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Domain Size and Density in Graphene Grown with Different CVD Growth

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Graphene is a two-dimensional carbon material whose structure is one-atom-thick planar sheet of sp2-bonded carbon atoms densely packed in a honeycomb crystal lattice. It has drawn significant attention with its distinguished structural and electrical properties. Extremely high mobility and a tunable band gap make graphene potentially useful for innovative approaches to electronics. Although mechanical exfoliation of graphite and decomposition of SiC surfaces upon thermal treatment have been the main method for graphene, they have some limitations in quality and scalability of as-produced graphene films. Solution-phase and solvothermal syntheses of graphene achieved a major improvement for processing, however for device fabrication, a reproducible method such as chemical vapor deposition (CVD) growth yielding high quality films of controlled thickness is required. In this research, we synthesized hexagonal graphene flakes on Cu foils by CVD method and controlled its coverage, density and the size of graphene domains by changing reaction parameters. It is important to control these parameters of graphene growth during synthesis in order to achieve tunable properties and optimized device performance.

Keywords: Graphene

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Epitaxial Growth of Polyurea Film by Molecular Layer Deposition

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Molecular layer deposition (MLD) is sequential, self-limiting surface reaction to form conformal and ultrathin polymer film. This technique generally uses bifunctional precursors for stepwise sequential surface reaction and entirely organic polymer films. Also, in comparison with solution-based technique, because MLD is vapor-phase deposition based on ALD, it allows epitaxial growth of molecular layer on substrate and is especially good for surface reaction or coating of nanostructure such as nanopore, nanochannel, nanwire array and so on. In this study, polyurea film that consisted of phenylenediisocyanate and phenylenediamine was formed by MLD technique. In situ Fourier Transform Infrared (FTIR) measurement on high surface area SiO2 substrate was used to monitor the growth of polyurethane and polyurea film. Also, to investigate orientation of chemical bonding formed polymer film, plan-polarized grazing angle FTIR spectroscopy was used and it showed epitaxial growth and uniform orientation of chemical bones of polyurea films.

Keywords: molecular layer deposition, polyurea