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Diffracting Samples: Nonlinear Optical Properties and Morphology for (2-Hydroxyphenyl) [2-(2-Methoxybenzylidene-Amino)-5-Methyl Phenyl] Telluride Film

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ABSTRACT. Nonlinear optical properties, 1HNMR, 13CNMR spectrums and Surface morphology of (2-Hydroxyphenyl) [2-(2-methoxy benzylidene amino)-5-methyl phenyl] telluride are studied by using self - diffraction induced, optical microscopy and Z-scan approach. The non-linear absorption of compound was obtained from open aperture and Z-scan approach. The optical behavior for azomethine with polymethyl methacrylate (PMMA) film was studied. The observation of diffraction ring patterns due to the irradiation of the azomethine group by 473 nm continuous wave (CW) laser irradiation.

INTRODUCTION

Recently, the developments in optics and non-linear optics led to increasing the demand for improving and developing new materials with non-linear properties. These features enable them to be used in optical applications and all control kinds on the behavior of optical switching for different devices [1-3]. So many materials have been tested for this goal such as dense atomic vapors [4], nematic liquid crystals [5], solids [6], liquids [7] and vegetable oils [8]. The low experimental investigations of the nonlinear properties of (2-Hydroxyphenyl) [2-(2-methoxybenzylideneamino)-5-methyl phenyl] film, make it an attractive material to use in optical applications. The multiple diffraction rings have been used to investigate the nonlinearities in these materials [9,10]. The Z-scan approach is another technique that has also been used, for the same goal [11,12]. In the diffraction ring technique, the rings number in general depends on the on-axis nonlinear phase shift be affected by laser beam as it passes through medium sample. The nonlinear refractive index was determined by counting rings number in each pattern noticed and Z-scan approach then both results are confronted. The phase shift depends on a luminous intensity optical, magnitude and saturation value, of the nonlinear refractive index and sample thickness. The Z-scan approach based on the 3D-distortions of a laser beam that crossed the medium sample is widely used in materials description, for its difficult-free, high sensitivity and well-detailed theory. The Z-scan approach, exploits the self-focusing and refocusing phenomena, in nonlinear optical materials. In this method, the nonlinear optics sample is exposed by focal plane of a closely focused Gaussian laser beam and the change of pattern for far-field intensity is supervised. Towards perspicuous refractive nonlinearity, the light field induces an intensity-dependent nonlinear phase as results of the intensity of Gauss Cross-Sectional. In this paper, we have investigated the third order nonlinear properties by using Z-scan setup for close and open aperture technique. Also optical parameters of film by optical limiting device were studied.

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