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**Magnetic Ferroelectrics Bi,Pb-3$d$ Transition Metal Perovskites** MASAKI AZUMA, KAZUHIDE TAKATA, TAKASHI SAITO, YUICHI SHIMAKAWA, MIKIO TAKANO, Inst. Chem. Res., Kyoto Univ., SEIJI NIITAKA, Mag. Res. Lab., RIKEN, ALEXEI BELIK, ICYS, NIMS, SHINTARO ISHIWATA, Dept. Appl. Phys., Waseda Univ. — Magnetic ferroelectrics attract much attention because of the possible application for the memory device and the fascinating coupling between magnetic and dielectric properties. A classical way to obtain a magnetic ferroelectric is to locate $Bi^{3+}$ or $Pb^{2+}$ions and a magnetic transition metal ion on A and B sites of perovskite structure. The $6s^2$ lone pair and the strong covalent character of Bi(Pb)-O bonds stabilize a noncentrosymmetric distorted structure. For example, $BiFeO_3$ and $BiMnO_3$ are established antiferromagnetic and ferromagnetic ferroelectrics, respectively. We have studied structure, magnetic and electric properties of Bi$MO_3$ with $M$=Cr, Co and Ni and $PbVO_3$ stabilized by high-pressure synthesis. $BiCrO_3$ is an antiferromagnetic ferroelectric with $BiMnO_3$ type structure. $BiCoO_3$ and $PbVO_3$ are found to have tetragonal $PbTiO_3$ type structures with expected polarizations of $\sim 100 \mu C/cm^2$. $BiNiO_3$crystallizes in a triclinic structure where disproportionation into $Bi^{3+}$ and $Bi^{5+}$ takes place. We have also succeeded in preparing a designed ferromagnetic ferroelectric double provskite $Bi_2NiMnO_6$. In this compound, NaCl type ordering of $Ni^{2+}$ ($e_g^1$) and $Mn^{4+}$ ($t_{2g}^3$) leads to ferromagnetism with $T_C$=140 K.

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