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Synthesis and characterization of graphene patterned with Fe_3O_4 nanoparticles SAYAN CHANDRA, K. STOJAK, D. FERIZOVIC, M. MUNOZ, M.H. PHAN, H. SRIKANTH, University of South Florida — Graphene has emerged as a very exciting material with its outstanding physical, chemical, and mechanical properties. Due to the presence of excess free electrons on a graphene surface, the possibility of graphene-mediated long-range interactions between magnetic nanoparticles would open up new avenues of research and device development. Our studies aimed to deposit ∼9 nm Fe_3O_4 NPs on graphene layers to understand the role of the metallic interface in mediating the magnetic interactions between the particles. We successfully grew the high-quality graphene on Ni films using CVD and used the Langmuir-Blodgett technique to pattern different layers of the Fe_3O_4 nanoparticles on the graphene sheets. The samples were well structurally characterized by XRD, TEM, AFM, and Raman spectroscopy. Interestingly we have observed strong variation in the magnetic properties such as magnetic anisotropy of the NPs pattered graphene samples when compared to just the NPs. These results point to the important role of the metallic interface in mediating the magnetic interactions between the Fe_3O_4 nanoparticles.

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