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The Global Market for Carbon Nanomaterials in Energy Storage 2022-2032

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Abstracts

With global energy demands ever increasing, allied to efforts to reduce the use of fossil fuel and eliminate air pollutions, it is now essential to provide efficient, cost-effective, and environmental friendly energy storage devices. The growing market for smart grit networks, electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) is also driving the market for improving the energy density of rechargeable batteries.

Rechargeable battery technologies (such as Li-ion, Li-S, Na-ion, Li-O2 batteries) and supercapacitors are among the most promising power storage and supply systems in terms of their widespread applicability, and tremendous potential owing to their high energy and power densities. LIBs are currently the dominant mobile power sources for portable electronic devices used in cell phones and laptops.

Although great advances have been made, each type of battery still suffers from problems that seriously hinder the practical applications for example in commercial EVs and PHEVs. The performance of these devices is inherently tied to the properties of materials used to build them. Carbon nanomaterials will play an important role in all aspects of the energy sector:

Lithium-ion batteries have shown great promise in portable electronics and electric vehicles due to their long lifespan and high safety. However, hurdles relating to the sluggish dynamics and poor cycling stability restrict the practical application. Carbon nanomaterials such as graphene and carbon nanotubes (CNTs), due to their significantly decreased particles size, effectively address these issues. Advantages of nanomaterials include:

Nanoscale shortens lithium-ion diffusion length.

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New reactions at nanoscale are not possible with bulk materials.

Nanoscale combining with electronic conductive coating improves electronic transport.

Decreased mechanical stresses due to volume change lead to increased cyclability and lifetime.

Nanoscale enhances the electrode capability of Li storage.

Ordered mesoporous structure favours both Li storage and fast electrode kinetic.

Nano-structure enhances cycle stability.

Carbon nanomaterials are also finding application in Lithium–sulfur (Li–S) batteries, sodium-ion batteries, lithium-air batteries, magnesium batteries and paper, flexible and stretchable batteries. Carbon nanomaterials have been widely investigated as effective electrodes in supercapacitors due to their high specific surface area, excellent electrical and mechanical properties. Applications of Carbon nanomaterials in batteries and supercapacitors include:

Electrodes in batteries and capacitors.

Anodes, cathodes and electrolytes in Li-ion (LIB) batteries.

Inks printable batteries and supercapacitors.

LIB cathodes.

Anode coatings to prevent corrosion.

Nanofiber-based polymeric battery separators.

Biodegradable green batteries.

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Carbon nanomaterials covered in this report include:

- Graphene
- Multi-walled nanotubes (MWCNT)
- Single-walled carbon nanotubes (SWCNTs)
- Graphene quantum dots.
- Nanodiamonds.
- Carbon Nanofibers.

Report contents include:

- Battery and supercapacitor market megatrends and market drivers.
- Types of Carbon nanomaterials utilized in batteries, supercapacitors and fuel cells.
- Global market for in tons and revenues, historical and forecast to 2032, by Carbon nanomaterials types
- Markets for Carbon nanomaterials in batteries, supercapacitors and fuel cells including electric vehicles, UAVs, medical wearables, consumer wearables and electronics.
- 126 in depth company profiles. Companies profiled include CHASM, LG Energy Solution, Nanotech Energy, NAWA Technologies, NBD, OCSiAl and many more.

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Contents

1 GRAPHENE IN ENERGY STORAGE

1.1 Market overview
  1.1.1 Graphene properties
  1.1.2 Commercialization
  1.1.3 The graphene market to date
  1.1.4 Market outlook for 2022 and beyond
  1.1.5 The market in 2021
  1.1.6 Graphene global production capacities, in tons and by type
  1.1.7 Global demand for graphene
    1.1.7.1 Global graphene demand, to 2032, tons
    1.1.7.2 Global graphene demand, by end user market to 2032
1.2 Types of graphene
  1.2.1 Graphene materials
    1.2.1.1 CVD Graphene
    1.2.1.2 Graphene nanoplatelets
    1.2.1.3 Graphene oxide and reduced Graphene Oxide
    1.2.1.4 Graphene quantum dots (GQDs)
  1.2.2 Intermediate products
    1.2.2.1 Graphene masterbatches
    1.2.2.2 Graphene dispersions
1.3 Graphene in Batteries
  1.3.1 Current market
  1.3.2 Market outlook
  1.3.3 Market drivers, trends and applications
  1.3.4 Global market in tons, historical and forecast to 2032
1.4 Graphene in Fuel cells
  1.4.1 Current market
  1.4.2 Market outlook
  1.4.3 Market drivers, trends and applications
  1.4.4 Global market in tons, historical and forecast to 2032
1.5 Graphene in Supercapacitors
  1.5.1 Current market
  1.5.2 Market outlook
  1.5.3 Market drivers, trends and applications
  1.5.4 Global market in tons, historical and forecast to 2031
  1.5.5 Product developers

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1.6 Graphene energy storage company profiles 65 (85 company profiles)

2 CARBON NANOTUBES IN ENERGY STORAGE

2.1 Market overview
  2.1.1 The global market for carbon nanotubes in 2021
  2.1.2 Exceptional properties
  2.1.3 Market outlook in 2022
  2.1.4 Commercial CNT-based products
  2.1.5 MWCNTs
    2.1.5.1 Applications
    2.1.5.2 Key players
    2.1.5.3 Production capacities in 2021
    2.1.5.4 Market demand, metric tons (MT)
  2.1.6 SWCNTs
    2.1.6.1 Applications
    2.1.6.2 Global SWCNT market consumption
    2.1.6.3 Production capacities
2.2 Carbon nanotube materials
  2.2.1 Multi-walled nanotubes (MWCNT)
    2.2.1.1 Properties
    2.2.1.2 Applications
  2.2.2 Single-wall carbon nanotubes (SWCNT)
    2.2.2.1 Properties
    2.2.2.2 Applications
    2.2.2.3 Comparison between MWCNTs and SWCNTs
  2.2.3 Double-walled carbon nanotubes (DWNTs)
    2.2.3.1 Properties
    2.2.3.2 Applications
  2.2.4 Vertically aligned CNTs (VACNTs)
    2.2.4.1 Properties
    2.2.4.2 Synthesis of VACNTs
    2.2.4.3 Applications
  2.2.5 Few-walled carbon nanotubes (FWNTs)
    2.2.5.1 Properties
    2.2.5.2 Applications
  2.2.6 Carbon Nanohorns (CNHs)
    2.2.6.1 Properties
    2.2.6.2 Applications

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2.2.7 Carbon Onions
2.2.7.1 Properties
2.2.7.2 Applications
2.2.8 Boron Nitride nanotubes (BNNTs)
2.2.8.1 Properties
2.2.8.2 Applications
2.3 Intermediate products
2.3.1 CNT yarns
2.3.2 CNT films
2.4 Carbon nanotubes in batteries
2.4.1 Market overview
2.4.2 Applications
2.4.2.1 CNTs in Lithium–sulfur (Li–S) batteries
2.4.2.2 CNTs in Nanomaterials in Sodium-ion batteries
2.4.2.3 CNTs in Nanomaterials in Lithium-air batteries
2.4.2.4 CNTs in Flexible and stretchable batteries in electronics
2.4.2.5 CNTs in Flexible and stretchable LIBs
2.4.2.6 CNTs in Flexible and stretchable supercapacitors
2.4.3 Market outlook
2.4.4 Global market in tons, historical and forecast to 2032
2.5 Carbon nanotubes in Supercapacitors
2.5.1 Market overview
2.5.2 Applications
2.5.3 Market outlook
2.5.3.1 Global market in tons, historical and forecast to 2032
2.6 Carbon nanotubes in Fuel cells
2.6.1 Market overview
2.6.2 Applications
2.6.3 Market outlook
2.6.4 Global market in tons, historical and forecast to 2032
2.7 Carbon nanotubes energy storage company profiles 204 (32 company profiles)

3 CARBON NANOFIBERS IN ENERGY STORAGE

3.1 Properties
3.2 Carbon nanofibers in Batteries
3.3 Carbon nanofibers in Supercapacitors
3.4 Carbon nanofibers in Fuel cells
3.5 Carbon nanofibers energy storage company profiles 236 (7 company profiles)

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4 NANODIAMONDS IN ENERGY STORAGE

4.1 Types
4.1.1 Commercial nanodiamonds
4.2 Applications
4.3 Nanodiamonds in Batteries
4.3.1 Market for nanodiamonds in batteries
4.3.2 Global market demand for nanodiamonds in batteries to 2032 (tons)
4.4 Nanodiamonds in Supercapacitors
4.4.1 Market for nanodiamonds in supercapacitors
4.4.2 Global market demand for nanodiamonds in supercapacitors to 2032 (tons)
4.5 Nanodiamond energy storage company profiles 253 (3 company profiles)

5 RESEARCH METHODOLOGY

5.1 Technology Readiness Level (TRL)

6 REFERENCES

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List Of Tables

LIST OF TABLES

Table 1. Main graphene producers by country, annual production capacities, types and main markets they sell to.
Table 2. Demand for graphene (tons), 2018-2032.
Table 3. Applications of GO and rGO.
Table 4. Comparison of graphene QDs and semiconductor QDs.
Table 5. Applications of graphene quantum dots.
Table 6. Markets and applications for graphene quantum dots in energy storage.
Table 7. Applications of nanomaterials in batteries.
Table 8. Market overview for graphene in batteries.
Table 9. Market outlook for graphene in batteries.
Table 10. Market drivers for use of graphene in batteries.
Table 11. Applications of nanomaterials in flexible and stretchable batteries, by materials type and benefits thereof.
Table 12. Market and applications for graphene in batteries.
Table 13. Estimated demand for graphene in batteries (tons), 2018-2032.
Table 14. Market overview for graphene in fuel cells.
Table 15. Market outlook for graphene in fuel cells.
Table 16. Market and applications for graphene in fuel cells.
Table 17. Demand for graphene in fuel cells (tons), 2018-2032.
Table 18. Market overview for graphene in supercapacitors.
Table 19. Market outlook for graphene in supercapacitors.
Table 20: Comparative properties of graphene supercapacitors and lithium-ion batteries.
Table 21. Market and applications for graphene in supercapacitors.
Table 22. Demand for graphene in supercapacitors (tons), 2018-2032.
Table 23. Product developers in graphene supercapacitors.
Table 24. Chasm SWCNT products.
Table 25. Performance criteria of energy storage devices.
Table 26. Market summary for carbon nanotubes-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.
Table 27. Typical properties of SWCNT and MWCNT.
Table 28. Applications of MWCNTs.
Table 29. Annual production capacity of the key MWCNT producers in 2021 (MT).
Table 30. Demand for MWCNT by region in 2020, 2031.
Table 31: Markets, benefits and applications of Single-Walled Carbon Nanotubes.

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Table 32. SWCNT market demand forecast (metric tons), 2018-2032.
Table 33. Annual production capacity of SWCNT producers in 2021 (KG).
Table 34. Markets, benefits and applications of Single-Walled Carbon Nanotubes.
Table 35. Comparison between single-walled carbon nanotubes and multi-walled carbon nanotubes.
Table 36. Comparative properties of BNNTs and CNTs.
Table 37. Applications of BNNTs.
Table 38. Market overview for carbon nanotubes in batteries.
Table 39. Applications of carbon nanotubes in batteries.
Table 40. Applications in sodium-ion batteries, by nanomaterials type and benefits thereof.
Table 41. Applications in lithium-air batteries, by nanomaterials type and benefits thereof.
Table 42. Applications in flexible and stretchable supercapacitors, by advanced materials type and benefits thereof.
Table 43. Market and applications for carbon nanotubes in batteries.
Table 44. Estimated demand for carbon nanotubes in batteries (tons), 2018-2032.
Table 45. Market overview for carbon nanotubes in supercapacitors.
Table 46. Applications of carbon nanotubes in supercapacitors.
Table 47. Market and applications for carbon nanotubes in supercapacitors.
Table 48. Demand for carbon nanotubes in supercapacitors (tons), 2018-2032.
Table 49. Electrical conductivity of different catalyst supports compared to carbon nanotubes.
Table 50. Market overview for carbon nanotubes in fuel cells.
Table 51. Applications of carbon nanotubes in fuel cells.
Table 52. Market and applications for carbon nanotubes in fuel cells.
Table 53. Demand for carbon nanotubes in fuel cells (tons), 2018-2032.
Table 54. Properties of nanodiamonds.
Table 55. Markets, benefits and applications of nanodiamonds.
Table 56. Market overview for nanodiamonds in batteries -market maturity, market demand, competitive landscape.
Table 57. Market and applications for NDs in batteries- applications, benefits, market megatrends, market drivers for use of nanodiamonds, technology challenges, competing materials, market demand.
Table 58. Global market demand for nanodiamonds in batteries to 2032 (tons).
Table 59. Market overview for nanodiamonds in supercapacitors-market maturity, market demand, competitive landscape.
Table 60. Market and applications for nanodiamonds in supercapacitors- applications, benefits, market megatrends, market drivers for use of nanodiamonds, technology

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challenges, competing materials, market demand.
Table 61. Global market demand for nanodiamonds in supercapacitors to 2032 (tons)
Table 62. Ray-Techniques Ltd. nanodiamonds product list.
Table 63. Comparison of ND produced by detonation and laser synthesis.
Table 64. Technology Readiness Level (TRL) Examples.

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List Of Figures

LIST OF FIGURES

Figure 1. Demand for graphene, by market, 2021.
Figure 2. Demand for graphene, 2018-2032, tons.
Figure 3. Global graphene demand by market, 2018-2032 (tons), conservative estimate.
Figure 4. Global graphene demand by market, 2018-2032 (tons). Medium estimate.
Figure 5. Global graphene demand by market, 2018-2032 (tons). High estimate.
Figure 6. Graphene and its descendants: top right: graphene; top left: graphite = stacked graphene; bottom right: nanotube=rolled graphene; bottom left: fullerene=wrapped graphene.
Figure 7. Types of CVD methods.
Figure 8. Schematic of the manufacture of GnPs starting from natural graphite.
Figure 9. Green-fluorescing graphene quantum dots.
Figure 10. 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 11. Graphene quantum dots.
Figure 12. Revenues for graphene quantum dots 2019-2032, millions USD
Figure 13. Applications of graphene in batteries.
Figure 14. Demand for graphene in batteries (tons), 2018-2032.
Figure 15. Applications of graphene in fuel cells.
Figure 16. Demand for graphene in fuel cells (tons), 2018-2032.
Figure 17. Applications of graphene in supercapacitors.
Figure 18. Demand for graphene in supercapacitors (tons), 2018-2032.
Figure 19. KEPCO’s graphene supercapacitors.
Figure 20. Skeleton Technologies supercapacitor.
Figure 21. Zapgo supercapacitor phone charger.
Figure 22. Graphene heating films.
Figure 23. Graphene flake products.
Figure 24. Schematic of a fluidized bed reactor which is able to scale up the generation of SWNTs using the CoMoCAT process.
Figure 25. Graphene battery schematic.
Figure 26. Proprietary atmospheric CVD production.
Figure 27. Nanotech Energy battery.
Figure 28. The Sixth Element graphene products.
Figure 29. Thermal conductive graphene film.
Figure 30. Talcoat graphene mixed with paint.
Figure 31. Market demand for carbon nanotubes by market, 2018-2032 (tons).

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Figure 32. Demand for MWCNT by application in 2021.
Figure 33. Demand for MWCNT by application in 2021.
Figure 34. Demand for MWCNT by region in 2021.
Figure 35. SWCNT market demand forecast (metric tons), 2018-2032.
Figure 36. Schematic of single-walled carbon nanotube.
Figure 37. TIM sheet developed by Zeon Corporation.
Figure 38. Double-walled carbon nanotube bundle cross-section micrograph and model.
Figure 39. Schematic of a vertically aligned carbon nanotube (VACNT) membrane used for water treatment.
Figure 40. TEM image of FWNTs.
Figure 41. Schematic representation of carbon nanohorns.
Figure 42. TEM image of carbon onion.
Figure 43. Schematic of Boron Nitride nanotubes (BNNTs). Alternating B and N atoms are shown in blue and red.
Figure 44. Process flow chart from CNT thin film formation to device fabrication for solution and dry processes.
Figure 45. Electrochemical performance of nanomaterials in LIBs.
Figure 46. Theoretical energy densities of different rechargeable batteries.
Figure 47. Printed 1.5V battery.
Figure 48. Materials and design structures in flexible lithium ion batteries.
Figure 49. LiBEST flexible battery.
Figure 50. Schematic of the structure of stretchable LIBs.
Figure 51. Electrochemical performance of materials in flexible LIBs.
Figure 52. Carbon nanotubes incorporated into flexible, rechargeable yarn batteries.
Figure 53. (A) Schematic overview of a flexible supercapacitor as compared to conventional supercapacitor.
Figure 54. Stretchable graphene supercapacitor.
Figure 55. Demand for carbon nanomaterials in batteries (tons), 2018-2032.
Figure 56. Demand for carbon nanotubes in supercapacitors (tons), 2018-2032.
Figure 57. Demand for carbon nanotubes in fuel cells (tons), 2018-2032.
Figure 58. Fuji carbon nanotube products.
Figure 59. MEIJO eDIPS product.
Figure 60. Hybrid battery powered electrical motorbike concept.
Figure 61. NAWAStitch integrated into carbon fiber composite.
Figure 62. Schematic illustration of three-chamber system for SWCNH production.
Figure 63. TEM images of carbon nanobrush.
Figure 64. Detonation Nanodiamond.
Figure 65. DND primary particles and properties.
Figure 66. Global market demand for nanodiamonds in batteries to 2032 (tons).

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Figure 67. Global market demand for nanodiamonds in supercapacitors to 2032 (tons)
Figure 68. NBD battery.

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