IBS CINAP Seminar

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van der Waals gap tunneling spectroscopy For low dimensional materials

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Abstract

Field-effect transistors based on low-dimensional materials such as carbon nanotubes (CNTs), graphene, and transition metal dichalcogenides have been developed in order to provide enhanced electronic performance, with significant efforts to overcome the van der Waals (vdW) gap between the metal and inert material components. We report a new method that offers a high resolution tunneling spectroscopy by adopting tunnel barrier as the vdW interface indium (In) metal and low-dimensional nano-structures without an artificial insulating tunnel barrier. We show that multiple differential conductance peaks for varying bias voltages correspond to the van Hove singularities existing in the electronic density of states of CNTs. For the multi-layer MoS_2 FET, conductance shoulders were observed at the source-drain voltage (Vsd) of ~0.9 V and were attributed to a semiconducting gap. For the 1T-TaS_2 case, Mottgap induced conductance peaks at Vsd ~ 0.2 V were observed at T = 4 K, which coexist with the commensurate charge-density-wave phase.

Biography

Mr. Donghwan Choi completed his bachelor's and master's degree at Chonbuk National University in 2013 and 2015. He is scheduled to complete his doctorate at Chonbuk National University in August 2019. He also worked as a research assistant at the Korea Research Institute of Standards and Science (KRISS) during his Ph.D.

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