Abstract Submitted
for the CAL09 Meeting of
The American Physical Society

Cooling and Heating Processes in the Magnetocaloric Materials: Is Reversibility possible? ANA L. LIMA SHARMA, San Jose State University, ANGELO M. GOMES, CATALINA SALAZAR MEJIA, Universidade Federal do Rio de Janeiro, ADELINO A. COELHO, Universidade Estadual de Campinas — Irreversibility and reversibility of adiabatic processes in the magnetocaloric materials such as MnAs and $YbInCu_4$ have been a major concern for technological applications. We used a differential scanning calorimeter in order to record the heat flux as a function of the temperature and applied field. From the measured heat flux, we extracted the latent heat and entropy associated to cooling and heating processes. For materials with structural phase transition associated to magnetic ordering, we observed irreversibility of the thermodynamic cycle. On the other hand, for materials with valence transition, we observed a nearly reversible process. The thermomagnetic behavior can be understood as Zener's $p-d$exchange mechanism dominates for MnAs, i.e. the interaction range is weaker but long ranged, because the extended valence hole states mediate the ferromagnetic interaction.

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Date submitted: 19 Oct 2009 Electronic form version 1.4