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The Pressure Effect on the Ferroelectricity in Multiferroic $R$$\mathbf{Mn_2O_5}$ (R=Tb, Dy, Ho) CLARINA DELA CRUZ, BERND LORENZ, CHING-WU CHU, Dept. of Physics and TCSUH, University of Houston, SOON YONG PARK, SANG-WOOK CHEONG, Dept. of Physics and Astronomy and RCEM, Rutgers University, MARIN GOSPODINOV, Inst. of Solid State Physics, Bulgarian Academy of Sciences — The effect of isotropic pressure (**P**) up to 1.7 GPa on the magnetic and ferroelectric phase diagram of $R\mathrm{Mn_2O_5}$ (R=Tb, Dy, Ho) is investigated. Distinctive anomalies of the b-axis dielectric constant identifying the critical temperatures for the various magnetic and ferroelectric transitions are monitored as a function of **P** and the temperature-pressure phase diagram of multiferroic $R\mathrm{Mn_2O_5}$ was constructed. The magnetic and ferroelectric orders are stabilized under pressure and their respective onset temperatures increase with **P**. Most notably, the step-like change of the dielectric constant at lower temperatures (T_{C2}) that is associated with a drop in the ferroelectric polarization is suddenly quenched upon passing a critical pressure. These results suggest that above the critical pressure the ferroelectric polarization is restored below T_{C2} and the ferroelectric phase in $\mathrm{RMn_2O_5}$ is stabilized and extends to the lowest temperatures. *also at LBNL, Berkeley and HKUST, Hong Kong

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