Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Heterogeneous Nucleation and Growth Dynamics in the Light-induced Phase Transition in Vanadium Dioxide NATHANIEL BRADY, Univ of Alabama - Birmingham, KANNATASSEN APPAVOO, JOYEETA NAG, Vanderbilt University, MIN-AH SEO, ROHIT PRASANKUMAR, Los Alamos National Lab, RICHARD HAGLUND, Vanderbilt University, DAVID HILTON, Univ of Alabama - Birmingham — Vanadium dioxide is a well-known transition metal oxide that undergoes an insulator-to-metal phase transition at $T_c = 340$ K that is accompanied by a structural distortion from monoclinic [$P2_1/c$ for $T < T_c$] to rutile [$P42/mnm$ for $T > T_c$]. The heterogeneous nature of this phase transition is evident from the significantly smaller the thermal energy at T_c when compared to the energy barrier for homogenous nucleation [see: Phys. Rev. B 65, 224113 (2002)]. The identity of the relevant defect that locally lowers this barrier enabling this phase transition, however, is currently unclear. In our talk, we will report on ultrafast optical investigations of the light-induced insulator-to-metal phase transition in samples with controlled disorder generated by substrate mismatch. Our results reveal several common features of this optical phase transition that are independent of this disorder and a small variation in threshold fluence needed to drive this phase transition that depends on the sample morphology.

David Hilton
Univ of Alabama - Birmingham

Date submitted: 14 Nov 2014 Electronic form version 1.4