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Magnetoelectricity in antiferromagnetic Ni_3TeO_6 with chiral and polar lattice JAEWOOK KIM, X. WANG, F.-T. HUANG, S. ARTYUKHIN, J. YANG, Y. OH, D. VANDERBILT, S.-W. CHEONG, Rutgers University, E. D. MUN, M. JAIME, N. HARRISON, A. HANSEN, V. ZAPF, Los Alamos National Laboratory — Ni_3TeO_6 , crystallizing in a polar and chiral lattice structure ($R3$ space group), becomes antiferromagnetic below $T_N = 52$ K. It was reported that magnetic field-induced spin flop transition below T_N accompanies a record-large non-hysteretic magnetoelectric effect (1300 pS/m). Here we present comprehensive magnetic, electric and structural properties of Ni_3TeO_6 single crystals for magnetic fields up to 92 T and temperatures down to 1.5 K. We discovered an additional sharp field-induced phase transition at 55 T, accompanied by a colossal change of electric polarization - the largest magnetically induced polarization change observed to date. We interpret our data with the help of density-functional calculations and construct a microscopic model across the whole magnetic field range.

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