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Neutron Scattering Study of Single Crystal PZT DANIEL PHELAN, PETER GEHRING, National Institute of Standards and Technology, ZUO-GUANG YE, XIFA LONG, Simon Fraser University — Single crystal specimens of the technologically important ferroelectric material $Pb(Zr_{1-x}Ti_x)O_3$, or PZT, have only recently been grown for the first time at Simon Fraser University. We have characterized the transition temperatures, thermal expansion, and crystal structure of a PZT single crystal between 10 K and 670 K using neutron scattering methods. This crystal, which has a composition (x$\sim$0.46) that lies close to the morphotropic phase boundary (MPB), exhibits a surprisingly large thermal expansion ($\sim 10^{-3}$ 1/K) that changes sign near 545 K, and a rhombohedral crystal structure at 30 K. In addition we observe an enormous relief of extinction beginning around 650 K, which was observed through the temperature dependence of the (200) Bragg peak. Neutron inelastic measurements are planned as are measurements under an applied electric field. This work was supported by the U. S. Office of Naval Research (Grant No. N00014-1-06-0166). All neutron measurements were performed at the NIST Center for Neutron Research.

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