

2nd World Congress and Expo on

GRAPHENE & 2D MATERIALS

November 06-07, 2017 | Frankfurt, Germany



Zheng Liu

Nanyang Technological University, Singapore

CVD approach of atom-thin transition metal dichalcogenides: Synthetic strategy and case studies

The one-atom-thick crystal like graphene has fantastic properties and attracted tremendous interests in these years, which open a window to the landscape of the two-dimensional (2D) materials. There are a large variety of 2D materials beyond graphene that are to be explored. Using chemical solid reaction and chemical vapour deposition, we have successfully synthesized a wide spectrum of 2D materials (both single crystals and few layers), including: 1. Binary 2D materials: Borides (h-BN, WB), TMDs (MoS_2 , WSe_2 , MoSe_2 , WTe_2 , MoTe_2 , WSe_2 , ReS_2 , ReSe_2 , PtS_2 , PtSe_2 , PdS_2 , PdSe_2 , NbSe_2 , SnS_2 , SnSe , SnSe_2 , TiS_3 , HfSe_3 , HfTe_3 , TiSe_2 , TaTe_2 , TaSe_2), and others (InSe , In_2Se_3 , GaSe , SrSi_2 , Ta_3S_2 , BiI_3 , PbI_2), etc; 2. Ternary and multi-component 2D materials: BxCyNz , $\text{MoxW}_{1-x}\text{S}_2$, MoWTe_4 , $\text{MoS}_{2x}\text{Se}_{2(1-x)}$, $\text{WSe}_{2x}\text{Te}_{2(1-x)}$, $\text{ReS}_{2x}\text{Se}_{2(1-x)}$, Ta_2NiS_5 , Ta_2NiSe_5 , Ta_2ISe_8 , $\text{TixTa}_{1-x}\text{S}_2$, $\text{TixNb}_{1-x}\text{S}_2$, $\text{Ta}_3\text{Pd}_3\text{Te}_{14}$, NiPS_3 , FePS_3 , ZnIn_2S_4 , Ta_2SeI , V_2AlC , W_2AlC , CuIP_2S_4 , $\text{Tl}_2\text{Mn}_2\text{O}_7$; 3. Heterostructured 2D materials: Graphene/h-BN, MoS_2/WS_2 , $\text{WSe}_2/\text{MoSe}_2$; 4. Organ/Inorganic heterostructures: $\text{MoS}_2/\text{Rubrene}$, Organic Perovskite/2D. Potential applications of 2D materials have been developed, such as ultrathin high-temperature oxidation-resistant coatings 2D anisotropic electronics (FETs, resonators and photodetectors), energy harvester, lithium ion battery and catalyst and wearable devices, etc. These applications pave a promising way to the large-scale applications of 2D materials.

Biography

Zheng Liu received his B.S. degrees (2005) at Nankai University (China), and completed his Ph.D at National Center for Nanoscience and Technology (NCNST, China), working on the synthesis and energy harvest of carbon nanotubes. He then worked in Prof. Pulickel M. Ajayan and Prof. Jun Lou's groups as a joint postdoc research fellow (2010~2012) and research scientist (2012~2013) at Rice University (USA), focusing on the synthesis and applications of two-dimensional (2D) crystals, including graphene, hexagonal boron nitride (h-BN, so called "white graphene"), oxides and transition metal dichalcogenides (TMDs: MoS_2 , WS_2 , MoSe_2 etc.) He has published >130 peer-reviewed papers in top journals, including 16 papers in Nature serial journals (Nature Materials, Nature Nanotechnology and Nature Communications) and Science Advances; 21 in Nano Letters; 15 in Advanced Maters; 8 in ACS Nano, with total citations more than 11000 and H-index of 46. He was also a recipient of World Technology Award in Energy category in 2012. This award has been presented as a way to honor those in doing "the innovative work of the greatest likely long-term significance." He was awarded the prestigious Singapore NRF Fellowship and Nanyang Assistant Professorship in 2013.

z.liu@ntu.edu.sg

Notes: