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Anisotropic Magnetocaloric Effect in Single Crystalline $NiTa_2O_6$[1]

AARON T. SCHYE, SUELI H. MASUNAGA, AARON B. CHRISTIAN, JOHN J. NEUMEIER, Montana State University, YI-KUO YU, National Center for Biotechnology Information — Magnetic susceptibility and heat capacity measurements were made on the low-dimensional antiferromagnet $NiTa_2O_6$. The antiferromagnetic structure most consistent with our measurements is the two sub-lattice model proposed by Law et al.[2] in which magnetic moments in the z = 0 plane are aligned parallel to [110] and those in the z = 1/2 plane are aligned parallel to $[1\bar{1}0]$. Applying a magnetic field along [110] causes the peak in the heat capacity to split into two with one remaining at T_N and the other shifting to lower temperatures as the field is increased with a maximum $\Delta T \sim 3$ K at 8 T. This splitting indicates that each sub-lattice orders at different Néel temperatures. Calculation of the magnetic entropy change associated with an increase in magnetic field($\Delta S_m(T, \Delta H)$) reveals $\Delta S_m(T, \Delta H) \sim 0.7$ J/kg K for $H \parallel [110]$ and $\Delta S_m(T, \Delta H) \sim 0$ J/kg K for $H \parallel [001]$ if $\Delta H = 8$ T. This anisotropy in the magnetocaloric effect suggests that rotating the sample in constant magnetic field will result in a change in sample temperature.

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[2]Law et al., *Phys. Rev. B.* **89**, 014423 (2014).

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