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Structural and magnetic characterization of Fe-Mo Oxide nanoparticles J.C. HO, H.H. HAMDEH, H. AL-GHANEM, T.J. FOLKERTS*, Wichita State University, Y.Y. CHEN, S.H. WU, C.B. TSAI, T.H. LIN, S. NEELESHWAR**, Academia Sinica — Fe-Mo oxides with different Fe:Mo ratio x (0.5 to 1.5) were synthesized by aerogel process. As microns-diameter spherical shells comprising of nanoscaled needle-like grains, XRD patterns correspond to a beta-$FeMoO_4$ structure independent of x. SQUID measurements on two selected samples with x = 1.0 and 1.5, respectively, reveal a broad transition to antiferromagnetism at low temperatures. In addition, a slowly decreasing magnetic susceptibility with decreasing temperature below approximately 100 K for x = 1.0, but not for x = 1.5, presumably reflects a beta- to alpha-$FeMoO_4$ phase transition. After being annealed at 500°C for 2 hr, both samples transform to a $Fe_2(MoO_4)_3$ structure. The antiferromagnetic ordering becomes well defined at T_N = 13 K. A secondary anomaly near 5 K likely arises from spin reorientation in the magnetic frustrated systems. These observations are corroborated by calorimetric and Mössbauer measurements. Specific heat data also yield lattice softening and the associated entropy change.
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