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Magnetic properties of intercalated Dy and Eu under Graphene[1]
NATHANIEL ANDERSON, MYRON HUPALO, Iowa State University, JOHN FREELAND, Argonne National Laboratory, MICHAEL TRINGIDES, DAVID VAKNIN, Iowa State University — X-ray magnetic circular dichroism (XMCD) measurements of graphene intercalation with Dy and Eu on silicon SiC(0001) surface reveal magnetic correlations in these single layer rare-earth metals. The intercalation of Dy or Eu is achieved by depositing the metal on graphene that is grown on SiC and by annealing at high temperatures to allow diffusion through the graphene. Comparing the XMCD signal of the intercalated Dy sample with that of sample for which the Dy coverage is known, we show that the intercalated Dy forms an intact and stable monolayer under graphene. Furthermore, the field dependence of the Dy magnetic moment extracted from the XMCD by standard sum-rules (at 15 K) deviates from the paramagnetic Brillouin function indicating finite in-plane magnetic correlations in the Dy or the Eu layer. The XMCD spectra of both intercalated systems (Dy or Eu) compared to those of Dy_2O_3 and Eu_2O_3 are significantly different, respectively, demonstrating that the ex-situ intercalated metal-layer is stable in atmospheric environment over time.

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Nathaniel Anderson
Iowa State Univ

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