

Abstract Submitted
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Laser induced ultrafast magnetization reorientation in two dimensional arrays of Fe nanoparticles ZEHRA CEVHER, YU GONG, WEI LAI, YUHANG REN, Physics, Hunter College, the City University of New York, C. KIM, S. DELIKANLI, HAO ZENG, Physics, University at Buffalo, the State University of New York, Buffalo — We report on our recent study of ultrafast demagnetization and reorientation dynamics induced by femtosecond optical pulses in two dimensional arrays of magnetic nanoparticles. The transient Faraday rotation signal and magnetic hysteresis loops were acquired with a probe beam following excitation by pump pulses in the 50-nm Fe nanoparticle arrays. We observed rapid change and recovery of magnetization hysteresis loops of about 50 fs along with excitation of 50 fs optical pulses under Voigt geometry. The processes are consistent with the ultrafast coherent magnetic responses of the sample and clearly show that the mechanisms of optomagnetic interactions do not rely on laser-induced heating but have a nonthermal origin. Our results clearly show the feasibility of ultrafast optical control of both the magnetization and the magnetocrystalline anisotropy.

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