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Large electric polarization in high pressure synthesized orthorhombic manganites $R\mathbf{MnO_3}$ (R=Ho,Tm,Yb and Lu) by using the double-wave PE loop measurements Y.S. CHAI, Y.S. OH, N. MANIVANNAN, Y.S. YANG, KEE HOON KIM, XMPL, Seoul National University, S.M. FENG, L.J. WANG, C.Q. JIN, Institute of Physics, Chinese Academy of Science — The magnitude of electric polarization via the conventional pyroelectric current and/or PE loop measurements often is ambiguous due to resistive components of the sample. To avoid this, a new technique called the double-wave method has been recently developed [1], in which only hysteretic PE components can be measured. Using this technique, we have measured the ferroelectric polarization of the orthorhombic $R\mathrm{MnO_3}$ (R=Ho, Tm, Yb, and Lu) synthesized under high pressure. Large remnant polarization P_r up to 920 $\mu\mathrm{C/m^2}$ is observed at 10 K for $\mathrm{LuMnO_3}$. Furthermore, the P_r vs. temperature data from the PE loop has shown consistency with that measured through the pyroelectric current measurements, supporting a theoretical prediction of large polarization in the E-type spin structure in this system [2]. We also discuss the influence of thermal histories on the ferroelectric domain dynamics and possible internal bias field effects originating from oxygen vacancies in $R\mathrm{MnO_3}$. [1] M. Fukunaga, *et al.* J. Phys. Soc. Jpn. **77**, 064706 (2008). [2] I. A. Sergienko, *et al.* Phys. Rev. Lett., **97,** 227204 (2006)

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