

SEMINAR IN PHYSICS

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Nanosphere Lithography Applied to Magnetic Thin Films

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Magnetic nanostructures have widespread applications in many areas of physics and engineering, and nanosphere lithography has recently emerged as a promising tool for the fabrication of such nanostructures. The magnetic properties of a thin film of ferromagnetic material deposited onto a hexagonally close-packed monolayer array of polystyrene nanospheres are shown to differ from the magnetic properties of a typical flat thin film.

Optimal nanosphere deposition conditions are explored and characterized with scanning electron microscopy. Single layers of permalloy ($\text{Ni}_{80}\text{Fe}_{20}$) are deposited on top of the nanosphere array to create an array of magnetic nanocaps. The coercivities of the thin films are measured using a home-built magneto-optical Kerr effect (MOKE) system in longitudinal arrangement, and these measurements show that for a single layer of permalloy (Py), the coercivity of a thin film deposited onto an array of nanospheres increases compared to that of a flat thin film.