Fabrication and characterization of mesoporous TiO_2/SnO_2 composite electrodes for dye-sensitized solar cells

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In this study, we have successful synthesized ordered mesoporous TiO_2/SnO_2 with three-dimensional bicontinuous cubic structure, high surface area and crystalline frameworks by using a facile solvent-free infiltration method from a mesoporous silica template of KIT-6 and employed as electrode in dye-sensitized solar cells. On the basis of the investigation of the XRD pattern, nitrogen adsorption (BET), dye adsorption, UV-vis diffuse reflectance spectroscopy, dark current, current-voltage(I-V)characteristics and electrochemical impedance spectra(EIS),it was found that when the Ti-content is 20wt%, the energy-conversion efficiency of TiO_2/SnO_2 is significantly best, by about 1.95%. And it is mainly the result of TiO_2 particles on mesoporous SnO_2 electrode inhibited electron recombination caused by passivation of reactive surface states and increased the light scattering, leading to greatly improvement in the open-circuit voltage, short-circuit current, and fill factor.