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Surface Strain and Multiple Charge Density Wave States in $TbTe_3$ LING FU, AARON KRAFT, BISHNU SHARMA, MANOJ SINGH, Clark University, PHILIP WALMSLEY, IAN FISHER, Stanford University, MICHAEL BOYER, Clark University — We present our near-room temperature scanning tunneling microscopy (STM) measurements on $TbTe_3$. Recent x-ray measurements and DFT calculations [1] indicate that anisotropic lattice strain energy is important in the establishment of a unidirectional CDW along the c-axis over the a-axis in the bulk below 336 K. In our STM measurements [2], we detect spatially separated perpendicular unidirectional CDWs established along both the $a-$ and $c-$crystal axes with no directional preference for the in-plane crystal axes (a or c). In addition we find regions where these two unidirectional orders coexist leading to observed bidirectional order. Our measurements indicate that the surface Te layer exposed on cleaving is only weakly coupled to the bulk and that strain variations across the surface drive the specific CDW order(s) observed. Our work suggests that similar mechanisms for CDW formation in the bulk are also involved at the surface.\[1] Moore et al., PRB, 93, 024304, 2016.2] Fu et al., PRB, 94, 205101, 2016.

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