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**Polarized Magnetic Induced Broadening of Plasmon-photonics in $Fe_3O_4$- Silicone Elastomer Composite Films**[1] DANHAO MA, DEREK CAPLINGER, DUSTIN HESS, KOFI ADU, Department of Physics, The Pennsylvania State University, Altoona College, Altoona, PA 16601, RICHARD BELL, Department of Chemistry, The Pennsylvania State University, Altoona College, Altoona, PA 16601 — We report systematic studies of polarization dependence of magneto-optical response of $Fe_3O_4$-silicone elastomer composite. The $Fe_3O_4$ particles were aligned in the elastomer matrix with static magnetic field. The optical response of two composites containing 5wt% and 15wt% of 20nm-30nm diameter $Fe_3O_4$ particle aligned in- and out-of-plane were measured with an absorption spectrometer. We observed a systematic redshift in the optical response of the out-of-plane samples with increasing static magnetic field. Furthermore, the observed redshift increases with increasing weight percent of $Fe_3O_4$ in the composite; obtaining a maximum shift of $\sim$ 174 nm at 600 Gauss in the 15wt% $Fe_3O_4$-elastomer composite films. The observed redshift in the optical response of the out-of-plane composite is attributed to the effect of magnetic field strength and the metal particle/cluster size in the elastomer. However, there were no observable shifts in the in-plane samples, suggesting that the orientation (polarization) of the magnetic dipole and the induced electric dipole play a crucial role in the optical response.

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