**Synthesis of Graphdiyne Nanowalls using Glaser-Hay Coupling Reaction**

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Graphyne refers to a family of carbon allotropes composed of only sp- and $sp^2$- hybridized carbon atoms in a two-dimensional plane[1]. There are many different predicted structures in this family and some of them are envisioned to have novel electronic band structure and even expected as competitors for graphene.[2] Specifically, graphdiyne is a certain one containing hexagonal benzene rings connected by diacetylenic linkages. With highly conjugated structure, remarkable electronic properties, uniformly distributed pores and distinct optical properties, graphdiyne is predicted to be promising in applications of semiconductor devices, electrode materials, hydrogen storage, gas separation, high third-order nonlinear optical (NLO) susceptibility material, and so on.

Synthesizing graphdiyne with well-defined structures and distinct properties is of great importance and challenge. Herein we demonstrate the synthesis of a novel structure of graphdiyne, graphdiyne nanowalls, using a modified Glaser-Hay coupling reaction[3]. Raman spectra, UV-Vis spectra and HRTEM results confirmed the feature of graphdiyne. Layered and continuous nano-sheets were obtained through mechanical exfoliation method. Due to highly conjugated structure and uniformly distributed sharp walls, graphdiyne nanowalls exhibited excellent and stable field emission properties. Next, we would devote to making clear some basic properties of this rising carbon material.

[1] Baughman, R. H., Eckhardt H., Kertesz M. J. Chem. Phys. **87**(1987) 6687.
[2] Malko, D.; Neiss, C.; Viñes, F.; Görling, A. PRL **108**(2012) 086804.
[3] JY Zhou, X Gao, R Liu, ZQ Xie, J Yang, SQ Zhang, GM Zhang, HB Liu, YL Li, Jin Zhang, ZF Liu J. Am. Chem. Soc. **137**(2015) 7596.