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Title:	Local ferroelectricity in thermoelectric SnTe above room temperature driven by competing phonon instabilities and soft resonant bonding
Authors:	Aggarwal, L. (/jspui/browse?type=author&value=Aggarwal%2C+L.) Sheet, G. (/jspui/browse?type=author&value=Sheet%2C+G.)
Keywords:	SnTe Phonon instabilities Ferroelectricity Thermoelectrics
Issue Date:	2016
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Abstract:	We report direct observation of local ferroelectric ordering above room temperature in rocksalt SnTe, which is a topological crystalline insulator and a good thermoelectric material. Although SnTe is known to stabilize in a ferroelectric ground state (rhombohedral phase) below ~100 K, at high temperatures it was not expected to show any ferroelectric ordering forbidden by its globally centro-symmetric crystal structure (Fm-3m). Here, we show that SnTe exhibits local ferroelectric ordering that is robust above room temperature through direct imaging of ferroelectric domains by piezoresponse force microscopy and measurement of local polarization switching using switching spectroscopy. Using first-principles theoretical analysis, we show how the local ferroelectricity arises from soft bonding and competing phonon instabilities at intermediate wavelengths, which induce local Sn-off centering in the otherwise centrosymmetric SnTe crystal structure. The results make SnTe an important member of the family of new multi-functional materials namely the ferroelectric-thermoelectrics.
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