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Magnetic Phase Diagrams of Hexagonal $ErMnO_3$, $TmMnO_3$ and $HoMnO_3$[1] F. YEN, C. R. DELA CRUZ, B. LORENZ, Y. Y. SUN, Department of Physics and TcSUH, University of Houston, C. W. CHU, also in LBNL, Berkeley and HKUST, Hong Kong, M. M. GOSPODINOV, Institute of Solid State Physics, Bulgarian Academy of Sciences, Bulgaria — Multiferroic rare earth manganites have attracted special attention because of the coexistence of ferroelectric and magnetic orders resulting in higher-order magnetoelectric effects and complex phase diagrams at low temperature. We investigate the magnetic phase diagrams of $RMnO_3$ (R = Er, Tm, Ho) and show that all phase boundaries are well determined by sharp changes in their dielectric properties proving the existence of strong spin-lattice coupling. The stability range of the AFM order below the Neel temperature of $RMnO_3$ (R=Er, Tm) extends to far higher magnetic fields than previously assumed. For the case when R = Ho, the magnetic phase diagram was found to be extremely complex including new phases with yet unknown magnetic structures. Hence, we extend the phase diagram to higher external magnetic fields up to 14 Tesla for all of the three aforementioned compounds. The detection of these phase boundary lines is through anomalies of the dielectric constant, DC and AC magnetization.

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