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Magnetic Behavior Of Mn-Intercalated TaS_2 ZACH GRIFFITH, STROH LESLIE, P.M. SHAND, TIM KIDD, LAURA STRAUSS, University of Northern Iowa — In this project, the magnetic properties of manganese-intercalated tantalum disulfide ($MnTaS_2$) grown in nanotube form were investigated. Two samples were studied; one with 15% Mn and the other with 23% Mn . These samples were investigated thoroughly by dc magnetization and ac susceptibility measurements. For $Mn_{.23}TaS_2$, a sharp upturn in the dc magnetization and ac susceptibility at $\sim$ 100 K heralded a ferromagnetic transition, which is similar to the behavior exhibited by bulk crystals with a similar concentration of Mn. Ac susceptibility measurements with and without an applied dc magnetic field in the vicinity of the transition temperature confirmed ferromagnetic critical behavior in this sample. In the $Mn_{.15}TaS_2$ sample, a spin-glass-like transition was observed at $\sim$ 10 K, consistent with a disordered distribution of the intercalated Mn ions. The out-of-phase ac susceptibility, which is very sensitive to phase transitions, was non-zero at temperatures substantially above that of the spin-glass-like transition. This suggested the presence of strong magnetic correlations far above the transition likely resulting in short-range ordering. Significant deviation from the Curie-Weiss law supports the presence of short-range ordering far above the transition temperature. The anisotropic nature of the $TaS_2Mn_{0.15}$ nanotubes may have contributed to the unusual behavior, but more research in this area is needed.

Paul Shand
University of Northern Iowa

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