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Spectroscopic Observation of Plasmonic Polarons in a Doped Ferromagnetic Semiconductor J.M. RILEY, Univ of St Andrews, L. DUFFY, Univ of Oxford, M. WATSON, Diamond Light Source, L. BAWDEN, Univ of St Andrews, F. CARUSO, C. VERDI, T. HESJEDAL, F. GIUSTINO, Univ of Oxford, M. HOESCH, Diamond Light Source, P.D.C. KING, Univ of St Andrews — Since its discovery in the 1960â^{TM}s, europium monoxide (EuO) has been shown to host a rich array of physical phenomena including the giant magneto-optic Kerr and Faraday effects, anomalous Hall effect, colossal magnetoresistance under doping [1], and a massive, tuneable ferromagnetic metal-insulator transition [2]. The Curie temperature responds sensitively to carrier doping, which can be readily controlled via substitution of Gd for Eu in epitaxial thin films. Here, we use in-situ synchrotron-based angle-resolved photoemission spectroscopy to study the corresponding electronic structure evolution in Eu1-xGdxO grown by molecular beam epitaxy. At low carrier densities, our measured spectral function exhibits signatures of polaron formation due to strong coupling to a bosonic mode. Similar spectral features have recently attracted great attention in polar oxides such as TiO2 [3] and SrTiO3 [4-6] and interfacial systems such as FeSe/SrTiO3 [7]. Unlike these systems, however, we show that it is not electron-phonon, but, rather, electron-plasmon coupling that is the dominant driver of this effect, providing a rare observation of plasmonic polarons.[1] Phys. Rev. B 8, 2316 (1973); [2] Phys. Rev. Lett. 100, 046404 (2008); [3] Phys. Rev. Lett. 110, 196403 (2013); [4] Nat. Comms. 6, 8585 (2015); [5] Nat. Comms. 7, 10386 (2016); [6] Nat. Mat. 15, 835 (2016); [7] Nature 515, 245 (2014)

Jonathon Riley
Univ of St Andrews

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