Plasma-enhanced chemical vapor deposition of few-layer graphene on copper foils from greenhouse CO2 gas

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Emission of carbon-containing greenhouse gases particularly carbon dioxide (CO2) is currently one of the most important environmental problems in the world. Various means have been developed and applied to reduce greenhouse gases towards net-zero carbon society. A promising approach is to capture and utilize them as sources for production of high-value nanocarbon materials, especially graphene. However, it is difficult to directly convert CO2 into nanocarbon because of the high chemical bonding energy of CO2. Plasma-enhanced chemical vapor deposition (PECVD) can be a solution to this challenging issue. In this research, direct growth of graphene on copper foils is demonstrated. The influence of plasma power, temperature and time on graphene growth are systematically studied. Characterization results using Raman spectroscopy, transmission electron microscopy show that few-layer graphene with good quality can only be grown on Cu foil under some specific growth conditions. In addition, graphene grown on Cu foil can lower the electrical sheet resistance and allow Cu to be used at higher working temperature.

Biography:

Anurat Wisitsoraat received the B.Eng. degree in electrical engineering from Chulalongkorn University, Bangkok, Thailand, in 2002, and the M.S. and Ph.D. degrees from Vanderbilt University, Nashville, TN, U.S.A., in 1997 and 1993, respectively. He is currently a Principal Researcher with the Nanoelectronics and MEMS Laboratory, National Electronics and Computer Technology Center (NECTEC). He has authored more than 200 ISI-indexed journal papers and holds more than 30 patents. His research interests include nanomaterial synthesis, such as graphene, CNTs and metal oxide nanostructures, micro/nanoelectronic fabrication, gas/chemical/bio sensors, and micro/nano electromechanical systems (MEMS).