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Gigantic ferroelectric polarization and magnetoelectric coupling in a ferrimagnetic oxide $\text{CaBaCo}_4\text{O}_7$ JOHN MITCHELL, Argonne National Laboratory, VINCENT CAIGNERT, ANTOINE MAIGNAN, KIRAN SINGH, CHARLES SIMON, BERNARD RAVEAU, VALERIE PRALONG, Laboratoire CRISMAT, UMR 6508 CNRS/ENSICAEN, LAURENT CHAPON, Institut Laue-Langevin — From both fundamental and applications points of view, improper ferroelectrics that exhibiting a strong coupling between polarization and magnetic structure are challenging the scientific community. Several multiferroics belonging to that category have been reported; however, they exhibit rather small values of electric polarization combined with low magnetic ordering temperatures. Only the CuO (tenorite), the ordered perovskites LBaCuFeO_5 and the Z-type hexaferrites display magnetic ordering temperatures near room temperature, but they all suffer from polarization much smaller than that of proper ferroelectrics. Here, we report a ferrimagnetic cobaltite, $\text{CaBaCo}_4\text{O}_7$, crystallizing in a polar space group, which enters an improper ferroelectric phase below $T_C = 64$ K. Single crystals of $\text{CaBaCo}_4\text{O}_7$ demonstrate the highest polarization value reported among improper ferroelectrics to date, reaching 10 mC/m^2 at T_C and approaching 16 mC/m^2 at 8 K. Moreover a large magnetoelectric coupling coefficient is also evidenced near T_C . This result points to routes for exploring new multiferroics among ferrimagnetic phases.

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