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Heterogeneous Catalysis on Defect-Engineered Graphene[1] M. SAMY EL-SHALL, Virginia Commonwealth University — Graphene has attracted great interest for a fundamental understanding of its unique structural and electronic properties and also for important potential applications in nanoelectronics and devices. The combination of thermal, chemical and mechanical stability with the high surface area offers many interesting applications in a wide range of fields including heterogeneous catalysis where metallic and bimetallic nanoparticle catalysts can be efficiently dispersed on the graphene sheets. We have developed facile and scalable chemical and laser reduction methods for the synthesis of defect-engineered graphene, as well as metal and semiconductor nanoparticles dispersed on graphene. We recently discovered a remarkable catalytic activity of metal nanoparticles supported on defect-engineered graphene in a variety of chemical transformation including carbon-carbon cross coupling reactions and Fischer-Tropsch Synthesis of long chain liquid hydrocarbons. The results demonstrate the role of the defect sites on the graphene surface in providing favorable nucleation sites for the selective deposition of the metal nanoparticles and as a result, play a major role in imparting exceptional catalytic properties.

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