Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**The local electronic structure of 1T-Ta($S_{1-x}Se_x$)$_2$ studied by scanning tunneling microscopy** XINTONG LI, PENG CAI, ZHENQI HAO, CUN YE, Tsinghua Univ, NAIZHOU WANG, XIANHUI CHEN, YAYU WANG, University of Science and Technology of China — The 1T-$TaS_2$ compound exhibits a series of complex charge density wave (CDW) transitions and an unexpected insulating ground state at low temperature. It is generally considered to be a Mott insulator, thus is a rare example of strongly correlated transition metal dichalcogenide. When a sufficient amount of S is substituted by Se, the system becomes a superconductor. The evolution of the electronic structure and CDW order across the insulator and superconductor transition has attracted much attention. In this talk, we report scanning tunneling microscopy studies of the atomic scale electronic structure of 1T-Ta($S_{1-x}Se_x$)$_2$ with varied Se contents. In pristine 1T-$TaS_2$, we observe the $\sqrt{13} \times \sqrt{13}$ commensurate CDW order at low temperature, as well as a well-defined insulating energy gap. With increasing Se content, the commensurate CDW order becomes a nearly commensurate CDW order, and a finite electron density of state appears at the Fermi level. Spectroscopic imaging reveals close correlations between the electronic density of states at various energies. We will discuss the implications of these results on the local electronic structure of doped Mott insulators and superconductors in correlated transition metal dichalcogenides.

Xintong Li
Tsinghua Univ

Date submitted: 13 Nov 2014 Electronic form version 1.4