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## Structure and magnetic properties of Mn-doped CeO<sub>2</sub> nanostructures prepared by egg-white solution route

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Ce<sub>1-x</sub>Mn<sub>x</sub>O<sub>2</sub> ( $x = 0.05, 0.075$  and  $0.1$ ) nanoparticles were synthesized by simple solution method using cerium(III) nitrate hexahydrate manganese (II) nitrate hydrate (Mn(NO<sub>3</sub>)<sub>2</sub>·H<sub>2</sub>O) and freshly extract egg white (ovalbumin) in an aqueous medium. The precursors were calcined at 600 °C for 2 h in air. The nanoparticles were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and X-ray absorption near edge structure (XANES) techniques. The XRD results indicated the presence of a cubic structure of Ce<sub>1-x</sub>Mn<sub>x</sub>O<sub>2</sub> in all samples. The SEM and TEM images showed thin platelike clusters with the particle sizes  $\approx 20$ -40 nm. The oxidation states of Mn and Ce K-edge in samples were confirmed by X-ray absorption near edge structure (XANES) technique. The magnetic properties were studied by a vibrating sample magnetometer (VSM). All samples exhibit superparamagnetism behavior. The saturation magnetization (M<sub>S</sub>) of Ce<sub>1-x</sub>Mn<sub>x</sub>O<sub>2</sub> ( $x = 0.05, 0.075$  and  $0.1$ ) nanoparticles increase from 0.00003 to 0.00035 emu/g with increasing Mn content. The origin of the magnetic properties observed in the prepared Ce<sub>1-x</sub>Mn<sub>x</sub>O<sub>2</sub> nanoparticles is discussed.

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