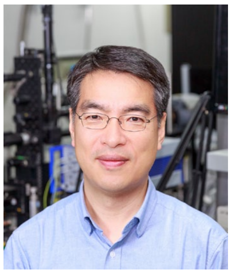
9th International Workshop on 2D Materials

Title of the Presentation: Optical spectroscopy of twisted TMD heterostructures



First Name: Hyeonsik

Last Name: Cheong

Affiliation: Department of Physics, Sogang University

Email: hcheong@sogang.ac.kr

Short Biography:

Hyeonsik Cheong received his B.S. in physics from Seoul National University in 1986 and A.M. and Ph.D. in physics from Harvard University in 1988 and 1993, respectively. After 2 years of postdoctoral fellowship at Harvard, he moved to National Renewable Energy Laboratory in Golden, Colorado, where he worked as a postdoc and a senior scientist. He joined the faculty of Sogang University in 1999, where he currently is a full professor. He served as the president of Korean Graphene Society from 2015 to 2016 and as the chair of the Applied Physics Division of the Korean Physical Society from 2016 to 2020.

Abstract:

Heterostructures of transition metal dichalcogenides (TMDs) have been extensively studied as the alignment of the bands in the constituent materials allow for manipulation of optoelectronic and transport properties. The band offset between the bands is usually the most important parameter in determining the physical properties of these structures. However, as evidenced in the so-called 'magic-angle graphene' [1], the twist angle between the crystallographic directions of the two layers is an important parameter that affect the physical properties. As the twist angle between two layers of a given set of materials is varied, the moiré periodicity changes. The additional periodicity imposed by the moiré superlattice modifies the phonon spectrum as well as the electronic band structure, and the optoelectronic properties of the HSs change systematically. Furthermore, at very small twist angles, atomic-scale lattice reconstruction [2] has been observed and should be accounted for in describing the physical properties of heterostructures. In this talk, I will present some of the latest experimental data on the phonon spectra and the band structures from twisted heterostructures of different combination of TMDs.

[1] Cao Y., et al., Nature (2018); 556, 43; Ibid. 80.
[2]Yoo H., et al., Nature Materials (2019), 18, 448.