Giant Magnetoelectric Effect in Antiferromagnetic BaMnO$_{2-\delta}$ and Its Derivatives$^1$ M. GE, O.B. KORNETA, T.F. QI, S. PARKIN, L.E. DELONG, G. CAO, University of Kentucky, P. SCHLOTTMANN, Florida State University — Hexagonal perovskite 15R-BaMnO$_{2.99}$ with a ratio of cubic to hexagonal layers of 1/5 in the unit cell is an antiferromagnetic insulator that orders at a Néel temperature $T_N = 220$ K. Here we report structural, magnetic, dielectric and thermal properties of single crystal BaMnO$_{2.99}$ and its derivatives BaMn$_{0.97}$Li$_{0.03}$O$_3$ and Ba$_{0.97}$K$_{0.03}$MnO$_3$. The central findings of this work are: (1) these materials possess a usually large, high-temperature magnetoelectric effect that amplifies the dielectric constant by more than an order of magnitude near their respective Néel temperature; (2) Li and K doping can readily vary the ratio of cubic to hexagonal layers and cause drastic changes in dielectric and magnetic properties. These findings provide a new paradigm for developing novel, high-temperature magnetoelectric materials that may eventually contribute to technology.

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