Seminarankündigung

Dienstag, 13. Oktober 2015
17:15 Uhr

WSI, Seminarraum S 101

"Two-dimensional van der Waals materials: Synthesis, properties, and applications"

Chemical exfoliation of layered two-dimensional (2D) materials such as graphite and transition metal chalcogenides allow access to large quantities of atomically thin nanosheets that have properties that are distinctly different from their bulk counterparts. Although 2D materials have recently become popular, their fabrication *via* exfoliation of bulk crystals has been known for decades. For example, British chemist Brodie first exfoliated graphite into atomically thin oxidized form of graphene in 1859. In the case of layered transition metal dichalcogenides (LTMDs) such as MoS_2, WS_2, $MoSe_2$, WSe_2, etc., Canadian physicist Frindt performed seminal work in the '80s and '90s. We have revived these techniques to obtain a wide variety of chemically exfoliated 2D nanosheets and utilized these materials in wide variety of electronic and energy applications.

In this presentation, I will highlight some of our key contributions with graphene oxide (GO) and LTMD nanosheets. Specifically, I will present implementation of GO into transparent conductors of large area & flexible electronics and electrochemical devices, hermetic barriers for organic electronics, and demonstration of its unique properties such as tunable photoluminescence and interference of field emitted electrons from the edge. I will also present intriguing photoluminescence and catalytic properties of chemically exfoliated LTMDs, as well as an important role of their phase transformation that occurs in the material synthesis process. I will conclude by briefly mentioning about our recent efforts in implementing "phase-engineering" approach that we gained from the chemical exfoliation processes of LTMDs to solve an important problem of reducing high contact resistance in electronic and optoelectronic devices based on chemical vapor deposition (CVD) grown LTMDs.

Dr. Hisato Yamaguchi
Los Alamos National Laboratory,
Los Alamos, New Mexico
USA