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Magnetic Behavior of Nanostructured Mn0.23TaS2 Near Ferromagnetic Transition[1] COREY COOLING, PAUL SHAND, K.R. BOYLE, TIM KIDD, LAURA STRAUSS, University of Northern Iowa — We have investigated the ferromagnetic transition for tantalum disulfide intercalated with 23% manganese. The material was grown in the form of nanotube/nanowire structures with diameters ranging from 30nm to several hundred nanometers. These nanotube structures give the material a high anisotropy. The material was studied through Curie-Weiss analysis, dc magnetization, and ac susceptibility measurements. The ferromagnetic transition for $Mn_{0.23}TaS_2$ occurs around 85K and varies with the applied dc magnetic field. The ferromagnetic transition is characterized by a peak in the ac susceptibility. Analysis of the susceptibility peaks revealed atypically high critical exponent values when compared to other disordered ferromagnetic systems. The large exponents may be due to the existence of two transitions in close proximity. The first transition (at a higher temperature) is to a ferromagnetic state; the second is to a disordered magnetic state. Arrott-Noakes plotting provided further justification of a multicritical transition. Further work includes taking measurements on a bulk crystalline sample of similar concentration and comparing its properties to those of the nanostructured sample.

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