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Fe-Doped Sno$_2$ Powders Obtained By Sol-Gel Method, Mechanochemical Alloying, and Thermal Treatment JAIME OSORIO, ANA CALLE, JAILES BELTRAN, LUIS SANCHEZ, Universidad de Antioquia, LILIANA TIRADO, Universidad del Quindio, KIYOSHI NOMURA, University of Tokyo, CESAR BARRERO, Universidad de Antioquia, ESTADO SOLIDO TEAM, OPTOELECTRONICA TEAM, APPLIED CHEMISTRY SCHOOL OF ENGINEERING TEAM — The present work is aimed to investigate experimental conditions to obtain pure $Sn_{1-x}Fe_xO_{2-\delta}$ (x=0, 0.05, and 0.1) powders by three methods: (1) sol-gel method, (2) mechanochemical alloying and (3) thermal treatment. In (1), different precursors were employed: mixtures of Sn^{4+} and Fe^{3+} or Sn^{2+} and Fe^{2+}. In (2), SnO_2 and α-Fe or α-Fe_2O_3 were used as reactants. In (3), the Fe-doped SnO_2 were obtained by mechanochemical milling and thermal treatment. All samples were characterized by X-Ray diffraction (XRD) using Rietveld refinement, Fourier-transformed infrared (FTIR) spectroscopy and room temperature ^{57}Fe Mössbauer spectrometry (MS). The XRD patterns of samples prepared by (1) showed only peaks of SnO_2. The MS showed ferromagnetic and paramagnetic signals. The samples obtained by (2) showed XRD peaks due to SnO_2 (rutile). The MS revealed the presence of Fe^{2+} and Fe^{3+} states as well as α-Fe or α-Fe_2O_3 due to the reactants. In the case of (3) was observed total incorporation of Fe^{3+} in the SnO_2 structure without presence of impurities.

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