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FeGa3 – a strongly correlated insulator? MONIKA GAMZA, Brookhaven National Laboratory, MEIGAN ARONSON, Stony Brook University and Brookhaven National Laboratory — FeGa3 is one of few Fe-based nonmagnetic semiconductors, in which a small gap is produced by the hybridization of Fe 3d states with p states of a group 13 or 14 element. The role of strong electron-electron correlation effects in formation of the gap is unclear. In case of FeSi and FeSb2, a metal-insulator transition was observed at temperatures low relative to the gap energy, which is a hallmark of a Kondo nature of the gap. For FeGa3, a combination of photoemission data and DFT-based electronic structure calculations indicated a rather strong on-site effective Coulomb repulsion within the Fe 3d shell Ueff$\sim$3 eV and a sizable Ueff/W $\sim$ 0.6 (W – band width) [1]. Interestingly, recent ARPES measurements revealed a Fe 3d derived state located around 0.4 eV away from the top of the valence band [1]. Thermodynamic and transport measurements do not give any sign of a metal-insulation transition up to 1000 K [2]. To get insight into the importance of e-e correlation effects in formation of the gap in FeGa3, we drive the system towards a metallic state by doping. The results of resistivity, specific heat and magnetization measurements on doped single crystals of FeGa3 grow by Ga-flux technique will be discussed.

[1] Arita M et al., Phys. Rev. B 83, 245116 (2011)
[2] Hadano Y et al., J. Phys. Soc. Jpn. 78, 013702 (2009)

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