

The Global Market for Graphene Quantum Dots

<https://marketpublishers.com/r/GA808AA3A6CEN.html>

Date: December 2020

Pages: 47

Price: US\$ 550.00 (Single User License)

ID: GA808AA3A6CEN

Abstracts

Graphene quantum dots (GQDs) represent relatively new members of the carbon nanomaterials family. Studies have demonstrated that quantum confinement could appear in graphene with finite size and edge effects-graphene quantum dots (GQDs). GQDs display properties derived from both graphene and quantum dots (QDs), combining the structure of graphene with the edge effects, non-zero band gap, and quantum confinement effects of QDs. They possess unique optical and electrical properties such as:

high quantum yield

high electrical conductivity

high thermal conductivity

excellent photostability

biocompatibility

superior stability compared to non-carbon QDs.

highly tunable photoluminescence (PL)

electrochemiluminescence

exceptional multi-photon excitation (up-conversion) property

ease of functionalization

low-toxicity.

As a result, they are being widely investigated for applications in optoelectronics, photonics, biomedicine, energy storage and conversion, anti-counterfeiting and sensors.

Report contents include:

Properties of graphene quantum dots (GQDs).

Comparison to quantum dots.

Synthesis and production assessment.

Applications of graphene quantum dots (GQDs).

Addressable markets for graphene quantum dots (GQDs) including Optoelectronics, Photonics, Energy storage and conversion, Biomedicine and life sciences and Anti-counterfeiting.

Global revenues estimated to 2030 by market.

Market and technology challenges for graphene quantum dots (GQDs).

Pricing.

Company profiles including Dotz Nano Ltd., Green Science Alliance Co., Ltd., Quantuag Nanotechnologies and Qurv Technologies.

Contents

1 OVERVIEW OF GRAPHENE

- 1.1 History
- 1.2 Types of graphene
- 1.3 Properties

2 OVERVIEW OF QUANTUM DOTS

- 2.1 Properties
- 2.2 Synthesis
- 2.3 Types
 - 2.3.1 Cadmium Selenide, Cadmium Sulfide and other materials
 - 2.3.2 Cadmium free quantum dots
- 2.4 Carbon quantum dots (CDs)
 - 2.4.1 Properties
 - 2.4.2 Applications
- 2.5 Perovskite quantum dots (PQDs)
 - 2.5.1 Properties
 - 2.5.2 Comparison to conventional quantum dots
 - 2.5.3 Synthesis methods
 - 2.5.4 Applications
 - 2.5.4.1 Displays

3 GRAPHENE QUANTUM DOTS

- 3.1 Composition
- 3.2 Comparison to quantum dots
- 3.3 Properties
- 3.4 Synthesis
 - 3.4.1 Top-down method
 - 3.4.2 Bottom-up method
 - 3.4.3 Comparison of synthesis methods
- 3.5 Applications

4 MARKETS FOR GRAPHENE QUANTUM DOTS

- 4.1 Electronics and photonics

4.2 Energy storage and conversion

4.3 Sensors

4.4 Biomedicine and life sciences

4.5 Anti-counterfeiting

5 MARKET AND TECHNOLOGY CHALLENGES

6 TECHNOLOGY READINESS LEVEL (TRL)

7 PRODUCTION OF GRAPHENE QUANTUM DOTS

7.1 Current and projected revenues

7.2 Pricing

8 GRAPHENE QUANTUM DOTS PRODUCER PROFILES.

9 REFERENCES

Tables

TABLES

Table 1: Properties of graphene, properties of competing materials, applications thereof.

Table 2: Chemical synthesis of quantum dots.

Table 3: Applications of carbon quantum dots.

Table 4. Comparative properties of conventional QDs and Perovskite QDs.

Table 5. Applications of perovskite QDs.

Table 6. Development roadmap for perovskite QDs.

Table 7. Properties of perovskite QLEDs comparative to OLED and QLED.

Table 8. Comparison of graphene QDs and semiconductor QDs.

Table 9. Advantages and disadvantages of methods for preparing GQDs.

Table 10. Applications of graphene quantum dots.

Table 11. Markets and applications for graphene quantum dots in electronics and photonics.

Table 12. Markets and applications for graphene quantum dots in energy storage and conversion.

Table 12. Markets and applications for graphene quantum dots in sensors.

Table 12. Markets and applications for graphene quantum dots in biomedicine and life sciences.

Table 13. Markets and applications for graphene quantum dots in electronics.

Table 14. Market and technology challenges for graphene quantum dots.

Table 15. Prices for graphene quantum dots.

Figures

FIGURES

Figure 1: Graphene layer structure schematic.

Figure 2: Illustrative procedure of the Scotch-tape based micromechanical cleavage of HOPG.

Figure 3: Graphite and graphene.

Figure 4: Graphene and its descendants: top right: graphene; top left: graphite = stacked graphene; bottom right: nanotube=rolled graphene; bottom left: fullerene=wrapped graphene.

Figure 5: Quantum dot schematic.

Figure 6. Quantum dot size and colour.

Figure 7. Carbon dots development.

Figure 8. A pQLED device structure.

Figure 9: Perovskite quantum dots under UV light.

Figure 10: Green-fluorescing graphene quantum dots.

Figure 11. Schematic of (a) CQDs and (c) GQDs. HRTEM images of (b) C-dots and (d) GQDs showing combination of zigzag and armchair edges (positions marked as 1–4).

Figure 12. Graphene quantum dots.

Figure 13. Top-down and bottom-up methods.

Figure 14: TRL for graphene quantum dots.

Figure 15. Revenues for graphene quantum dots 2019-2030, millions USD

Figure 16. Dotz Nano GQD products.

Figure 17. InP/ZnS, perovskite quantum dots and silicon resin composite under UV illumination.

Figure 18. Quantag GQDs and sensor.

I would like to order

Product name: The Global Market for Graphene Quantum Dots

Product link: <https://marketpublishers.com/r/GA808AA3A6CEN.html>

Price: US\$ 550.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/GA808AA3A6CEN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

****All fields are required**

Customer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970