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**Superconductivity and Antiferromagnetism In Fe($Te_{1-x}S_x$)$_y$ System** T.J. LIU, Tulane Univerisity, M.H. FANG, B. QIAN, E.K. VEHSTEDT, Tulane University, J.H. YANG, Zhejiang University, H.M. PHAM, L. SPINU, University of New Orleans, Z.Q. MAO, Tulane University — The surprising discovery of superconductivity up to 56 K [1] in FeAs based compounds has reinvigorated the search for unusual superconductors. The recently revealed FeSe superconductor [2] has inspired the community to take a second look at other previously studied materials, such as FeTe. We have investigated properties of Fe($Te_{1-x}S_x$)$_y$. Our results show that the solid solution of S in this system is limited, $< 30\%$. We observed superconductivity at 9 K in both polycrystalline samples Fe($Te_{1-x}S_x$)$_y$ with $0 < x \leq 0.3$ and $0.86 \leq y \leq 1.1$, and single crystals with the composition Fe($Te_{0.9}S_{0.1}$)$_{0.91}$. In addition, our results suggest that this superconducting phase coexists with antiferromagnetism and that the superconducting volume fraction depends on excess Fe at interstitial sites, and excess Fe suppresses superconductivity. This allows us a unique view into the important role of magnetic correlations in mediating superconducting pairing.

[1] A. Cho, Science **320**, 870 (2008).
[2] F. C. Hsu *et al.*, Proc. Natl. Acad. Sci. USA. **105**, 14262 (2008).

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