

Properties of Al-doped ZnO thin films grown by pulsed laser deposition on Si (100) substrates

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Abstract: Undoped and Al-doped ZnO (AZO) polycrystalline thin films (Al: 3, 5 at.%) have been deposited at 450°C onto Si(100) substrates by pulsed laser deposition method. A KrF excimer (248 nm, 25 ns, 2 J/cm²) was used as laser source. The study of the obtained undoped and Al-doped ZnO thin films has been accomplished using X-ray diffraction (XRD), atomic force microscopy (AFM) and Rutherford backscattering spectrometry (RBS) techniques. The ZnO and AZO thin films deposited have been crystallised in hexagonal wurtzite-type structure with a strong (00.2) orientation. The grain sizes calculated from XRD patterns decrease from 38 to 26 nm with increasing Al doping. All nanoparticle thin films have a good surface morphology.

Keywords : ZnO, Al doping, pulsed laser deposition, PLD, X-ray diffraction, XRD, atomic force microscopy, AFM, Rutherford backscattering spectrometry, RBS, nanoparticles