28

Nonlinear Thermal-Origin Effect of Ferrofluids with Different Stabilization Mechanisms with Visible and IR Wavelengths

Author: Antonio Martins Figueiredo Neto[1]

Co-authors: Angela Niño-Santisteban [2]; Fabio Cuppo [2]

[1] *University of São Paulo, Institute of Physics*

[2] *IFUSP*

By using the time-resolved Z-Scan technique with visible (532 nm) and near infrared - IR (979 nm) wavelengths, this study investigated the relation between particle size distribution and thermal nonlinear optical effect in water based ferrofluids. Commercial Fe3O4 ferrofluid samples, with different stabilization mechanisms, were employed. Transmission electron microscopy was used to determine the particle-size distribution of the samples. Measurements were performed with 2 wavelengths due to IR light is absorbed by the liquid carrier of ferrofluids while absorption of visible light by this carrier is negligible. For both wavelengths it was found that the measured thermal effect was linearly increasing with the mean particle size and no evidence of the influence of the solution stabilization mechanism was found. The results indicate that the nonlinear response comes mainly from the optical absorption of the magnetic grains but that for the measurement made with IR light the contribution of water is not negligible. The samples presented an optical thermal response about eight times more sensitive to exposure at 532 nm than at 979 nm. It was also observed from the measurements performed with the IR setup that the thermal-lens formation process takes longer to saturate than those carried out with the visible light setup. This effect can be related to the very slow response of water which slows down the sample saturation process. CNPq, INCT-FCx and FAPESP financial support.

Type:

Oral