Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Characterization of atomically thin layers of 1T-TaS_2[1] ADINA LUICAN-MAYER, JEFFREY R. GUEST, SAW WAI HLA, Center for Nanoscale Materials, Argonne National Lab — 1T-TaS_2 is a transition metal dichalcogenide that shows a wealth of correlated phenomena: it is metallic at higher temperatures, it has four temperature-dependent charge density wave phases with distinct structures [1]; at low temperatures it shows Mott insulator behavior and it becomes superconducting under pressure [2,3]. Due to the weak van der Waals bonding between its layers we show that it is possible, by mechanical exfoliation, to obtain atomically thin 1T-TaS_2 crystals. In this talk we address the question of how the transition from bulk to few layers affects the different phases of this material. Specifically, we discuss resistivity measurements for flakes of 1T-TaS_2 exfoliated onto the surface of Si/SiO_2 complemented by temperature-dependent Raman spectroscopy characterization.

[1] Thomson, R. E. et al. Phys. Rev. B 49,16899-16916 (1994).
[2] Fazekas, P. and Tosatti, E. Phil. Mag. B 39, 229-244 (1979).
[3] Sipos, B. et al. Nature Materials 7,960-965 (2008).

[1]This work was performed at the Center for Nanoscale Materials, a U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences User Facility under Contract No. DE-AC02-06CH11357.

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Date submitted: 15 Nov 2013 Electronic form version 1.4