Sintesis dan karakterisasi nanopartikel Cr-doped ZnO = Synthesis and characterization of Cr-doped ZnO nanoparticles

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Abstrak

Pada penelitian ini, nanopartikel Cr-doped ZnO dengan kosentrasi Cr yang berbeda (3-16%) telah disintesis dengan metode kopresipitasi. Struktur, sifat optik dan sifat magnetik sampel yang dihasilkan telah dikarakterisasi dengan XRD (Xray Diffraction), EDX (Energy Dispersive X-ray, FTIR (Fourier Transform Infra Red), spektroskopi UV-Vis, ESR (Electron Spin Resonance) dan VSM (Vibrating Sampel Magnetometer). Hasil karakterisasi XRD (X-ray Diffraction) dan EDX (Energy Dispersive X-Ray) menunjukkan bahwa Cr telah bergabung ke dalam ZnO (fase hexagonal wurtzite) tanpa adanya fase kedua. Hasil tersebut menunjukkan bahwa doping Cr menghambat pertumbuhan kristal. Pergeseran merah pada absorbsi band edge pada spektrum absorbansi UV-Vis dengan peningkatan konsentrasi Cr juga mengkonfirmasi doping Cr pada ZnO. FTIR telah dipelajari untuk mengindentifikasi karakteristik frekuensi vibrasi ikatanikatan kimia pada sampel. Hasil ESR menunjukkan penambahan ion Cr 3+ yang mungkin berkontribusi dalam pembentukkan sifat magnet yang diperoleh pada hasil karakterisasi VSM.
.....In this research, Cr-doped ZnO nanoparticles with different concentrations of Cr (3-16%) were synthesized by coprecipitation method. The Structure, the optical and the magnetic properties of the produced samples were characterized by XRD (X-ray Diffraction), EDX (Energy Dispersive X-ray, FTIR (Fourier Transform Infra Red), UV-Vis spectroscopy, ESR (Electron Spin Resonance) and VSM (Vibrating Sampel Magnetometer). The XRD (X-ray Diffraction) dan EDX (Energy Dispersive X-Rays) characterization results indicated that Cr has been incorporated into ZnO (hexagonal wurtzite phase) without any secondary phase.
The results indicated that Cr-doping restrained the growth of the crystal. The red shift in band edge absorbtion in UV-Vis absorbance spectrum with in increasing Cr concentration also confirm the doping of Cr in ZnO. FTIR have been studied in order to identify the characteristic frequencies of the vibrational chemical bonds. The ESR results indicated the addition of Cr3+ ions that may contribute in order the magnetic properties that was found in VSM characterization results.