

Abstract Submitted  
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**The role of magnetism and disorder in superconductivity of gold-doped BaFe<sub>2</sub>As<sub>2</sub> crystals**<sup>1</sup> LI LI, HUIBO CAO, MIAOFANG CHI, ATHENA S. SEFAT, Oak Ridge National Lab — We present bulk magnetic and transport properties, and find structural and magnetic transitions, in order to construct the detailed T-x phase diagram for Ba(Fe<sub>1-x</sub>Au<sub>x</sub>)<sub>2</sub>As<sub>2</sub> single crystals [1]. The Au substitution into the FeAs-planes is only possible up to a small amount of ~3%, probably due to the large size of gold. We find that 5d is more effective in reducing magnetism in BaFe<sub>2</sub>As<sub>2</sub> than its counter 3d Cu, and this relates to superconductivity. In this talk, we reveal more comprehensive neutron diffraction data in order to clarify some of the inferred  $T_N$ ,  $T_S$  points in our literature report [1]. New transmission electron microscopy results will be presented that sheds light on the role of chemical disorder for preventing high  $T_c$  in these crystals. [1] L. Li et al., Phys. Rev. B 92, 094504 (2015).

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