PULSUS
WWW.PULSUS.COM
Nanotechnology Letters
2020
Vol.5 No.4

2D Graphdiyne Materials: From Foundation to Applications

Yurui Xue, Yuliang Li*
Institute of Chemistry, Chinese Academy of Sciences, P.R. China

Abstract

Graphdiyne (GDY) is a promising carbon allotrope comprising of sp- and sp2-hybridized carbon atoms in a 2D all-carbon network. Due to the presence of sp-hybridized carbon atoms, it exhibits many unique properties including electronic structure (band gap), optical property, high chemical activity and good physical stability. Compared with other carbon materials, GDY has good controllability in terms of its structure and preparation. The character of GDY allows the production of well-defined morphologies, such as nanowires, nanotubes, nanowalls, ordered stripe arrays, and 3D framework. Crystalline GDY was successfully synthesized and characterized by using low-voltage and low-current density transmission electron microscope (TEM). The experimental and theoretical results prove that the few-layer GDY is in the ABC stacking mode.

As a new carbon allotrope, GDY has already exhibited great potentials in many fields, such as atom catalysts, lithium-ion batteries (LIBs), solar cells, electrochemical actuators, electronic devices, detectors, and water purification. For example, a new actuation mechanism based on the alkene–alkyne complex transition effect of GDY was proposed. The transduction efficiency was six times higher than that with common materials, and the energy density was comparable to that of mammalian skeletal muscle. Moreover, using GDY as a supporting material, our group synthesized the first zero-valent meal atom catalysts (ACs) with excellent catalytic activity and stability. Compared with the traditional single atom catalysts, ACs possess well-defined chemical/electronic structures and known valence states. This sheds light on our understanding of the atomic catalysis and acceleration in the development of efficient and selective catalysts.

Biography:

Prof. Yuliang Li, a professor at ICCAS and academician of Chinese Academy of Sciences. His research interests lie in the fields on design and synthesis of functional molecules, self-assembly methodologies of low dimension and large size molecular aggregations structures, chemistry of carbon and carbon-rich material, with particular focus on the design and synthesis of photo-, electro-active organic–inorganic hybrid materials and nanoscale and nano-structural materials.

1. Rapid colorimetric detection of arsenic (III) by glutathione functionalized gold nanoparticles based on RGB extracting system; January 2021Optics & Laser Technology 133:106522; DOI: 10.1016/j.optlastec.2020.106522
2. Graphdiyne-templated palladium-nanoparticle assembly as a robust oxygen generator to attenuate tumor hypoxia; October 2020Nano Today 34:100907; DOI: 10.1016/j.nantod.2020.100907
3. Loading Copper Atoms on Graphdiyne for Highly Efficient Hydrogen Production; August 2020ChemPhysChem; DOI: 10.1002/cphc.202000579

21st Edition of International Conference on Materials Science and Engineering; August 03-04, 2020; London, UK

Abstract Citation: Yuliang Li, *2D Graphdiyne Materials: From Foundation to Applications*, Materials Conference 2020, 21st Edition of International Conference on Materials Science and Engineering; August 03-04, 2020; London, UK