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Role of the apical oxygen in RMnO3 (R = Ho and Lu) low temperature magneto-electric effect JONATHAN VERMETTE, SERGE JANDL, Département de Physique, Université de Sherbrooke, M. ORLITA COLLABORATION, M. M. GOSPODINOV COLLABORATION — Multiferroic materials are promising candidates for new innovative devices, particularly in the field of memory storage. The strong coupling between magnetic ordering and ferroelectricity characterizing these compounds allows the modulation of the electric polarization (magnetic moment) with an external magnetic (electric) field. Hexagonal $RMnO_3$ (Ho to Lu) compounds are type-I multiferroics in which ferroelectricity and magnetism have different sources giving a relative weak magneto-electric coupling with a large polarization. In this case ferroelectricity is induced at a relative high temperature ($T_C \sim 800K$) following a structural transition, while magnetic ordering of Mn^{3+} and R^{3+} occurs at lower temperatures ($T < 100K$). In order to determine which atoms play a major role in the giant low temperature magneto-electric effect, we study the evolutions of infrared active phonon frequencies in $HoMnO_3$ and $LuMnO_3$ under applied magnetic field below T_{Ho}= 5K. By comparing the renormalized force constants and the Born-effective charges, apical oxygen role in Ho^{3+}-Mn^{3+} superexchange interaction is particularly underlined.

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