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Pressure effect on ferroelectric properties of multiferroics RMn_2O_5, (R = Gd, Tm) NARAYAN POUDEL, MELISSA GOOCH, BERND LORENZ, TcSUH and Department of Physics, University of Houston, CHING-WU CHU, TcSUH and Department of Physics, University of Houston and Lawrence Berkeley National Laboratory, JAEWOOK KIM, SANG-WOOK CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University — The pressure effect on the ferroelectric properties of the multiferroics $GdMn_2O_5$ and $TmMn_2O_5$ is studied up to 18.2 kbar. Unlike in RMn_2O_5 (R= Tb, Ho, Y), no significant change in polarization is observed in $TmMn_2O_5$ up to 16.6 kbar . However, a new ferroelectric phase is observed in $GdMn_2O_5$ above a critical pressure, P_c = 10 kbar at higher temperature. Our result indicates that pressure decouples the Gd moment from the Mn spin system and splits the ferroelectric phase. Thermal expansion data shows a large increase of the c axis at the ambient-pressure ferroelectric transition. The pressure-induced contraction of the c lattice parameter is found to be the cause for splitting of ferroelectric phase by decoupling of two spin systems above P_c. The pressure-temperature phase diagram is derived based on dielectric and ferroelectric properties.

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