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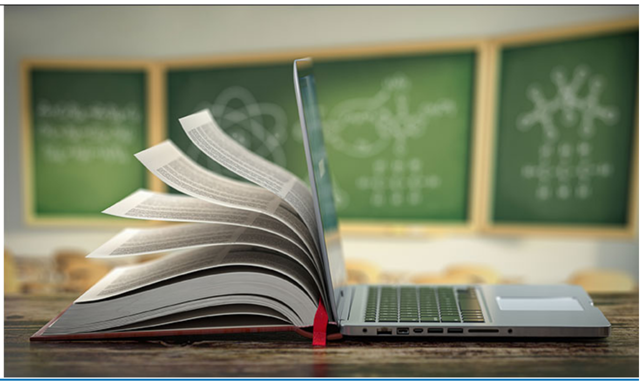

Study the Effect of Concentration on the Evolution of Far-Field Diffraction Patterns of Bromocresol Purple and Congo Red Solution

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Abstract. Experimental evolution of the diffraction pattern of Bromocresol Purple (BCP) and Congo Red (COGR) Solutions, by diffraction ring technique under CW laser illumination is present. The two azo dyes, COGR dye and COGR dye, were studied for their absorbance spectra, as well as the diffraction rings experimental. The measurement rings were performed when the incident beam propagates through a quartz cell containing dye. Many diffraction rings were observed on the sensitive screen. Among the results we obtained are the diffraction rings at 0.07mM concentration, where the number of rings was 4 at the power of the 50 mW laser beam for the Bromocresol dye and three rings in the congo red dye. The nonlinear refractive index for the Bromocresol dye and congo red dye are found to be in the order of 0.11×10^{-8} cm^2/Watt, 3.093×10^{-8} cm^2/Watt, respectively.The efficiency of the ring pattern was found to depend on the concentration of the dye and the power of the laser.

Keyword: azo dye; diffraction ring; refractive index; relative phase shift; laser.

1. Introduction

The field of searching for optical materials that exhibit nonlinear optical properties has witnessed wide popularity, due to a large number of applications that rely on nonlinear optical materials[1-4] and the importance of these applications in terms of the high demand for them. Practical applications include, but are not limited to, optical communications that rely on optical fibers [5-8] or photon fibers [9], optical power limiters [10], and integrated optics that include optical information processing [11], perfect optical switches [12] optical modulation [13] and photosensitizer [14].
The optical materials that exhibit nonlinear effects are split into two parts, some of which are inorganic materials, such as volumetric crystals [15] that are suitable for some photon devices because they have high quality, good mechanical and chemical stability and have large nonlinear optical coefficients. However, their high cost and difficulty in adapting them to the devices made researchers find alternatives to them.
The organic nonlinear optical materials, such as dyes and polymers, become a wide field of research due to their low-cost and ease of adaptation to the required applications in addition to their large non-linear transactions, wide range and characteristic [16]. The best in it can be mixed with other materials to obtain a new material with high non-linear characteristics [17]. As well as the stability of their chemical and optical properties under normal