structures. Different organic additives were used during the formation of these structures in order to change nanostructures morphology and other characteristics. X-ray diffraction analysis was employed to prove non-stoichiometric tungsten oxide (WO_x) structure. Scanning electron microscopy (SEM) was used to determine nanoparticles surface morphology and size distribution. Photoluminescence spectra (PL) were measured to determine structure defects.

It was determined that by applying different organic additives surface morphology and defects of WO₃/WO_x nanostructures could be controlled. By using dip-coating method samples of thin films were prepared on different substrates in search of various applications for synthesized structures.

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