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Excess-hole induced high temperature polarized state and its correlation with the multiferroicity in single crystalline DyMnO₃ TAO ZOU, Michigan State University, ZHILING DUN, University of Tennessee, HUIBO CAO, Oak Ridge National Lab, MENGZE ZHU, DANIEL COULTER, Michigan State University, HAIDONG ZHOU, University of Tennessee, XIANGLIN KE, Michigan State University — Controlling the ferroelectricity and magnetism in multiferroic materials has been an important research topic. We report the formation of a highly polarized state in multiferroic DyMnO₃ single crystals which develops well above the magnetic transition temperatures, and we attribute it to the thermally stimulated depolarization current effect of excess holes forming Mn⁴⁺ ions in the system. We also show that this high temperature polarized state intimately correlates with the lower temperature ferroelectric state that is induced by the incommensurate spiral magnetic order of Mn spins. This study demonstrates an efficient approach to tune the multiferroicity in the manganite system.

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