Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Growth and properties of semi-metallic and semiconducting phases of $MoTe_2$ monolayer by molecular-beam epitaxy[1] JINGLEI CHEN, The Univ of Hong Kong, GUANYONG WANG, Shanghai Jiaotong University, YANAN TANG, Henan Normal University, JINPENG XU, The Univ of Hong Kong, XIANQI DAI, Henan Normal University, JINFENG JIA, Shanghai Jiaotong University, WINGKIN HO, MAOHAI XIE, The Univ of Hong Kong — Hexagonal (2H) and distorted octahedral (1T') phases are the two common structures of monolayer $MoTe_2$ showing, respectively, semiconducting and semi-metallic properties. The formation energies between the two structures of $MoTe_2$ are almost equal, so there is a high chance to tune the structures of $MoTe_2$ and to bring in new applications such as phase-change electronics. In this work, we report growth of both 2H and 1T' $MoTe_2$ ML by molecular-beam epitaxy (MBE) and demonstrate the tunability of the structural phases by changing the growth conditions of MBE. We present experimental and theoretical evidences showing the important role of Te surface adsorption in promoting and stabilizing the otherwise metastable 1T'-$MoTe_2$ during MBE. By scanning tunneling microscopy and spectroscopy, we also reveal quantum dot states and quantum inter-valley interference patterns in the 2H and 1T' domains, respectively.

[1]RGC(HKU9/CRF/13G), the Ministry of Science and Technology of China(2013CB921902), NSFC (11521404, 11227404), NSFC (11504334 and U1404109)

Jinglei Chen
The Univ of Hong Kong

Date submitted: 07 Jan 2017 Electronic form version 1.4