7th International Workshop on 2D Materials

Title of the Presentation: Raman Spectroscopy for 2D Materials Research

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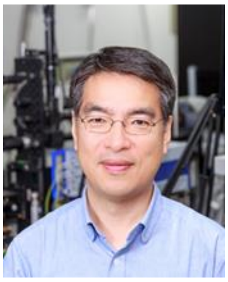

Short Biography:

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 the 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:

Raman spectroscopy is one of the most widely used tools in the studies of 2-dimensional layered materials. It is used to determine the number of layers or other physical properties. In the case of graphene, the line shape and the position of the 2D band depend on the excitation energy due to the inter-valley double resonance scattering and can be used to determine the number of layers and the stacking order. In the case of transition metal dichalcogenides, the Raman spectrum varies greatly depending on the excitation energy, and many unusual effects have been reported. The Raman intensities of high-frequency intra-layer vibration modes are enhanced near resonance with exciton states. Some Raman peaks that are either forbidden or weak in non-resonant cases show strong enhancement near resonances. In the low-frequency Raman spectra, some unusual features, in addition to shear and breathing modes, appear near resonance with exciton states. Some intra-layer vibration modes exhibit Davydov splitting due to inter-layer interactions when the excitation energy is close to resonances. Recently, Raman spectroscopy is used to study magnetic ordering in 2D van der Waals magnetic materials. Some Raman features show an excellent correlation with the magnetic susceptibility changes and can be used as indicators of magnetic transitions.

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[3] J. Kim, J.-U. Lee and H Cheong, J. Phys.: Condens. Matter **32**, 343001 (2020).