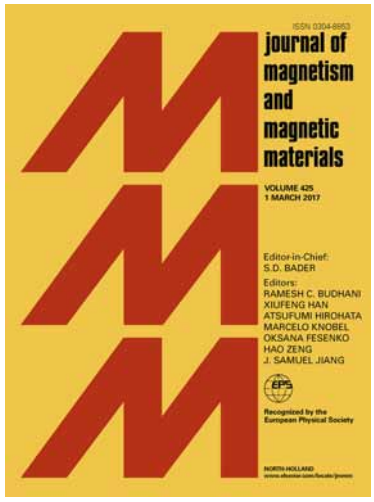

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Magnetic enhancement and magnetic signal tunability of (Mn, Co) co-doped SnO_2 dilute magnetic semiconductor nanoparticles

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Abstract

Co and Mn-Co co-doped SnO_2 nanoparticles have been successfully synthesized using a simple technique called as citrate precursor assisted co-precipitation (CPACP). Structural and compositional analyses by X-ray diffraction (XRD), high-resolution transmission electron microscopy (HRTEM), Energy Dispersive X-Ray Fluoresence Spectrometer (EDX), X-ray photoelectron spectroscopy (XPS) and Raman spectroscopy confirmed that Co and Mn ions were incorporated into the SnO_2 host lattice without changing the inherent rutile structure. The average crystallite size of the prepared samples were estimated to be in the range of 8-12 nm. In a single Co^{2+}-doped SnO_2 sample, the magnetization was observed to increase as the Co^{2+} ions concentration increased. The transition metal Mn can adjust the magnetic signal of the Co^{2+}-doped SnO_2 sample, which is subject to the concentration of Mn dopant. Adding a proper amount of Mn to the Co^{2+}-doped SnO_2 sample enhanced the magnetization. As the Mn^{2+} ions concentration increases, the magnetic properties of the (Mn, Co)