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$Ba_{1-x}K_xMn_2As_2$: An Antiferromagnetic Local Moment Metal[1]

ABHISHEK PANDEY, R.S. DHAKA, J. LAMSAL, Y. LEE, V.K. ANAND, A. KREYSSIG, R.J. MCQUEENEY, A. GOLDMAN, B.N. HARMON, A. KAMINSKI, D. C. JOHNSTON, Ames Laboratory and Dept. Phys. Astron., Iowa State Univ., Ames, IA 50011, T.W. HEITMANN, The Missouri Research Reactor, Univ. Missouri, Columbia, MO 65211 — The syntheses of K-doped single crystalline $Ba_{0.984}K_{0.016}Mn_2As_2$ and polycrystalline $Ba_{0.95}K_{0.05}Mn_2As_2$ with the tetragonal $ThCr_2Si_2$ structure are reported. Electrical resistivity, heat capacity, magnetic susceptibility, angle-resolved photoemission spectroscopy and neutron diffraction measurements and spin-polarized electronic structure calculations consistently establish that these hole-doped $Ba_{1-x}K_xMn_2As_2$ samples are antiferromagnetic local-moment metals, in contrast to the parent $BaMn_2As_2$ [1-3] which is an antiferromagnetic local-moment semiconductor. This new class of materials bridges the gap between the iron pnictide and cuprate high T_c materials. Investigations of the phase diagram of the $Ba_{1-x}K_xMn_2As_2$ system and other similar systems are underway.

[1] Y. Singh et al., Phys. Rev. B **79**, 094519 (2009).
[2] Y. Singh et al., Phys. Rev. B **80**, 100403 (2009).
[3] D. C. Johnston et al., Phys. Rev. B **84**, 094445 (2011).

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