Abstract Submitted
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Magnetite nano-islands on Graphene[1] NATHANIEL ANDERSON, QIANG ZHANG, Ames Laboratory and Iowa State University, RICHARD ROSENBERG, Advance Photon Source, Argonne National Laboratory, DAVID VAKNIN, Ames Laboratory and Iowa State University — X-ray magnetic circular dichroism (XMCD) of ex-situ iron nano-islands grown on graphene reveals that iron oxidation spontaneously leads to the formation of magnetite nano-particles - i.e, the formation of the inverse spinel Fe3O4. Fe islands have been grown with two different heights (20 and 75 MLs) on epitaxial graphene and we have determined their magnetic behavior both as function of temperature and applied external field. Our XAS and XMCD at an applied magnetic field of B = 5 T show that the thin film (20 MLs) is totally converted to magnetite whereas the thicker film (75 MLs) exhibits magnetite properties but also those of pure metal iron. For both samples, temperature dependence of the XMCD shows clear transitions at ≈120 K consistent with the Verwey transition of bulk magnetite. XMCD at low temperatures shows a weak hysteresis and provide the average spin <Sz>and angular-momentum <Lz>moments, the dipolar <Tz>term, and the total moment <Mz>. In addition, manipulation and comparison of the XMCD data from both samples allows us to extract information about the pure iron nano-islands from the thicker sample.

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