Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Entropic and magnetic properties of Ni-Mn-In magnetocaloric materials[1] JING-HAN CHEN, Department of Physics and Astronomy, Texas A&M University, NICKOLAUS BRUNO, Department of Mechanical Engineering, Texas A&M University, IBRAHIM KARAMAN, Department of Materials Science and Engineering, Texas A&M University, YUJIN HUANG, JIANGUO LI, School of Materials Science and Engineering, Shanghai Jiaotong University, JOSEPH H. ROSS, JR., Department of Physics and Astronomy, Texas A&M University — We report magnetization and field-dependent calorimetry studies of phase transitions in Ni-Mn-In. Off-stoichiometric alloys based on NiMnIn have drawn attention due to the coupled first order magnetic and structural transformation, and the large magnetocaloric entropy associated with this martensitic transformation. We have analyzed materials with compositions NiMnIn, NiMnInand NiMnIn, which differ in that the former exhibits a paramagnetic to antiferromagnetic transition, while the others exhibit an additional ferromagnetic transition. Our results show that in the Ni-materials, the total entropy change at the phase transition can be modeled solely according to a magnetic contribution due to local moments on the Mn sites. On the other hand, NiMnIncludes a larger contribution which can be described in terms of a magneto-elastic coupling. This we will discuss in terms of the Bean-Rodbell model and a renomalization of the Debye temperature coupled with magnetism. We will also discuss the low-temperature properties, which show divergent behavior including antiferromagnetic, ferrimagnetic and superparamagnetic behavior.

[1]We gratefully acknowledge the support from NSF-DMR and the Robert A. Welch Foundation.

Jing-Han Chen
Department of Physics and Astronomy, Texas A&M University

Date submitted: 14 Nov 2014 Electronic form version 1.4