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Effect of Magnetic Nanoparticles, Their Size and Functionalization on Liquid Crystal Order[1] LUZ J. MARTINEZ-MIRANDA, KEVIN MCCARTHY, JR, University of Maryland, LYNN K. KURIHARA, Naval Research Laboratory, JASON J. HARRY[2], Xavier University and MARC Program, ROBERT L. BRUCE, University of Maryland — We have observed the effects of adding magnetic nanoparticles with a different surface termination to smectic A 8CB liquid crystals by examining the liquid crystals by X-ray scattering. Adding the magnetic nanoparticles improves the liquid crystal's response to a magnetic field by at least one to two orders of magnitude. We have performed the experiments with four types of organic compounds covering the nanoparticles, using 11 nm and 2 nm FeCo nanoparticles, and have varied the applied magnetic field from 225 mT to 362 mT. There is a variation on the effect due to the size of the nanoparticles and also to the concentration of the particles in the mixture. As a function of magnetic field, the 11 nm and 2 nm particles terminated in polyethelyne glycol 3000 exhibit the largest rotation with the magnetic field. The liquid crystal rotates in opposite directions depending on the concentration of particles.

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