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The Relationship between Local Structure Changes and Magnetization as a Function of Hole Concentration in Doped Perovskite Manganites L.M. DOWNWARD, F. BRIDGES, S. BUSHART, D. LARSON, C. DOWNS, T.A. O'BRIEN, University of California, Santa Cruz, J.J. NEUMEIER, Montana State University — We present X-ray Absorption Fine Structure (XAFS) measurements on several perovskite manganite samples, $La_{1-x}Ca_xMnO_3$, in the CMR region ($0.2 \leq \quad x \quad \geq 0.5$) as a function of temperature and applied magnetic field. These results indicate that polaron-induced changes in the local structure depend only on magnetization for a given sample, irrespective of whether the sample magnetization, M, is achieved through a decrease in temperature or an applied magnetic field. Furthermore, the relationship between changes in local structure and magnetization is clearly a function of hole concentration, x, demonstrated by a change in slope at roughly $\frac{M}{M_0} \approx 2x$ (M_0 is the saturation magnetization at low T). These results lead to a proposed model for the magnetization process, in which the magnetization initially develops via Mn pairs throughout the sample. This model is similar to the cluster and phase separated models proposed by others but the clusters are at the nanoscale. NSF DMR0301971.

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