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Magnetic properties of the layered III-VI diluted magnetic semiconductor Ga1−xFexTe THOMAS PEKAREK, P.S. EDWARDS, T.L. OLEJNICZAK, J. GARNER, Physics, U. of North FL, C. LAMPROPOULOS, Chemistry, U. of N. FL, I. MIOTKOWSKI, A.K. RAMDAS, Physics, Purdue U., PHYSICS, U. OF N. FL COLLABORATION, CHEMISTRY, U. OF N. FL COLLABORATION, PHYSICS, PURDUE U. COLLABORATION — Magnetic properties of single crystalline Ga1-xFexTe (x = 0.05) have been measured. GaTe and related layered III-VI semiconductors exhibit a rich collection of important properties for THz generation and detection. The magnetization versus field for an x = 0.05 sample deviates from the linear response seen previously in Ga1-xMnxSe and Ga1-xMnxS and reaches a maximum of 0.68 emu/g at 2 K in 7 T. The magnetization of Ga1-xFexTe saturates rapidly even at room temperature where the magnetization reaches 50% of saturation in a field of only 0.2 T. In 0.1 T at temperatures between 50 and 400 K, the magnetization drops to a roughly constant 0.22 emu/g. In 0 T, the magnetization drops to zero with no hysteresis present. The data is consistent with Van-Vleck paramagnetism combined with a pronounced crystalline anisotropy, which is similar to that observed for Ga1−xFexSe. Neither the broad thermal hysteresis observed from 100-300 K in In1−xMnxSe nor the spin-glass behavior observed around 10.9 K in Ga1−xMnxS are observed in Ga1−xFexTe. Single crystal x-ray diffraction data yield a rhombohedral space group bearing hexagonal axes, namely R3c. The unit cell dimensions were a = 5.01 A, b = 5.01 A, and c = 17.02 A, with alpha = 90*, Beta = 90*, and gamma = 120* giving a unit cell volume of 369 Aˆ3.

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