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Far-field diffraction patterns and optical limiting properties of bisdemethoxycurcumin solution under CW laser illumination

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Highlights

- We studied the nonlinear optical properties of bisdemethoxycurcumin solution.
- The nonlinear refractive index of this sample is determined using diffraction ring patterns method.
- The bisdemethoxycurcumin solution exhibits self-diffraction ring patterns due to self-phase modulation.
- Optical power limiting characteristics of sample was studied.

Abstract

In this work, nonlinear optical properties of bisdemethoxycurcumin solution were studied using [diffraction](#) ring patterns method. Multiple diffraction rings observed as a [continuous wave](#) (CW) [laser beam](#) passes through a bisdemethoxycurcumin solution. The nonlinear [refractive index](#), n_2 , and change in refractive index, Δn , for sample were determined from the number of observed rings, and are found to be $0.8327 \times 10^{-6} \text{ cm}^2/\text{W}$ and 0.00946 respectively. The evolution of the diffraction ring patterns are numerically studied using the Fresnel–Kirchhoff diffraction integral theory. The experimental findings are in good agreement with theoretical analysis. Also

the optical limiting properties of the sample were measured at 473 nm. The obtained results proved that the sample bear good optical limiting property.

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Keywords

Spatial self-phase modulation; Nonlinearity; Nonlinear refractive index; Diffraction ring pattern; Optical limiting

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