Abstract

In this work, Mn_2O_3 were synthesized by molten salt method and WO_3 via hydrothermal treatment. Metal oxide-polymer based composites were prepared by incorporating the natural biopolymer, chitosan that is environment friendly and biodegradable. Direct blending strategy was applied to make Mn_2O_3, WO_3 and chitosan hybrid composites. Drop casting method was utilized for facile fabrication of composite films on FTO glass substrate. FTIR analysis exhibited the functional groups of chitosan in hybrid composite films. XRD and Raman analysis described structural properties pristine Mn_2O_3 and WO_3, (Mn_2O_3- chitosan), (WO_3-chitosan) and (Mn_2O_3-WO_3-chitosan) confirmed the formation of cubic crystalline Mn_2O_3 and hexagonal WO_3. Thermal stability of Mn_2O_3 -WO_3 -chitosan composite was investigated by Thermogravimetric Analysis/Differential Scanning Calorimetry (TGA/DSC) that depicted two stages of degradation, first one attributed to the removal of surface water and second to the decomposition of amine units. Scanning Electron Microscope images revealed the compact granular surface morphology of (Mn_2O_3 -WO_3 -chitosan) composite depicting stronger interaction of metal oxides and chitosan. Optical studies demonstrated that band gap of, (Mn_2O_3- chitosan), (WO_3-chitosan) and (Mn_2O_3-WO_3-chitosan) composite films were 2.13 eV, 2.43 eV, and 2.48 eV respectively and their photodegradation studies.