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**Thermally managed $f$s Z-scan methods investigation of the size-dependent nonlinearity of Graphene Oxide in different solvents** PAUL BURKINS, ISAAC BASALDUA, ROBINSON KUIS, ANTHONY JOHNSON, University of Maryland, Baltimore County, SIVA RAM SWAMINATHAN, DAIJE ZHANG, SUDHIR TRIVEDI, Brimrose Corporation, UNIVERSITY OF MARYLAND, BALTIMORE MARYLAND TEAM, BRIMROSE CORPORATION OF AMERICA COLLABORATION — Acoustic and thermal diffusion effects are often ignored in Z-scan measurements resulting in misinterpretation of the nonlinear index of refraction and nonlinear absorption. Thermally managed Z-scan using a modified chopper was compared to utilizing a pulsepicker with the common calibration material $CS_2$ and then extended to Graphene Oxide (GO) in different solvents. The chopper reveals properties of the material in time and is an inexpensive alternative to changing the repetition rate with a pulsepicker. The pulsepicker allows for much faster rise-times and therefore measurements can be taken before thermal effects have overwhelmed the nonlinear electronic response. GO in DI water using pulsepicked $f$s laser excitation yielded a value of (-1.79+/-.6)x$10^{-15}$ $cm^2$/W for nanometer particles and (-1.09+/-.6)x$10^{-15}$ $cm^2$/W for micrometer sized particles. Open aperture Z-scan of GO in THF using the modified chopper shows a flip from reverse saturable absorption to saturable absorption in time, previously shown to be intensity dependent, potentially resulting from thermal effects. Both measurements indicate smaller particles have larger negative nonlinearities originating from thermal effects or from defects in lattice structure at the edges.

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