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# Effect of supercritical organic solvent on structural and optical properties of cerium doped zinc oxide aerogel nanoparticles

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## Abstract

Cerium doped zinc oxide (2 at. %) aerogels were synthesized in supercritical methanol and different supercritical mixture solvents (methanol-acetone and methanol-ethanol). The as-elaborated samples were analyzed without any additional heat or chemical treatments by means of X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), optical absorption, photoluminescence (PL) and TGA techniques. The XRD results show that drying in solvents mixture enhances the crystalline quality and acts as a compression agent by exerting stress on the lattice parameters. SEM images demonstrate that the agglomeration rate of aerogel particles decreases when solvents mixture is used. TGA measurements showed the high purity of the samples. FTIR results showed a shift of Zn-O bond indicating that supercritical solvent influences the number of Ce-O-Zn bonds at the surface of the crystallites. UV-visible characterization demonstrates that a band-to-band transition (3.34 eV) is observed only in the spectrum of the aerogel synthesized in supercritical acetone. The photoluminescence (PL) spectra exhibited different optical properties of the aerogels in violet-blue-green wavelengths region (350-530 nm). A blue-green emission located at 485 nm is

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