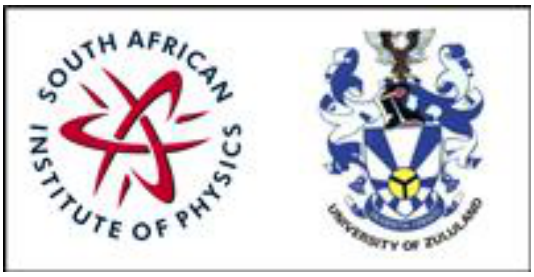

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Effect of annealing on undoped and Ce, Dy, Eu, Ni-doped ZnO properties synthesized by sol-gel method using zinc acetate and sodium hydroxide in aqueous ethanol solution.

Tuesday, 9 July 2013 17:40 (1 hour)

Abstract content
   (Max 300 words)

Abstract
In this study, un doped and Ce, Dy, Eu, and Ni-doped zinc oxide (ZnO) was prepared by sol-gel method from zinc acetate, metal nitrates and sodium hydroxide with water and ethanol as solvents. Doping with selective elements offers an effective method to enhance and control the electrical and optical properties of ZnO nanostructures, which is crucial for its practical application. The effect of the annealing temperature on the particle size, morphology and photo-luminescence (PL) properties of the synthesized ZnO nanoparticles were studied by XRD, SEM, UV-VIS, and PL measurements. The XRD results indicated that the synthesized ZnO nanoparticles had the pure wurtzite structure. It is found that with annealing the crystalinity improved and the particle size increases while the band gap energy of the materials reduces. The grain sizes of as-prepared doped ZnO nanoparticles calculated using the Scherer formula are in the range of 30 - 40nm. The dopants were also observed to have slight effect on the grain sizes. The high intensities of calcined ZnO nanostructure peaks with narrower width reveal a highly crystallized wurtzite structure. The absorption spectra of the products show that the percentage absorption in visible range increases with annealing temperature. The SEM micrograph of ZnO revealed that the surface aspect dependents on both the dopant used and annealing temperature. Furthemore, PL spectra showed strong, broad and intense emission in visible region for Ce-doped ZnO samples while other dopants suppressed this green emission.

Keywords: ZnO:Ce3+, Sol-gel, , Nanoparticles, Luminescent, RE3+-dopants

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