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## Effect of Fe substitution on optical and magnetic properties of CeO<sub>2</sub> nanoparticles

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**Abstract:** Pure and iron doped cerium oxide nanoparticles (Ce<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub>) at x= 0.00,0.01, 0.03 and 0.05 were synthesized using ball milling method and subjected to their microstructural, optical and magnetic properties. Face centred cubic structure was found for (Ce<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub>) nanoparticles at x = 0.00, 0.01, 0.03 and 0.05 and no evidence of impurities were found from X-ray diffraction patterns. The surface morphology and chemical compositions of the nanoparticles were studied using FE-SEM attached with EDAX and found that the nanoparticles were almost in spherical shape with nearly stoichiometric ratios. The optical band gap of the nanoparticles were calculated and found increase with Fe doping concentration. The pure CeO<sub>2</sub> nanoparticles exhibited a magnetization of 0.0043 emu/g and coercivity of 400 Oe. The magnetic moment is found to increase with increase of doping. The (Ce<sub>1-x</sub>Fe<sub>x</sub>O<sub>2</sub>) nanoparticles at x = 0.05 exhibited the magnetization of 0.07 emu/g and coercivity of 491 Oe which are far higher values when compared with that of undoped CeO<sub>2</sub> nanoparticles.

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