

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dynamics of the hysteretic voltage-induced torsional strain in tantalum trisulfide associated with charge-density-wave depinning¹ J.W. BRILL, J. NICHOLS, C. SANDAMALI WEERASOORIYA, University of Kentucky — Crystals of orthorhombic tantalum trisulfide twist (by ~ 1 degree) when voltages near the charge-density-wave depinning threshold are applied. We have studied how this hysteretic voltage-induced torsional strain depends on square-wave and triangle-wave voltages of different frequencies and amplitudes. The strains are measured by placing the sample, with a wire glued to the center as a transducer, in a radio frequency cavity and measuring the modulated response of the cavity. From the triangle waves, we map out the time dependence of the hysteresis loops, and find that the hysteresis loops broaden for waves with periods less than 30 seconds. The square-wave response shows that the dynamic response to positive and negative voltages can differ. The overall frequency dependence is relaxational, but with multiple relaxation times which typically decrease with increasing voltage. The detailed dynamic response is sample dependent, suggesting that it depends on interactions of the CDW with sample defects.

¹This research was supported by NSF grants DMR-0800367 and EPS-0814194.

Joseph Brill
University of Kentucky

Date submitted: 17 Nov 2009

Electronic form version 1.4