IBS Seminar

FAST MASS TRANSPORT UNDER GRAPHITIC NANOCONFINEMENT

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- PLACE: Research Bldg. 1, #112, POSTECH
- HOST: Prof. Kimoon Kim, Dr. Kangkyun Baek

Fast mass transport inside and across nanoscale graphitic surfaces such as carbon nanotubes and graphene, respectively, forms the basis of Carbon Nanofluidic phenomena and poses potential applications in energy and clean technologies. This talk will review the existing paradigm of the fast transport in carbon nanotube conduits with a proposal of a new scaling relation to answer a question, "how fast is fast?", followed by our story of shifting the paradigm with a recognition that *having a nearly frictionless channel could be equivalent to having no channel but only openings*. Synthesis, transfer, perforation and device integration of graphene enable altogether to prepare an atomically thin porous membrane for the embodiment of this new concept. Transport physics across the 2D pores points to an ultimate permeation of fluids (both in molecular and viscous transport regimes) as well as emergence of a high-permeation membrane. The high-permeation membranes are in need of proper applications in membrane technology, for which this talk introduces our active endeavors of utilizing the porous graphene and imposing substantial selectivity to it. The talk ends with a brief overview and outlook of my faculty research portfolio, *Nanoscience for Energy Technology and Sustainability*.

Hyung Gyu Park is a tenured, Associate Professor of Nanoscience for Energy Technology and Sustainability in the Department of Mechanical and Process Engineering at Swiss Federal Institute of Technology (ETH) Zurich. He received B.S. and M.S. in Mechanical Engineering from Seoul National University, Seoul, Korea, in 1998 and 2000, respectively. Following, he received Ph.D. from University of California at Berkeley, CA, U.S.A., by carrying out research projects in collaboration with Lawrence Livermore National Laboratory (LLNL), CA, U.S.A.: (a) development of micro fuel-cell system and (b) mass transport phenomena in carbon nanotubes.

After further academic training at LLNL as a postdoctoral research staff member, he joined ETH Zurich in 2009. His research interest at ETH Zurich encompasses syntheses of carbon nanomaterials and 2D material, fundamental transport physics at nanometer scale, nanomanufacturing towards multiscale integration, and nanotechnology solutions for our sustainable growth such as addressing energy and water sustainability issues. He received R&D Magazine 2010 R&D 100 Award and Editor's Choice Award, U.S.A., in recognition of his contribution to "Ultrapermeable Carbon Nanotube Membranes". He holds senior adjunct researcher position at Eawag (Swiss Federal Institute of Aquatic Science and Technology), Switzerland, and adjunct professorship at KAIST (Korean Advanced Institute of Science and Technology, Graduate School of Energy, Environment, Water and Sustainability), visiting professorship at Sungkyunkwan University (Department of Energy Science), and KNRF (Brain Pool) supported guest professorship at Seoul National University (Department of Mechanical and Aerospace Engineering).

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