

The Global Market for Graphene Quantum Dots (GQDs)

Table of contents

1	Executive summary.....	6
1.1	Markets.....	6
2	Research methodology.....	8
3	The Global Market for Graphene Quantum Dots.....	9
3.1	Properties.....	10
3.2	Synthesis.....	12
3.3	Applications.....	13
4	End user markets.....	15
4.1	Optoelectronics.....	16
4.2	Photodetectors.....	17
4.3	Sensors.....	17
4.4	Quantum computing.....	18
4.5	Batteries and supercapacitors.....	18
4.6	Fuel cells.....	19
4.7	Photovoltaics.....	19
4.8	Lighting (OLED).....	20
4.9	Biomedicine and life sciences.....	20
4.10	Catalysis.....	21
4.11	Printing.....	22
4.12	Anti-counterfeiting.....	22
4.13	Detergents.....	23
5	Market and technology challenges.....	24

6	Roadmap.....	25
7	Production of graphene quantum dots.....	27
• 7.1	Current and projected volumes.....	27
• 7.2	Prices.....	28
8	Producer profiles.....	30
9	References.....	33

Tables

Table 1. Market snapshot for Graphene Quantum Dots (GQDs).....	6
Table 2. Addressable markets and applications for Graphene Quantum Dots (GQDs).....	7
Table 3. Comparison of graphene QDs and semiconductor QDs.....	10
Table 4. Synthesis routes for graphene quantum dots.....	12
Table 5. Markets and applications of Graphene Quantum Dots (GQDs).....	14

Figures

Figure 1: 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).....	11
Figure 2. Graphene quantum dots.....	11
Figure 3: Green-fluorescing graphene quantum dots.....	16
Figure 4. Roadmap for graphene quantum dots.....	25
Figure 5. Production of graphene quantum dots.....	27