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RESEARCH ARTICLE

Synthesis, optical nonlinear properties and all-optical switching of curcumin analogues

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Abstract

The curcumin analogues (Cur-MeS, Cur-MeO) are synthesized using the 3-chloroacetyl acetone and aromatic aldehydes reaction. Both compounds are characterized using FTIR, LC-MS, ^{1}H, and ^{13}C NMR spectroscopies. The geometric optimization and thermodynamic properties of the two compounds are carried out theoretically using DFT. The highest HOMO, lowest LUMO, and Mullikan atom charges of the two compounds are calculated using the B3LYP and CAM-B3LYP methods which are hybrid functionals with a 6-311+G (2d,p) as the basis set. The nonlinear optical (NLO) properties of both compounds are studied using the spatial-self phase modulation (SSPM) through the diffraction ring patterns (DRPs) and the Z-scan techniques, using a continuous wave (cw) low power 473 nm laser beam. The index of nonlinear refraction (INR) of both compounds are calculated by the two techniques. The all-optical switching property of both samples are tested using two visible cw laser beams.