

Nearly perfect reduction of graphene oxide using catalysts

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Abstract

Even though an efficient reduction method to obtain high-quality graphene sheets from mass-producible graphene oxide is critical for practical applications, the solid solution for this has not been reported. Here, we introduce an efficient reduction mechanism of graphene oxide by utilizing a catalyst, which allows for high-quality reduced graphene oxide sheets in a gram scale. TGA-mass data revealed that GO with catalysts released much less carbon-containing gases such as carbon monoxide, carbon dioxide, hydrocarbon gas during the reduction process, implying this process greatly suppresses carbon-loss of graphene oxide, leading to much reduced defects in reduced graphene oxide sheets. As a result, an average domain size and density of defect of CA-rGO are 4 times larger and 0.1 time lower than that for chemically reduced graphene oxide, respectively.

Figures

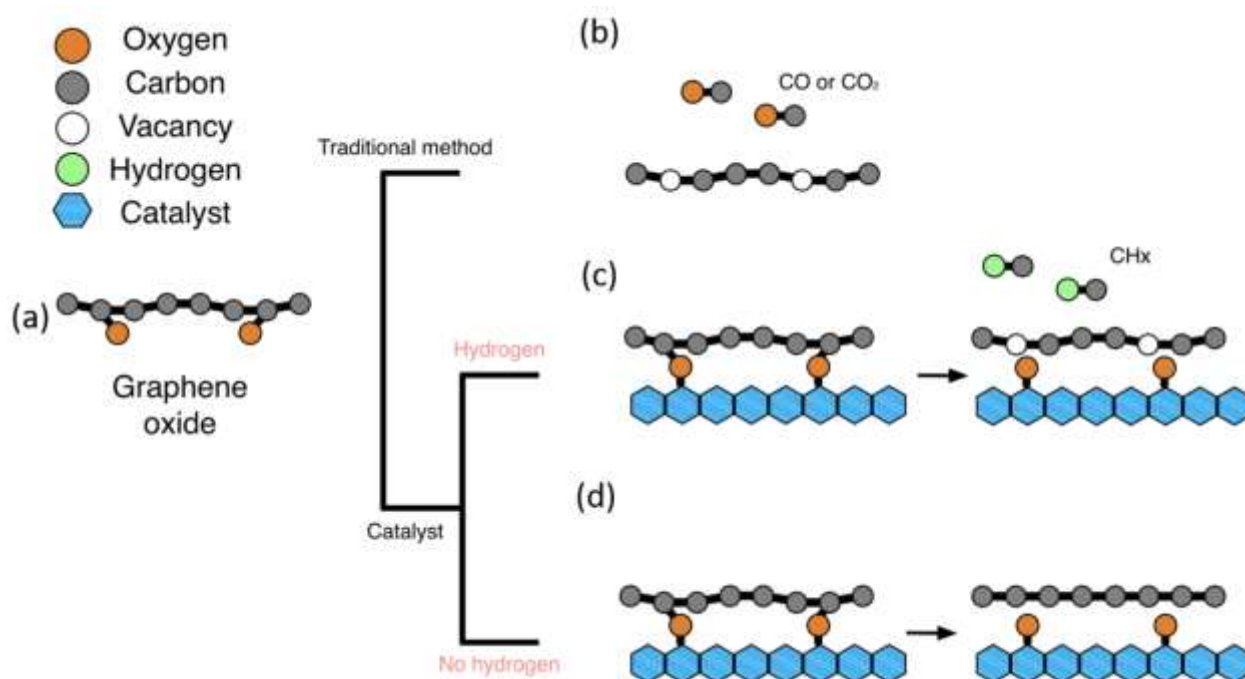


Figure 1 Schematic illustration of graphene oxide, reduction process of graphene oxide via traditional methods such as thermal and chemical treatment (b); the reduction process using catalyst with (c), and without hydrogen (d)