Development of Universal Transfer Technique for Large Area 2-Dimensional Materials onto Target Substrates

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Abstract
Transfer and integration of nanostructures onto desirable substrates is the prerequisite for their fundamental studies and practical applications. Conventional transfer techniques involving stamping, lift-off and/or striping are greatly limited by the process-specific shortcomings, including the requirement for chemical etchant or high-temperature annealing and the introduction of surface discontinuity and/or contamination that can greatly deteriorate the intrinsic properties of the transferred materials. We have developed a universal transfer method implementable at mild conditions to transfer large area 2-Dimensional (2D) materials grown by chemical vapor deposition method onto various substrates. This technique not only allows the effective transfer to an arbitrary target substrate with a high degree of freedom, but also avoids PMMA etching thereby maintaining the high quality of the transferred 2D materials with minimum contamination. We applied this method to transfer various 2D materials grown on different rigid substrates of general interest, such as graphene on copper foil, bilayer graphene on platinum, h-BN on platinum, MoS$_2$ on SiO$_2$/Si, MAXenes. We believe that our method can facilitate the development of nanoelectronics by accelerating the clean transfer and integration of low-dimensional materials into multidimensional structures.

Short Biography
Following 20 years of extensive research experiences in solid-state physics and nanotechnology at UK and USA based universities, Prof. Kang moved to Sungkyunkwan University (SKKU), Korea in 2005. He is the head of physics department, the director of Brain Korea 21 program, as well as the chair of the natural science sector of university college, SKKU, playing a key role in securing numerous government grants. He has published more than 210 SCI peer-reviewed SCI articles in the top journals including Nature Nanotechnology, Nano Letters, Advanced Materials, Advanced Functional Materials, ACS Nano etc and several book chapters in solid-state physics and nanotechnology area covering from nanofabrication to materials synthesis and to device physics. The quality of his work can be easily indicated by his H-index of 42. He has served as an editorial board member for several internationally renowned scientific journals including IOP journal “Nanotechnology” as a section editor and as Editor-in-Chief for “Current Nanoscience” over many years.