Chemical reduction of aqueous suspension of graphene oxide by nascent hydrogen

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Graphene –a single layer of sp2–hybridized carbon atoms –is now well known for its excellent mechanical, thermal and electrical properties and possible applications in various fields. Up–to–date, various effective techniques have been developed for producing graphene including micromechanical exfoliation, epitaxial growth, chemical vapor deposition and chemical synthesis. Although relatively few methods for preparing graphene on large scales have been demonstrated, one of the most promising is based on the chemical reduction of graphene oxide. Typically, strong reductants such as hydrazine, sodium borohydride and hydroiodic acid are used to transform aqueous dispersions of graphene oxide into a chemical converted graphene. However, a persistent challenge surrounding these methodologies is achieving high extents of reduction. In this study, we report a green, fast and highly–effective method to reduce aqueous suspension of graphene oxide by nascent hydrogen in–situ generated from reaction between diluted acid or base and amphoteric metals such as aluminum and zinc.