Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Investigation of Low Temperature Non-Linear Magnetization Behavior in Al and Ga–Substituted La$_{0.4}$Bi$_{0.6}$Mno$_3$ Manganites. VIJAYLAKSHMI DAYAL, PUNITH KUMAR V, Maharaja Institute of Technology-Mysore, RAVI HADIMANI, DAVID JILES, Iowa State University, DAVID C JILES TEAM, VIJAYLAKSHMI DAYAL COLLABORATION — Low temperature magnetization measurements have been carried out for the samples containing Al and Ga at B-site in La$_{0.4}$Bi$_{0.6}$MnO$_3$ manganites. The magnetization ($M$) vs. T(K) data shows strong ferromagnetic behavior with highest magnetization of 6.45 emu/g for La$_{0.4}$Bi$_{0.6}$Mn$_{0.95}$Al$_{0.05}$O$_3$ and 5.40 emu/g for La$_{0.4}$Bi$_{0.6}$Mn$_{0.90}$Al$_{0.1}$O$_3$ samples respectively for an applied magnetic field of $H=100$ Oe at $T=20$ K. Similarly at $T=20$ K for La$_{0.4}$Bi$_{0.6}$Mn$_{0.95}$Ga$_{0.05}$O$_3$ the highest magnetization ($M_S$) was found to be 5.44 emu/g and for La$_{0.4}$Bi$_{0.6}$Mn$_{0.90}$Ga$_{0.1}$O$_3$ the $M_S$ is 5.05 emu/g. The decrease in magnetization with both Al and Ga substitution produces magnetic dilution with increasing concentrations. Both Al and Ga substituted samples exhibit non-linear behavior in their magnetization ($M_{NL}$) curves around 40–120 K due to the frustrations arising from mismatch in their magnetic spin arrangements. The quantity non linear susceptibility, $\chi_{NL} = -M_{NL}/H$, diverges as the temperature approaches the frustrated region $T_f$ from above (i.e.$T_C$). Further from $d\chi_{NL}/dT$ vs. T(K) plots and critical analysis with unusual critical exponent’s $\gamma$ and $\beta$ gives an experimental evidence for the observed non linearity and magnetic frustration.

Ravi Hadimani
Iowa State Univ

Date submitted: 25 Nov 2015