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Thermal nonlinearities for three curcuminoids measured by diffraction ring patterns and Z-scan under visible CW laser illumination

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Highlights

- We studied the nonlinear optical properties of three curcuminoids compounds.
- The thermal nonlinear [refractive index](#) of these samples are determined using [diffraction](#) ring patterns and Z-scan method.
- Three curcuminoids compounds exhibits self-diffraction ring patterns due to self-phase [modulation](#).

Abstract

The Gaussian visible Continuous-wave (CW) laser beam propagation in three curcuminoids compounds has led to diffraction ring patterns. These patterns believed to be originated due to self-phase modulation. The study focuses on the effect of input power on the diffraction ring patterns. As a result of increasing input power each circular ring pattern flattened in the upper part due to the convection. These results are reproduced numerically using the Fresnel-Kirchhoff integral. It appears that each ring pattern evolve with time from circular to flattened ones. The thermal nonlinear refractive indexes of the curcuminoids are calculated based on diffraction ring patterns and the Z-scan technique.

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Keywords

Spatial self-phase modulation; Thermal nonlinearity; Nonlinear refractive index; Diffraction ring pattern; Z-scan technique

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