Effects of internal structural parameters on the properties of Ba-substituted La$_{0.5}$Sr$_{0.5}$MnO$_3$\textsuperscript{1} OMAR CHMAISSEM, BOGDAN DABROWSKI, STANISLAW KOLESNIK, LEOPOLDO SUESCUN, Northern Illinois University and Argonne National Laboratory, JAMES MAIS, TIMOTHY MAXWELL, Northern Illinois University, JAMES D. JORGENSEN\textsuperscript{2}, Argonne National Laboratory — Barium substituted La$_{0.5}$Sr$_{0.5-x}$Ba$_x$MnO$_3$ materials have been synthesized and investigated using neutron powder diffraction. We show that Ba substitution suppresses the low temperature orbital-ordering previously observed in La$_{0.5}$Sr$_{0.5}$MnO$_3$, and demonstrate the evolution of the magnetic and nuclear structures as a function of increasing Ba content. All samples exhibit paramagnetic and ferromagnetic properties near room temperature. The effects of A-site ionic size, size variance, and strains in the lattice on the ferromagnetic ordering temperature, $T_C$, are discussed and compared with other members of the general La$_{0.5}$Ca$\text{Sr, Ba}_{0.5}$MnO$_3$ series. Depending on the substitution path, the relationship between $T_C$ and $\langle r_A \rangle$ is either nearly constant or looks like an inverted parabola.

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