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Hole doping study in antiferromagnetic $BaFe_2Se_3$ and $BaMn_2As_2$[1]

JIN-KE BAO, GUANG-HAN CAO, Zhejiang Univ — Motivated by the close relationship between antiferromagnetism and superconductivity, we studied hole doping in two antiferromagnetic compounds $BaFe_2Se_3$ and $BaMn_2As_2$. $BaFe_2Se_3$ has a block antiferromagnetic transition around 250 K with a magnetic moment 2.8 μ_B/Fe and $BaMn_2As_2$ exhibits a G-type antiferromagnetism with a large Néel temperature $T_N = 625$ K and a large order moment 3.9 μ_B/Mn. We did the explicit investigations on the $Ba_{0.6}K_{0.4}Fe_2Se_3$ compound which had anisotropic Heisenberg-like spin glass and variable range hopping conductivity [J. K. Bao et al., J. Phys.: Condens. Matter 26, 026002 (2014)]. As for the semiconducting $BaMn_2As_2$, potassium doping introduces holes into this system and makes it a metal. Moreover, weak ferromagnetic transition appears for the heavily potassium doping [J. K. Bao et al., Phys. Rev. B 85, 144523 (2012)]. However, the origin of weak ferromagnetism in the heavily doped $Ba_{1-x}K_xMn_2As_2$ is still an open question.

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