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Understanding the unique electronic properties of nanostructures using photoemission theory

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Experimental techniques such as nano-ARPES are expected to provide an opportunity to measure the electronic properties of disordered nanomaterials directly. However, the interpretation of the spectra is not quite simple as it contains complicated quantum mechanical effects related to the measurement process itself. In this talk, I would like to demonstrate a novel approach that can overcome this conundrum by corroborating the experimental results with an adequate simulation. Ab. initio calculation on arbitrarily shaped or chemically ornamented nanostructures is elaborately correlated to the photoemission theory, a method also known as independent atomic center approximation (IAC). This correlation can be directly exploited to interpret the experimental results. To test this study, a direct comparison was made between the calculation results and experimental results on pentacene molecule and highly oriented pyrolytic graphite (HOPG). As a general extension, the unique electronic structures of nano-sized graphene oxide and features from the experimental result of black phosphorous (BP) are disclosed for the first time as supportive evidence for the usefulness of this method. This work opens an unprecedented approach to intuitive and practical understanding of the electronic properties of disordered nanomaterials.

Biography

Soonnam Kwon is a Staff Scientist of PAL-XFEL division group, Pohang University of Science and Technology has obtained his PhD degree from the Department of Physics, Yonsei University in 2001. He has worked in Daewoo Advanced Institute of Technology as a Principal Researcher until 2005, where he concentrated on organic materials characterization for use in OLED.

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