

Free Full Text from Publisher



Export ▾

Add To Marked List

&lt; 1 of 2 &gt;

## A short review on electrochemical exfoliation of graphene and graphene quantum dots

By: [Danial, WH](#) (Danial, Wan Hazman) <sup>1</sup>; [Norhisham, NA](#) (Norhisham, Noriliya Aina) <sup>1</sup>; [Noorden, AFA](#) (Ahmad Noorden, Ahmad Fakhrurrazi) <sup>2</sup>; [Majid, ZA](#) (Abdul Majid, Zaiton) <sup>3</sup>; [Matsumura, K](#) (Matsumura, Kazunari) <sup>4</sup>; [Iqbal, A](#) (Iqbal, Anwar) <sup>5</sup>

[View Web of Science ResearcherID and ORCID](#) (provided by Clarivate)

### CARBON LETTERS

Volume: 31 Issue: 3 Page: 371-388

DOI: 10.1007/s42823-020-00212-3

Published: JUN 2021

Early Access: JAN 2021

Document Type: Review

### Abstract

The synthesis of graphene and graphene quantum dots (GQDs) employing various approaches with a range of precursors, chemicals, and parameters has been reported. Most of the top-down and bottom-up techniques employ strong and hazardous chemical environments, complicated and tedious procedures, are time-consuming, and often require special equipment. Another drawback of the techniques reported is the production of agglomerated, inhomogeneous, and non-dispersible graphene in aqueous solvents or organic solvents, thus limiting its application. This work specifically and comprehensively describes the electrochemical exfoliation of graphene and GQDs, which is often considered as a simple one-step, facile, non-hazardous, and highly efficient technique yet favourable for mass production. A brief discussion on the advantageous and challenges of the electrochemical technique and applications of the electrochemically exfoliated graphene and GQDs is also presented.

### Keywords

**Author Keywords:** Electrochemical; Exfoliation; Graphene; Graphene quantum dots

**Keywords Plus:** FACILE SYNTHESIS; GRAPHITE; OXIDE; YIELD; WATER; SUPERCAPACITOR; DISPERSION; EXPANSION; SHEETS; SENSOR

### Author Information

**Corresponding Address:** Danial, Wan Hazman (corresponding author)

▼ Int Islamic Univ Malaysia, Dept Chem, Kulliyah Sci, Kuantan 25200, Pahang, Malaysia

#### Addresses:

▼ <sup>1</sup> Int Islamic Univ Malaysia, Dept Chem, Kulliyah Sci, Kuantan 25200, Pahang, Malaysia

▼ <sup>2</sup> Int Islamic Univ Malaysia, Dept Phys, Kulliyah Sci, Adv Optoelect Res Grp CAPTOR, Kuantan 25200, Pahang, Malaysia

▼ <sup>3</sup> Univ Teknol Malaysia, Dept Chem, Fac Sci, Utm Johor Bahru 81310, Johor, Malaysia

▲ <sup>4</sup> Shibaura Inst Technol, Dept Mat Sci & Engr, Koto Ku, 3-7-5 Toyosu, Tokyo 1358548, Japan

#### Affiliation

Shibaura Institute of Technology

▼ <sup>5</sup> Univ Sains Malaysia, Sch Chem Sci, Gelugor 11800, Penang, Malaysia

**E-mail Addresses:** [whazman@iium.edu.my](mailto:whazman@iium.edu.my)

### Categories/Classification

**Research Areas:** Chemistry; Materials Science

### Funding

Funding agency	Grant number
Fundamental Research Grant Scheme, Ministry of Higher Education (MOHE), Malaysia	FRGS/1/2018/STG01/UIAM/03/2 (FRGS19-015-0623)
Department of Chemistry, Kulliyah of Science, International Islamic University Malaysia	

Funding agency

[View funding text](#)

+ [See more data fields](#)

## Citation Network

In Web of Science Core Collection

# 1

Citation

[Create citation alert](#)

### All Citations

1 In All Databases

+ [See more citations](#)

### Cited References

# 85

[View Related Records](#)

### You may also like...

[Kharangarh, PR; Umapathy, S; Singh, G; Investigation of sulfur related defects in graphene quantum dots for tuning photoluminescence and high quantum yield APPLIED SURFACE SCIENCE](#)

[Zhu, SJ; Zhang, JH; Yang, B; et al. Fluorescent Nanocomposite Based on PVA Polymer Dots ACTA CHIMICA SINICA](#)

[Abdelkader, AM; Patten, HV; Kinloch, IA; et al. Electrochemical exfoliation of graphite in quaternary ammonium-based deep eutectic solvents: a route for the mass production of graphene NANOSCALE](#)

[Arvand, M; Hemmati, S; Magnetic nanoparticles embedded with graphene quantum dots and multiwalled carbon nanotubes as a sensing platform for electrochemical detection of progesterone SENSORS AND ACTUATORS B-CHEMICAL](#)

[Huang, DP; Zhou, HF; Hu, JF; et al. Bottom-up synthesis and structural design strategy for graphene quantum dots with tunable emission to the near infrared region CARBON](#)

[See all](#)

### Most Recently Cited by

[Danial, WH; Mohamed, NAS; Majid, ZA; Recent advances on the preparation and application of graphene quantum dots for mercury detection: a systematic review CARBON LETTERS](#)



Journal information

CARBON LETTERS

ISSN: 1976-4251

eISSN: 2233-4998

Current Publisher: SPRINGER JAPAN KK, SHIROYAMA TRUST TOWER 5F, 4-3-1 TORANOMON, MINATO-KU, TOKYO 105-6005, JAPAN

Journal Impact Factor: Journal Citation Report™

Research Areas: Chemistry; Materials Science

Web of Science Categories: Chemistry, Multidisciplinary; Materials Science, Multidisciplinary

1.917

Journal Impact Factor™ (2020)

Use in Web of Science

Web of Science Usage Count

17

Last 180 Days

[Learn more](#)

29

Since 2013

This record is from:

Web of Science Core Collection

Science Citation Index Expanded (SCI-EXPANDED)

Suggest a correction

If you would like to improve the quality of the data in this record, please [Suggest a correction](#)

85 Cited References

Showing 30 of 85

[View as set of results](#)

(from Web of Science Core Collection)

[Empty citation list area]



Five empty rectangular boxes stacked vertically, likely for a table of contents or a list of items.

© 2021 Clarivate  
Training Portal  
Product Support

Data Correction  
Privacy Statement  
Newsletter

Copyright Notice  
Cookie Policy  
Terms of Use

Follow Us  
 