Preparation and physical properties of Mg$_x$FeTe with tetragonal phase$^1$ W.H. LEE, M.C. CHUANG, K.J. SYU, S.C. CHEN, Department of Physics, National Chung Cheng University, Ming-Hsiung, Chia-Yi 621, Taiwan, ROC, Y.Y. CHEN, Institute of Physics, Academia Sinica, Taipei 115, Taiwan, ROC — Unlike Fe$_{1.01}$Se, which has a superconducting $T_c$ near 8 K, Fe$_{1+x}$Te shows no superconductivity though it forms the same tetragonal structure with $0.06 < x < 0.17$. The excess Fe (2) in Fe$_{1+x}$Te not only stabilizes the PbO-type crystal structure with space group P4/nmm but also is strongly magnetic as an electron donor. According to the spin fluctuation driven scenario of superconductivity the results indicate that FeTe with doping is a likely higher-temperature superconductor. In order to reduce the magnetic strength and keep the same tetragonal structure in Fe$_{1+x}$Te, in this work, we have prepared single phase samples Mg$_x$FeTe with $x$ around 0.1. Magnetic and electrical properties, the magnesium positions in the crystal structure as well as the possibility of high-$T_c$ superconductivity in the Mg$_x$FeTe system investigated will be discussed.

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