Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Development of Novel Two-dimensional Layers, Alloys and Heterostructures ZHENG LIU, School of Materials Science & Engineering, Nanyang Technological University, Singapore — The one-atom-think graphene has fantastic properties and attracted tremendous interests in these years, which opens a window towards various two-dimensional (2D) atomic layers. However, making large-size and high-quality 2D layers is still a great challenge. Using chemical vapor deposition (CVD) method, we have successfully synthesized a wide varieties of highly crystalline and large scale 2D atomic layers, including h-BN, metal dichalcogenides e.g. MoS_2, WS_2, CdS, GaSe and $MoSe_2$ which belong to the family of binary 2D materials. Ternary 2D alloys including BCN and $MoS_{2x}Se_{2(1-x)}$ are also prepared and characterized. In addition, synthesis of 2D heterostructures such as vertical and lateral graphene/h-BN, vertical and lateral TMDs are also demonstrated. Complementary to CVD grown 2D layers, 2D single-crystal (bulk) such as Phosphorene (P), WTe_2, $SnSe_2$, PtS_2, $PtSe_2$, $PdSe_2$, $WSe_{2x}Te_{2(1-x)}$, Ta_2NiS_5 and Ta_2NiSe_5 are also prepared by solid reactions. There work provide a better understanding of the atomic layered materials in terms of the synthesis, atomic structure, alloying and their physical properties. Potential applications of these 2D layers e.g. optoelectronic devices, energy device and smart coating have been explored.

Zheng Liu
Nanyang Tech Univ

Date submitted: 05 Nov 2014 Electronic form version 1.4