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Magnetoelectric properties of cobalt oxides with low dimensional structures H. KUWAHARA, M. AKAKI, K. NODA, F. NAKAMURA, D. AKAHOSHI, Sophia Univ. — Since the discovery of novel ferroelectric transition due to spiral spin structures in $TbMnO_3$, materials with spin frustration or nontrivial spin structures have attracted renewed interest as a promising candidate for new magnetoelectrics. In this context, we have focused on compounds with low dimensional structures because they often possess geometrical frustration and resultantly exhibit nontrivial spin structures. In this work, we have investigated the magnetic and dielectric properties of cobalt oxides with low dimensional structures. The subject compound, $BaCo_2Si_2O_7$ single crystal, is a derivative from $Ba_2CuGe_2O_7$ in which the spiral spin structure is reported below 3.26K. We have substituted Co^{2+} for Cu^{2+} to increase the transition temperature. The crystallographic symmetry of the obtained crystal at RT was confirmed to be $C2/c$ which does not break the inversion symmetry. The Weiss temperatures estimated in paramagnetic region are -20K ($H \| c$) and -74K ($H \perp c$), indicating the large magnetic anisotropy. The weak ferromagnetic magnetization rises up at 21K, where the dielectric constant perpendicular to the c axis ($\varepsilon^c_\perp$) decreases concomitantly. In addition, we have observed the magnetocapacitance effect below 21K: $\Delta\varepsilon^c_\perp(\mu_0 H^c_\perp{=}8\mathrm{T})/\varepsilon^c_\perp(0)$ reaches 0.2% at 5.5K. This result suggests that there exists a coupling between magnetism and dielectricity. Results of $Ba_2CoSi_2O_7$ will also be presented.

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