Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic refrigeration capabilities of magnetocaloric Ni2Mn:75Cu:25Ga[1] S.K. MISHRA, C.A. JENKINS, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, I. DUBENKO, T. SAMANTA, N. ALI, Department of Physics, Southern Illinois University, Carbondale, IL 62901, S. ROY, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 — Doping-driven competition between energetically similar ground states leads to many exciting materials phenomena such as the emergence of high-T_c superconductivity, diluted magnetic semiconductors, and colossal magnetoresistance. Doped Ni_2MnGa Heusler alloy, which is a multifunctional ferromagnetic alloy with various exotic physical properties demonstrates this notion of rich phenomenology *via* modified ground spin states. Adopting this generic concept, here we will present a novel doped $Ni_2Mn_{.75}Cu_{.25}Ga$ alloy that offers unprecedented co-existence of the magnetocaloric effect and fully controlled ferromagnetism at room temperature. Application of site engineering enables us to manipulate the ground spin state that leads to the decrease in magnetic transition temperature and also increases the delocalization of the Mn magnetism. SQUID magnetometery suggests that Cu doping enhances the saturation magnetization, coercive field and clarity of magnetic hysteresis loops. By exploiting x-ray absorption techniques and measuring element specific magnetic hysteresis loops, here we will describe the microscopic origin of enhnaced magnetocaloric properties and *d-d* interaction driven charge transfer effects in $Ni_2Mn_{.75}Cu_{.25}Ga$

[1]This work was supported by DOE Grant No. DE-FG02-06ER46291

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Date submitted: 27 Nov 2012 Electronic form version 1.4