

Abstract Submitted
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Superparamagnetic Magnetite Nanoparticles for Optical Modulation/Chopping SERKAN ZORBA, Whittier College, YADONG YIN, University of California, Riverside, WHITTIER COLLEGE/UC RIVERSIDE COLLABORATION — We demonstrate proof of concept operation of superparamagnetic magnetite nanoparticles and magnetite-TiO₂ peapod-superstructures for laser intensity optical modulation and chopping. The frequency of the modulation is shown to be twice that of the driving signal and a function of the size of the particles. Specifically, optical modulation with round nanoparticles of sizes 80, 130, 200 nm is compared with optical modulation with magnetite-TiO₂ peapod-superstructures of sizes of around 1 μ m. The former gave rise to modulations of up to 2 kHz of frequency—a number comparable to that of the commercial optical choppers—, the latter up to 100 Hz. We also show that particle shape asymmetry and anisotropy enhance optical modulation.

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