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Spin-glass ordering in the layered III-VI Diluted Magnetic Semiconductor $Ga_{1-x}Mn_xS$[1] TOM PEKAREK, Univ. of N. Florida, E.M. WATSON, J. GARNER, Univ. of N. FL, P.M. SHAND, I. MIOTKOWSKI, A.K. RAMDAS, Purdue U. — A spin-glass transition has been observed in a class of materials based on a layered III-VI semiconducing host. We have performed dc magnetization and ac susceptibility measurements on the diluted magnetic semiconductor Ga1-xMnxS (x = 0.09). A scaling analysis of the nonlinear magnetization just above the transition gives Tc = 11.2 +/- 0.2 K, and the critical exponent values gamma = 4.0 +/- 1.0 and beta = 0.8 +/- 0.2. The non-linear magnetization scaling for Ga1-xMnxS follow the same universal scaling function characterized with the same values of γ and β as $Zn_{0.49}Mn_{0.51}Te$ over many orders of magnitude along each axis. The values for the critical exponents γ and β obtained in this work are in excellent agreement with values reported for other spin-glass materials. These results represent convincing evidence that the IIIVI diluted magnetic semiconductor $Ga_{1-x}Mn_xS$ undergoes a true spin-glass transition and is in a subset of the class of insulating spin-glass materials with short-range interactions. The observed spin-glass transition in Ga1-xMnxS is unprecedented in the published literature on III-VI DMS.

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Tom Pekarek
Univ. of N. Florida

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