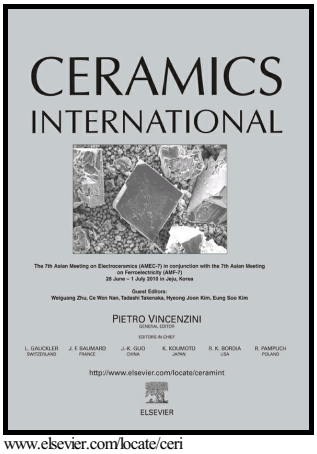

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Structural, magnetic and optical investigations of Fe and Ni co-doped TiO_2 dilute magnetic semiconductors

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Abstract

A series of $Ti_{0.9}Fe_{0.1-x}Ni_xO_2$ (x=0.0, 0.02, 0.04, 0.06, 0.08, 0.1) has been synthesized through the solid state reaction method at annealing temperature of 1100^oC for two hours. The synthesized samples have been analyzed by X-Ray diffractometer (XRD), Raman spectroscopy, Scanning electron microscopy (SEM), Energy dispersive X-ray spectroscopy (EDX), Vibrating sample magnetometer (VSM) and ultraviolet visible (UV-VIS) spectroscopy for structural investigations, defects measurements, surface morphology, magnetic and optical properties respectively. Structural analysis has revealed the dominant structure of rutile. An intensity loss and peak broadening of TiO_2 (rutile) vibration lines have been observed from Raman analysis, which is an indication of presence of oxygen vacancies. Magnetic analysis has revealed ferromagnetic behavior at room temperature. Optical characterization has shown the blue shift in band gap energy with increase of Ni concentration.