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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 γ and β gives an experimental evidence for the observed non linearity and magnetic frustration.

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