Spin-coated nickel doped cadmium sulfide thin films for third harmonic generation applications

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Mots-clés	CdS thin film [10], Morphological [11], Ni doped CdS [12], Sol-gel spin-coating [13], Structural [14], THG [15]
Résumé en anglais	In the current study, different percentages of Nickel (0%, 2%, 4% and 6%) doped CdS thin films have been deposited on glass substrates by the sol-gel spin-coating technique. Before performing the nonlinear optical studies, the structural, morphological and optical properties were examined as a function of Ni doping concentration through the XRD, SEM, AFM and UV–vis spectrometry, respectively. According to the XRD patterns, all films are polycrystalline and the incorporation of Ni does not change qualitatively the crystalline phase of CdS. The Ni doping affects the surface morphology of the CdS thin films which is indicated by scanning electron microscopy and atomic force microscopy images. The band gap was determined via the equation related to the absorption coefficient. It's deduced that the optical band-gap values increased from 2.35 eV to 2.41 eV depending on Ni content. Though, the nonlinear optical properties were determined based on the measurements of the third harmonic generation (THG) using the rotational Maker fringe technique. The results showed that the third order nonlinear optical susceptibilities oscillate between 5.40 × 10−21 m2/V2 for CdS:Ni (2%) and 4.98 × 10−21 m2/V2 for CdS:Ni (6%) while the pure CdS one falls inward, with a value of 5.09 × 10−21 m2/V2.
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