

Abstract

In this talk, I will summarize the recent research on the (crystal-)phase engineering of nanomaterials in my group. It includes the first-time synthesis of hexagonal-close packed (hcp) Au nanosheets (AuSSs) on graphene oxide, the first-time synthesis of 4H hexagonal phase Au nanoribbons (NRBs), the synthesis of crystal-phase heterostructured 4H/fcc Au nanorods, and the epitaxial growth of metals with novel phases on the aforementioned Au nanostructures. In addition, the first-time synthesis of 1T'-MoS₂ and 1T'-MoSe₂ crystals have been achieved. Moreover, the phase transformation of transition metal dichalcogenide nanomaterials during our developed electrochemical Li-intercalation method will also be introduced. Interestingly, the lithiation-induced amorphization of Pd₃P₂S₈ is also achieved. Currently, my group focuses on studies of (crystal) phase-based properties and applications in catalysis, surface enhanced Raman scattering, waveguide, photothermal therapy, chemical and biosensing, clean energy etc., which we believe are unique and very important not only in fundamental studies, but also in practical applications. Importantly, the concepts crystal phase heterostructures and hetero-phase nanomaterials are proposed.

Keywords: Crystal Phase; Noble Metal Nanomaterials; Hexagonal-Close Packed; Face-Centered Cubic; Gold; Ultrathin Nanosheets; Transition Metal Dichalcogenides