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Cation-, dipole-, and spin-order in perovskite oxides. XI-AOLI TAN, Iowa State University, R. WILLIAM MCCALLUM, VLADIMIR ANTROPOV, Ames Lab, US-DOE — Single phase compounds based on the $\text{Pb}(\text{Fe}_{2/3}\text{W}_{1/3})\text{O}_3$ perovskite oxide were designed and synthesized to develop long range cation order on the B-site in the ABO_3 structure. Pure $\text{Pb}(\text{Fe}_{2/3}\text{W}_{1/3})\text{O}_3$ oxide displays 1:1 cation order and electric dipole order both at only the nanometer scale. As a consequence of the nanoscale polar order, it shows a relaxor ferroelectric behavior with zero remanent polarization. Chemical doping schemes were designed to develop long range cation order. Presumably a long range polar order will accompany the long range cation order. Therefore, a normal ferroelectric behavior with some remanent polarization is expected. Since perovskite oxide structure favors the G-type antiferromagnetic order, an uncompensated antiferromagnetic order is also expected since the different occupancy of the Fe^{3+} on the two B-site sublattices. As a consequence, this will lead to an oxide with net magnetization. In this experimental study, the $\text{Pb}(\text{Fe}_{2/3}\text{W}_{1/3})\text{O}_3$ perovskite oxide was chemically modified with Zn-, Sc-, and In-dopants. Long range B-site cation order was successfully developed. Ferroelectric and magnetic properties measurements have shown that these double-perovskite compounds are promising magnetoelectric multiferroic materials.

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