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### **A Journey to Chemical Synthesis of Graphene and Its Applications**

Graphene, as the mother of all other graphitic carbons, has triggered intensive research work in the last few years since this one-atom-thick hexagonal carbon sheet possesses unique 2D morphology and many intriguing physical properties. Nevertheless, the future research on graphene and carbon materials calls for the efficient chemical synthesis and processing. Bottom-up approach renders the synthesis of well-defined graphenes and carbon materials with tailorable properties at the molecular level. This strategy allows for fine control of graphene size, shape and component at defined position. Further, feasible processibility and tunable self-assembly properties make the molecular graphenes promising for organic electronics and for building up carbonaceous materials with unique architectures and functions. Top-down fabrication of graphenes relies on smart processing of materials at the different thickness level, both in solution and on a surface. Rational assembly of graphene sheets offers the fabrication of carbon and related composite materials with different complexities ranging from 1D, 2D to 3D. Prominent applications have been achieved with using these graphene materials as well as their carbon-metal nanocomposite across the fields of organic electronics, transparent electrode, catalysis, sensing, supercapacitors and batteries.

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