Abstract Submitted
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Comparison of Magnetic Behavior in Nanostructured and Bulk-Crystalline Mn_xTaS_2[1] PAUL SHAND, LUCAS BEVING, MATTHEW FLEMING, PAYTON BURKEN, TIM KIDD, LAURA STRAUSS, University of Northern Iowa, CHIH-WEI CHEN, EMILIA MOROSAN, Rice University — The magnetic behavior of nanostructured Mn_xTaS_2 for several different Mn concentrations x have been studied and a magnetic phase diagram obtained. For x values between 0.15 (the lowest measured) and 0.19, the nanostructured system shows cluster-glass behavior as evidenced by spin relaxation well described by the Vogel-Fulcher-Tammann law as well as aging effects in the dc magnetization and ac susceptibility. For x values between 0.19 and 0.24, nanostructured Mn_xTaS_2 displays re-entrant cluster-glass characteristics, with transitions from paramagnetism to ferromagnetism at higher temperature and ferromagnetism to cluster glass at lower temperature. The tricritical point where all three phases converge seems to be close to $x = 0.19$. Results for single-crystal Mn_xTaS_2 from the literature show single transitions: paramagnetism to ferromagnetism for $x = 0.25$ and paramagnetism to cluster glass for x values in the range 0.02–0.1. For comparable x values, Curie temperatures seem to be slightly higher and cluster-glass transition temperatures slightly lower in the nanostructures. Bulk crystalline samples with Mn concentrations in the range 0.1–0.25 are currently being studied to more comprehensively compare the magnetic phase diagrams.

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Paul Shand
University of Northern Iowa

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