

# The Nanotechnology and Nanomaterials Global Market Report 2021-2031

https://marketpublishers.com/r/NA43E8B9F4C6EN.html

Date: August 2021 Pages: 1035 Price: US\$ 3,500.00 (Single User License) ID: NA43E8B9F4C6EN

# Abstracts

Nanotechnology and nanomaterials are key enablers for a whole new generation of products and processes. New products with enhanced properties are on the market from a broad range of players in consumer electronics, packaging, composites, biomedicine, healthcare and coatings.

At over 1000 pages, The Nanotechnology and Nanomaterials Global Market Report 2021-2031 is the most comprehensive assessment of the opportunities afforded by these remarkable materials and technologies. The report offers full market forecasts for nanomaterials and industrial sectors impacted by nanotechnology to 2031.

Report contents include:

In-depth analysis of the global market for nanotechnology and nanomaterials, applications, producers, product developers and products.

Product database by market.

Assessment of nanomaterials market including production volumes, competitive landscape, commercial prospects, applications, demand by market and region, stage of commercialization, prices and producer profiles.

Examples of successful markets and products.

TRL assessment for nanomaterials and end user markets.

Ten year forecasts to 2031 on nanomaterials demand in tons.



Revenues for nanotechnology and nanomaterials by end user market to 2031.

Analysis of global trends, including historical data from 2010, and projections to 2031.

Exploration of nanomaterials and nanotech-enabled products market structures and value chains.

Assessment of end user markets for nanotechnology and nanomaterials including market drivers and trends, applications, market opportunity, market challenges and application and product developer profiles.

Unique assessment tools for the nanomaterials market, end user applications, economic impact, addressable markets and market challenges to provide the complete picture of where the real commercial opportunities in nanotechnology and nanomaterials are.

Main application and product opportunities in nanotechnology and nanomaterials.

Profiles of over 1,500 nanotechnology nanomaterials producers and product developers.



# Contents

#### **1 RESEARCH METHODOLOGY**

1.1 Technology Readiness Level (TRL)

#### **2 INTRODUCTION**

- 2.1 Aims and objectives of the study
- 2.2 Market definition
- 2.2.1 Properties of nanomaterials
- 2.3 Categorization of nanomaterials

### **3 THE GLOBAL MARKET FOR NANOMATERIALS**

- 3.1 Production of nanomaterials
- 3.2 Global consumption of nanomaterials
- 3.3 ALUMINIUM OXIDE NANOPARTICLES/POWDERS
  - 3.3.1 Market overview
  - 3.3.2 Properties
  - 3.3.3 Markets and applications
  - 3.3.4 Technology Readiness Level (TRL)
  - 3.3.5 Global consumption in metric tonnes, 2010-2031
    - 3.3.5.1 Consumption by market
    - 3.3.5.1.1 Market share 2020 (%)
    - 3.3.5.1.2 Market Share 2020 (MT)
    - 3.3.5.1.3 Market share 2031 (%)
    - 3.3.5.1.4 Market Share 2031 (MT)
  - 3.3.5.2 Consumption by region
    - 3.3.5.2.1 Consumption by region 2020 (%)
    - 3.3.5.2.2 Consumption by region 2020 (MT)
    - 3.3.5.2.3 Consumption by region 2031(%)
    - 3.3.5.2.4 Consumption by region 2031 (MT)
  - 3.3.6 Prices
  - 3.3.7 Producers

#### 3.4 ANTIMONY TIN OXIDE NANOPARTICLES/POWDERS

- 3.4.1 Market overview
- 3.4.2 Properties
- 3.4.3 Markets and applications





- 3.4.4 Technology Readiness Level (TRL)
- 3.4.5 Global consumption in metric tonnes, 2010-2031
  - 3.4.5.1 Consumption by market
    - 3.4.5.1.1 Market share 2020 (%)
    - 3.4.5.1.2 Market Share 2020 (MT)
  - 3.4.5.1.3 Market share 2031 (%)
  - 3.4.5.1.4 Market Share 2031 (MT)
- 3.4.5.2 Consumption by region
  - 3.4.5.2.1 Consumption by region 2020 (%)
  - 3.4.5.2.2 Consumption by region 2020 (MT)
  - 3.4.5.2.3 Consumption by region 2031 (%)
  - 3.4.5.2.4 Consumption by region 2031 (MT)
- 3.4.6 Prices
- 3.4.7 Producers
- 3.5 BISMUTH OXIDE NANOPARTICLES/POWDERS
  - 3.5.1 Market overview
  - 3.5.2 Properties
  - 3.5.3 Markets and applications
  - 3.5.4 Technology Readiness Level (TRL)
  - 3.5.5 Global consumption in metric tonnes, 2010-2031
  - 3.5.5.1 Consumption by market
    - 3.5.5.1.1 Market share 2020 (%)
    - 3.5.5.1.2 Market Share 2020 (MT)
  - 3.5.5.1.3 Market share 2031 (%)
  - 3.5.5.1.4 Market Share 2031(MT)
  - 3.5.5.2 Consumption by region
    - 3.5.5.2.1 Consumption by region 2020 (%)
    - 3.5.5.2.2 Consumption by region 2020 (MT)
    - 3.5.5.2.3 Consumption by region 2031 (%)
  - 3.5.5.2.4 Consumption by region 2031 (MT)
  - 3.5.6 Prices
  - 3.5.7 Producers
- 3.6 CELLULOSE NANOFIBERS
  - 3.6.1 Market overview
  - 3.6.2 Properties
  - 3.6.3 Markets and applications
  - 3.6.4 Products
  - 3.6.5 Technology Readiness Level (TRL)
  - 3.6.6 Global consumption in metric tonnes, 2010-2031



- 3.6.6.1 Consumption by market
  - 3.6.6.1.1 Market share 2020 (%)
  - 3.6.6.1.2 Market Share 2020 (MT)
- 3.6.6.1.3 Market share 2031 (%)
- 3.6.6.1.4 Market Share 2031 (MT)
- 3.6.6.2 Consumption by region
  - 3.6.6.2.1 Consumption by region 2020 (%)
  - 3.6.6.2.2 Consumption by region 2020 (MT)
  - 3.6.6.2.3 Consumption by region 2031 (%)
  - 3.6.6.2.4 Consumption by region 2031 (MT)
- 3.6.7 Prices
- 3.6.8 Producers
- 3.7 CERIUM OXIDE NANOPARTICLES/POWDERS
  - 3.7.1 Market overview
  - 3.7.2 Properties
  - 3.7.3 Markets and applications
  - 3.7.4 Technology Readiness Level (TRL)
  - 3.7.5 Global consumption in metric tonnes, 2010-2031
  - 3.7.5.1 Consumption by market
  - 3.7.5.1.1 Market share 2020 (%)
  - 3.7.5.1.2 Market Share 2020 (MT)
  - 3.7.5.1.3 Market share 2031 (%)
  - 3.7.5.1.4 Market Share 2031(MT)
  - 3.7.5.2 Consumption by region
    - 3.7.5.2.1 Consumption by region 2020 (%)
    - 3.7.5.2.2 Consumption by region 2020 (MT)
    - 3.7.5.2.3 Consumption by region 2031 (%)
  - 3.7.5.2.4 Consumption by region 2031 (MT)
  - 3.7.6 Prices
  - 3.7.7 Producers
- 3.8 COBALT OXIDE NANOPARTICLES/POWDERS
  - 3.8.1 Market overview
  - 3.8.2 Properties
  - 3.8.3 Markets and applications
  - 3.8.4 Technology Readiness Level (TRL)
  - 3.8.5 Global consumption in metric tonnes, 2010-2031
  - 3.8.5.1 Consumption by market
    - 3.8.5.1.1 Market share 2020 (%)
    - 3.8.5.1.2 Market Share 2020 (MT)



- 3.8.5.1.3 Market share 2031(%)
- 3.8.5.1.4 Market Share 2031 (MT)
- 3.8.5.2 Consumption by region
- 3.8.5.2.1 Consumption by region 2020 (%)
- 3.8.5.2.2 Consumption by region 2020 (MT)
- 3.8.5.2.3 Consumption by region 2031 (%)
- 3.8.5.2.4 Consumption by region 2031 (MT)
- 3.8.6 Prices
- 3.8.7 Producers
- 3.9 COPPER OXIDE NANOPARTICLES/POWDERS
  - 3.9.1 Market overview
  - 3.9.2 Properties
  - 3.9.3 Markets and applications
  - 3.9.4 Technology Readiness Level (TRL)
  - 3.9.5 Global consumption in metric tonnes, 2010-2031
    - 3.9.5.1 Consumption by market
    - 3.9.5.1.1 Market share 2020 (%)
    - 3.9.5.1.2 Market Share 2020 (MT)
    - 3.9.5.1.3 Market share 2031(%)
    - 3.9.5.1.4 Market Share 2031 (MT)
  - 3.9.5.2 Consumption by region
    - 3.9.5.2.1 Consumption by region 2020 (%)
    - 3.9.5.2.2 Consumption by region 2020 (MT)
    - 3.9.5.2.3 Consumption by region 2031 (%)
    - 3.9.5.2.4 Consumption by region 2031 (MT)
  - 3.9.6 Prices
  - 3.9.7 Producers
- 3.10 DENDRIMERS
  - 3.10.1 Market overview
  - 3.10.2 Properties
  - 3.10.2.1 Types
  - 3.10.3 Markets and applications
  - 3.10.4 Technology Readiness Level (TRL)
  - 3.10.5 Global consumption in metric tonnes, 2010-2031
    - 3.10.5.1 Consumption by market
    - 3.10.5.1.1 Market share 2020 (%)
    - 3.10.5.1.2 Market Share 2020 (MT)
    - 3.10.5.1.3 Market share 2031 (%)
    - 3.10.5.1.4 Market Share 2031 (MT)



- 3.10.5.2 Consumption by region
  - 3.10.5.2.1 Consumption by region 2020 (%)
  - 3.10.5.2.2 Consumption by region 2020 (MT)
- 3.10.5.2.3 Consumption by region 2031 (%)
- 3.10.5.2.4 Consumption by region 2031(MT)
- 3.10.6 Prices
- 3.10.7 Producers
- 3.11 FULLERENES
  - 3.11.1 Market overview
  - 3.11.2 Properties
  - 3.11.3 Products
  - 3.11.4 Markets and applications
  - 3.11.5 Technology Readiness Level (TRL)
  - 3.11.6 Global consumption in metric tonnes, 2010-2031
    - 3.11.6.1 Consumption by market
      - 3.11.6.1.1 Market share 2020 (%)
      - 3.11.6.1.2 Market Share 2020 (MT)
      - 3.11.6.1.3 Market share 2031 (%)
    - 3.11.6.1.4 Market Share 2031 (MT)
    - 3.11.6.2 Demand by region
      - 3.11.6.2.1 Consumption by region 2020 (%)
      - 3.11.6.2.2 Consumption by region 2020 (MT)
      - 3.11.6.2.3 Consumption by region 2031 (%)
    - 3.11.6.2.4 Consumption by region 2031(MT)
  - 3.11.7 Prices
  - 3.11.8 Producers
- 3.12 GOLD NANOPARTICLES/POWDERS (Au-NPs)
  - 3.12.1 Market overview
  - 3.12.2 Properties
  - 3.12.3 Markets and applications
  - 3.12.4 Technology Readiness Level (TRL)
  - 3.12.5 Global consumption in metric tonnes, 2010-2031
  - 3.12.5.1 Consumption by market
  - 3.12.5.1.1 Market share 2020 (%)
  - 3.12.5.1.2 Market Share 2020 (MT)
  - 3.12.5.1.3 Market share 2031 (%)
  - 3.12.5.1.4 Market Share 2031 (MT)
  - 3.12.5.2 Consumption by region
    - 3.12.5.2.1 Consumption by region 2020 (%)



- 3.12.5.2.2 Consumption by region 2020 (MT)
- 3.12.5.2.3 Consumption by region 2031 (%)
- 3.12.5.2.4 Consumption by region 2031 (MT)
- 3.12.6 Prices
- 3.12.7 Producers
- 3.13 GRAPHENE
  - 3.13.1 Market overview
  - 3.13.2 Properties
  - 3.13.3 Markets and applications
  - 3.13.4 Technology Readiness Level (TRL)
  - 3.13.5 Products
  - 3.13.6 Global consumption in metric tonnes, 2010-2031
  - 3.13.6.1 Consumption by market
  - 3.13.6.1.1 Market share 2020 (%)
  - 3.13.6.1.2 Market share 2031 (%)
  - 3.13.6.1.3 Market 2018-2031 (MT)
  - 3.13.6.2 Consumption by region
    - 3.13.6.2.1 Consumption by region 2020 (%)
    - 3.13.6.2.2 Consumption by region 2020 (MT)
    - 3.13.6.2.3 Consumption by region 2031 (%)
    - 3.13.6.2.4 Consumption by region 2031 (MT)
  - 3.13.7 Prices
  - 3.13.8 Producers
- 3.14 IRON OXIDE NANOPARTICLES/POWDERS
  - 3.14.1 Market overview
  - 3.14.2 Properties
  - 3.14.3 Markets and applications
  - 3.14.4 Technology Readiness Level (TRL)
  - 3.14.5 Global consumption in metric tonnes, 2010-2031
  - 3.14.5.1 Consumption by market
  - 3.14.5.1.1 Market share 2020 (%)
  - 3.14.5.1.2 Market Share 2020 (MT)
  - 3.14.5.1.3 Market share 2031 (%)
  - 3.14.5.1.4 Market Share 2031 (MT)
  - 3.14.5.2 Consumption by region
    - 3.14.5.2.1 Consumption by region 2020 (%)
    - 3.14.5.2.2 Consumption by region 2020 (MT)
    - 3.14.5.2.3 Consumption by region 2031 (%)
    - 3.14.5.2.4 Consumption by region 2031 (MT)



- 3.14.6 Prices
- 3.14.7 Producers

3.15 MAGNESIUM OXIDE NANOPARTICLES/POWDERS

- 3.15.1 Market overview
- 3.15.2 Properties
- 3.15.3 Markets and applications
- 3.15.4 Technology Readiness Level (TRL)
- 3.15.5 Global consumption in metric tonnes, 2010-2031
- 3.15.5.1 Consumption by market
- 3.15.5.1.1 Market share 2020 (%)
- 3.15.5.1.2 Market Share 2020 (MT)
- 3.15.5.1.3 Market share 2031 (%)
- 3.15.5.1.4 Market Share 2031 (MT)
- 3.15.5.2 Consumption by region
  - 3.15.5.2.1 Consumption by region 2020 (%)
  - 3.15.5.2.2 Consumption by region 2020 (MT)
- 3.15.5.2.3 Consumption by region 2031 (%)
- 3.15.5.2.4 Consumption by region 2031 (MT)
- 3.15.6 Prices
- 3.15.7 Producers

#### 3.16 MANGANESE OXIDE NANOPARTICLES/POWDERS

- 3.16.1 Market overview
- 3.16.2 Properties
- 3.16.3 Markets and applications
- 3.16.4 Technology Readiness Level (TRL)
- 3.16.5 Global consumption in metric tonnes, 2010-2031
- 3.16.5.1 Consumption by market
- 3.16.5.1.1 Market share 2020 (%)
- 3.16.5.1.2 Market Share 2020 (MT)
- 3.16.5.1.3 Market share 2031 (%)
- 3.16.5.1.4 Market Share 2031 (MT)
- 3.16.5.2 Consumption by region
  - 3.16.5.2.1 Consumption by region 2020 (%)
  - 3.16.5.2.2 Consumption by region 2020 (MT)
  - 3.16.5.2.3 Consumption by region 2031 (%)
- 3.16.5.2.4 Consumption by region 2031 (MT)
- 3.16.6 Prices
- 3.16.7 Producers
- 3.17 MULTI-WALLED CARBON NANOTUBES (MWCNT)



- 3.17.1 Market overview
- 3.17.2 Properties
- 3.17.3 Markets and applications
- 3.17.4 Technology Readiness Level (TRL)
- 3.17.5 Global consumption in metric tonnes, 2010-2031
- 3.17.5.1 Consumption by market
  - 3.17.5.1.1 Market share 2020 (%)
  - 3.17.5.1.2 Market Share 2020 (MT)
  - 3.17.5.1.3 Market share 2031 (%)
  - 3.17.5.1.4 Market Share 2031 (MT)
- 3.17.5.2 Consumption by region
- 3.17.5.2.1 Consumption by region 2020 (%)
- 3.17.5.2.2 Consumption by region 2031 (MT)
- 3.17.5.2.3 Consumption by region 2031 (%)
- 3.17.5.2.4 Consumption by region 2031(MT)
- 3.17.6 Prices
- 3.17.7 Producers
- 3.18 NANOCLAYS
  - 3.18.1 Market overview
  - 3.18.2 Properties
  - 3.18.3 Markets and applications
  - 3.18.4 Technology Readiness Level (TRL)
  - 3.18.5 Global consumption in metric tonnes, 2010-2031
  - 3.18.5.1 Consumption by market
  - 3.18.5.1.1 Market share 2020 (%)
  - 3.18.5.1.2 Market Share 2020 (MT)
  - 3.18.5.1.3 Market share 2031 (%)
  - 3.18.5.1.4 Market Share 2031 (MT)
  - 3.18.5.2 Consumption by region
    - 3.18.5.2.1 Consumption by region 2020 (%)
    - 3.18.5.2.2 Consumption by region 2020 (MT)
    - 3.18.5.2.3 Consumption by region 2031 (%)
    - 3.18.5.2.4 Consumption by region 2031 (MT)
  - 3.18.6 Prices
  - 3.18.7 Producers
- 3.19 NANODIAMONDS
  - 3.19.1 Market overview
  - 3.19.2 Properties
  - 3.19.2.1 Types



3.19.3 Markets and applications

3.19.2.2 Fluorescent nanodiamonds (FNDs)

3.19.5 Global consumption in metric tonnes, 2010-2031

3.19.4 Technology Readiness Level (TRL)

3.19.5.1 Consumption by market 3.19.5.1.1 Market share 2020 (%) 3.19.5.1.2 Market Share 2020 (MT) 3.19.5.1.3 Market share 2031 (%) 3.19.5.1.4 Market Share 2031 (MT) 3.19.5.2 Consumption by region 3.19.5.2.1 Consumption by region 2020 (%) 3.19.5.2.2 Consumption by region 2020 (MT) 3.19.5.2.3 Consumption by region 2031 (%) 3.19.5.2.4 Consumption by region 2031 (MT) 3.19.6 Prices 3.19.7 Producers 3.20 NANOFIBERS 3.20.1 Market overview 3.20.2 Properties 3.20.2.1 Types 3.20.2.1.1 Polymer nanofibers 3.20.2.1.2 Alumina nanofibers 3.20.2.1.3 Carbon nanofibers 3.20.3 Markets and applications 3.20.4 Technology Readiness Level (TRL) 3.20.5 Global consumption in metric tonnes, 2010-2031 3.20.5.1 Consumption by market 3.20.5.1.1 Market share 2020 (%) 3.20.5.1.2 Market Share 2020 (MT) 3.20.5.1.3 Market share 2031 (%) 3.20.5.1.4 Market Share 2031 (MT) 3.20.5.2 Consumption by region 3.20.5.2.1 Consumption by region 2020 (%) 3.20.5.2.2 Consumption by region 2020 (MT) 3.20.5.2.3 Consumption by region 2031 (%)

3.20.5.2.4 Consumption by region 2031 (MT)

3.20.6 Producers

#### 3.21 NANOSILVER

3.21.1 Market overview



- 3.21.2 Properties
- 3.21.3 Markets and applications
- 3.21.4 Technology Readiness Level (TRL)
- 3.21.5 Global consumption in metric tonnes, 2010-2031
- 3.21.5.1 Consumption by market
- 3.21.5.1.1 Market share 2020 (%)
- 3.21.5.1.2 Market Share 2020 (MT)
- 3.21.5.1.3 Market share 2031 (%)
- 3.21.5.1.4 Market Share 2031 (MT)
- 3.21.5.2 Consumption by region
  - 3.21.5.2.1 Consumption by region 2020 (%)
  - 3.21.5.2.2 Consumption by region 2020 (MT)
- 3.21.5.2.3 Consumption by region 2031 (%)
- 3.21.5.2.4 Consumption by region 2031 (MT)
- 3.21.6 Prices
- 3.21.7 Producers
- 3.22 NICKEL NANOPARTICLES/POWDERS
  - 3.22.1 Market overview
  - 3.22.2 Properties
  - 3.22.3 Markets and applications
  - 3.22.4 Technology Readiness Level (TRL)
  - 3.22.5 Global consumption in metric tonnes, 2010-2031
  - 3.22.5.1 Consumption by market
    - 3.22.5.1.1 Market share 2020 (%)
    - 3.22.5.1.2 Market Share 2020 (MT)
    - 3.22.5.1.3 Market share 2031 (%)
    - 3.22.5.1.4 Market Share 2031 (MT)
  - 3.22.5.2 Consumption by region
    - 3.22.5.2.1 Consumption by region 2020 (%)
    - 3.22.5.2.2 Consumption by region 2020 (MT)
    - 3.22.5.2.3 Consumption by region 2031 (%)
    - 3.22.5.2.4 Consumption by region 2031 (MT)
  - 3.22.6 Prices
  - 3.22.7 Producers
- 3.23 QUANTUM DOTS
  - 3.23.1 Market overview
  - 3.23.2 Properties
    - 3.23.2.1 Cadmium QDs
    - 3.23.2.2 Cadmium-free QDs



- 3.23.3 Markets and applications
- 3.23.4 Products
- 3.23.5 Technology Readiness Level (TRL)
- 3.23.6 Global consumption in metric tonnes, 2010-2031
- 3.23.6.1 Consumption by market
- 3.23.6.1.1 Market share 2020 (%)
- 3.23.6.1.2 Market Share 2020 (MT)
- 3.23.6.1.3 Market share 2031 (%)
- 3.23.6.1.4 Market Share 2031 (MT)
- 3.23.6.2 Consumption by region
  - 3.23.6.2.1 Consumption by region 2020 (%)
  - 3.23.6.2.2 Consumption by region 2020 (MT)
- 3.23.6.2.3 Consumption by region 2020 (%)
- 3.23.6.2.4 Consumption by region 2020 (MT)
- 3.23.7 Prices
- 3.23.8 Producers
- 3.24 SILICON OXIDE NANOPARTICLES/POWDERS
  - 3.24.1 Market overview
  - 3.24.2 Properties
  - 3.24.3 Markets and applications
  - 3.24.4 Technology Readiness Level (TRL)
  - 3.24.5 Global consumption in metric tonnes, 2010-2031
  - 3.24.5.1 Consumption by market
    - 3.24.5.1.1 Market share 2020 (%)
    - 3.24.5.1.2 Market Share 2020 (MT)
    - 3.24.5.1.3 Market share 2031 (%)
    - 3.24.5.1.4 Market Share 2020 (MT)
  - 3.24.5.2 Consumption by region
    - 3.24.5.2.1 Consumption by region 2020 (%)
    - 3.24.5.2.2 Consumption by region 2020 (MT)
    - 3.24.5.2.3 Consumption by region 2031 (%)
  - 3.24.5.2.4 Consumption by region 2031 (MT)
  - 3.24.6 Prices
  - 3.24.7 Producers
- 3.25 SINGLE-WALLED CARBON NANOTUBES (SWCNT)
  - 3.25.1 Market overview
  - 3.25.2 Properties
  - 3.25.3 Markets and applications
  - 3.25.4 Technology Readiness Level (TRL)



- 3.25.5 Prices
- 3.25.6 Global consumption in metric tonnes, 2010-2031
- 3.25.7 Producers
- 3.26 TITANIUM DIOXIDE NANOPARTICLES/POWDERS
  - 3.26.1 Market overview
  - 3.26.2 Properties
    - 3.26.2.1 Photocatalytic
    - 3.26.2.2 UV-filter
  - 3.26.3 Markets and applications
  - 3.26.4 Technology Readiness Level (TRL)
  - 3.26.5 Global consumption in metric tonnes, 2010-2031
  - 3.26.5.1 Consumption by market
  - 3.26.5.1.1 Market share 2020 (%)
  - 3.26.5.1.2 Market Share 2020 (MT)
  - 3.26.5.1.3 Market share 2031 (%)
  - 3.26.5.1.4 Market Share 2031 (MT)
  - 3.26.5.2 Consumption by region
    - 3.26.5.2.1 Consumption by region 2020 (%)
    - 3.26.5.2.2 Consumption by region 2020 (MT)
    - 3.26.5.2.3 Consumption by region 2031 (%)
    - 3.26.5.2.4 Consumption by region 2031(MT)
- 3.26.6 Producers
- 3.27 ZINC OXIDE NANOPARTICLES/POWDERS
  - 3.27.1 Market overview
  - 3.27.2 Properties
  - 3.27.3 Markets and applications
  - 3.27.4 Technology Readiness Level (TRL)
  - 3.27.5 Global consumption in metric tonnes, 2010-2031
  - 3.27.5.1 Consumption by market
    - 3.27.5.1.1 Market share 2020 (%)
    - 3.27.5.1.2 Market Share 2020 (MT)
    - 3.27.5.1.3 Market share 2031 (%)
  - 3.27.5.1.4 Market Share 2031 (MT)
  - 3.27.5.2 Consumption by region
  - 3.27.5.2.1 Consumption by region 2020 (%)
  - 3.27.5.2.2 Consumption by region 2020 (MT)
  - 3.27.5.2.3 Consumption by region 2031 (%)
  - 3.27.5.2.4 Consumption by region 2031 (MT)
  - 3.27.6 Producers



3.28.1 Market overview 3.28.2 Properties 3.28.3 Markets and applications 3.28.4 Technology Readiness Level (TRL) 3.28.5 Global consumption in metric tons, 2010-2031 3.28.5.1 Consumption by market 3.28.5.1.1 Market share 2020 (%) 3.28.5.1.2 Market Share 2020 (MT) 3.28.5.1.3 Market share 2031 (%) 3.28.5.1.4 Market Share 2031 (MT) 3.28.5.2 Consumption by region 3.28.5.2.1 Consumption by region 2020 (%) 3.28.5.2.2 Consumption by region 2020 (MT) 3.28.5.2.3 Consumption by region 2031 (%) 3.28.5.2.4 Consumption by region 2031(MT) 3.28.6 Prices 3.28.7 Producers **3.29 OTHER NANOMATERIALS** 3.29.1 Carbon Nanohorns (CNHs) 3.29.1.1 Properties 3.29.1.2 Markets and applications 3.29.2 Cellullose nanocrystals 3.29.2.1 Synthesis 3.29.2.2 Properties 3.29.2.3 Markets and applications 3.29.2.4 Prices 3.29.2.5 Production 3.29.3 Boron Nitride nanotubes (BNNTs) 3.29.3.1 Properties 3.29.3.2 Markets and applications 3.29.3.3 Prices 3.29.4 Erbium oxide nanoparticles/nanopowders 3.29.4.1 Properties, applications, prices and producers. 3.29.5 Indium oxide nanoparticles/powders 3.29.5.1 Properties 3.29.6 Molybdenum nanoparticles/powders 3.29.6.1 Properties 3.29.7 Perovskite quantum dots The Nanotechnology and Nanomaterials Global Market Report 2021-2031

3.28 ZIRCONIUM OXIDE NANOPARTICLES/POWDERS



- 3.29.7.1 Properties
- 3.29.7.1.1 Comparison to conventional quantum dots
- 3.29.7.2 Synthesis methods
- 3.29.7.3 Applications
- 3.29.7.3.1 Displays
- 3.29.8 Carbon quantum dots (CDs)
  - 3.29.8.1 Properties
  - 3.29.8.2 Markets and applications
- 3.29.9 Graphene quantum dots
- 3.29.9.1 Composition
- 3.29.9.2 Comparison to quantum dots
- 3.29.9.3 Properties
- 3.29.9.4 Synthesis
- 3.29.9.4.1 Top-down method
- 3.29.9.4.2 Bottom-up method
- 3.29.9.4.3 Comparison of synthesis methods
- 3.29.9.5 Markets and applications
- 3.29.9.6 Producers

#### 4 MARKETS FOR NANOTECHNOLOGY AND NANOMATERIALS

#### 4.1 ADHESIVES

- 4.1.1 Market drivers
- 4.1.2 Markets and applications
  - 4.1.2.1 Properties
- 4.1.2.2 End user markets
- 4.1.2.3 Nanomaterials in adhesives
- 4.1.3 Technology Readiness Level (TRL)
- 4.1.4 Global revenues to 2031
- 4.1.5 Product developers
- 4.2 AEROSPACE AND AVIATION
  - 4.2.1 Market drivers
  - 4.2.2 Markets and applications
    - 4.2.2.1 Composites
    - 4.2.2.2 Coatings
  - 4.2.3 Technology Readiness Level (TRL)
  - 4.2.4 Global revenues to 2031
  - 4.2.5 Product developers
- 4.3 AUTOMOTIVE



- 4.3.1 Market drivers
- 4.3.2 Markets and applications
- 4.3.2.1 Composites
- 4.3.2.2 Paints and coatings
- 4.3.2.3 Tires
- 4.3.3 Technology Readiness Level (TRL)
- 4.3.4 Global revenues to 2031
- 4.3.5 Product developers
- **4.4 BATTERIES** 
  - 4.4.1 Market drivers
  - 4.4.2 Markets and applications
  - 4.4.2.1 Lithium-ion batteries (LIB)
  - 4.4.2.2 Nanomaterials in Lithium-sulfur (Li-S) batteries
  - 4.4.2.3 Sodium-ion batteries
  - 4.4.2.4 Lithium-air batteries
  - 4.4.2.5 Magnesium batteries
  - 4.4.3 Technology Readiness Level (TRL)
  - 4.4.4 Global revenues to 2031
  - 4.4.5 Product developers
- 4.5 BIOMEDICINE AND HEALTHCARE

#### 4.5.1 MEDICAL BIOSENSORS

- 4.5.1.1 Market drivers and trends
- 4.5.1.2 Applications
- 4.5.1.3 Technology Readiness Level (TRL)
- 4.5.1.4 Global revenues to 2031
- 4.5.1.5 Product developers
- 4.5.2 DRUG FORMULATION AND DELIVERY
  - 4.5.2.1 Market drivers
  - 4.5.2.2 Applications
  - 4.5.2.2.1 Products
  - 4.5.2.3 Technology Readiness Level (TRL)
- 4.5.2.4 Global revenues to 2031
- 4.5.2.5 Product developers
- 4.5.3 IMAGING AND DIAGNOSTICS
  - 4.5.3.1 Market drivers
  - 4.5.3.2 Applications
  - 4.5.3.3 Technology Readiness Level (TRL)
  - 4.5.3.4 Global revenues to 2031
  - 4.5.3.5 Product developers



## 4.5.4 MEDICAL COATINGS AND FILMS

- 4.5.4.1 Market drivers
- 4.5.4.2 Applications
- 4.5.4.3 Technology Readiness Level (TRL)
- 4.5.4.4 Global revenues to 2031
- 4.5.4.5 Product developers
- 4.5.5 MEDICAL IMPLANTS
- 4.5.5.1 Market drivers
- 4.5.5.2 Applications
- 4.5.5.3 Technology Readiness Level (TRL)
- 4.5.5.4 Global revenues to 2031
- 4.5.5.5 Product developers
- 4.5.6 WOUND CARE
  - 4.5.6.1 Market drivers
  - 4.5.6.2 Applications
  - 4.5.6.3 Products
  - 4.5.6.4 Technology Readiness Level (TRL)
  - 4.5.6.5 Global revenues to 2031
  - 4.5.6.6 Product developers
- 4.5.7 DENTAL
- 4.5.7.1 Market drivers
- 4.5.7.2 Applications
- 4.5.7.3 Technology Readiness Level (TRL)
- 4.5.7.4 Global revenues to 2031
- 4.5.7.5 Product developers
- 4.6 COATINGS AND PAINTS
  - 4.6.1 Market drivers
  - 4.6.2 Markets and applications
  - 4.6.3 Technology Readiness Level (TRL)
  - 4.6.4 Global revenues to 2031
  - 4.6.5 Product developers
  - 4.6.5.1 Anti-fingerprint nanocoatings
  - 4.6.5.2 Anti-bacterial nanocoatings
  - 4.6.5.3 Anti-corrosion nanocoatings
  - 4.6.5.4 Abrasion and wear resistant nanocoatings
  - 4.6.5.5 Barrier nanocoatings
  - 4.6.5.6 Anti-fogging nanocoatings
  - 4.6.5.7 Anti-fouling and easy-to-clean nanocoatings
  - 4.6.5.8 Self-cleaning (bionic) nanocoatings



- 4.6.5.9 Self-cleaning (photocatalytic) nanocoatings
- 4.6.5.10 UV-resistant nanocoatings
- 4.6.5.11 Thermal barrier and flame retardant nanocoatings
- 4.6.5.12 Anti-icing and de-icing nanocoatings
- 4.6.5.13 Anti-reflective nanocoatings
- 4.6.5.14 Self-healing nanocoatings

#### **4.7 COMPOSITES**

- 4.7.1 Market drivers
- 4.7.2 Market in 2021
- 4.7.3 Markets and applications
- 4.7.3.1 Thermal management
- 4.7.3.2 Electrostatic discharge (ESD) and electromagnetic interference (EMI) shielding
  - 4.7.3.3 Flame retardants
  - 4.7.4 Technology Readiness Level (TRL)
  - 4.7.5 Market opportunity
  - 4.7.6 Global revenues to 2031
- 4.7.7 Product developers
- 4.8 CONDUCTIVE INKS
  - 4.8.1 Market drivers
  - 4.8.2 Markets and applications
  - 4.8.3 Global revenues to 2031
- 4.8.4 Companies
- 4.9 CONSTRUCTION AND BUILDINGS
  - 4.9.1 Market drivers
  - 4.9.2 Markets and applications
  - 4.9.2.1 Insulation and thermal management
  - 4.9.2.1.1 Product developers
  - 4.9.2.2 Exterior coatings (protective, wood and glass)
  - 4.9.2.2.1 Product developers
  - 4.9.2.3 Smart windows and glass products
  - 4.9.2.3.1 Product developers
  - 4.9.2.4 VOC mitigation and air filtration
  - 4.9.2.4.1 Product developers
  - 4.9.2.5 Concrete and cement
  - 4.9.2.6 Self-healing construction materials
  - 4.9.2.6.1 Product developers
  - 4.9.2.7 Asphalt and bitumen
  - 4.9.3 Technology Readiness Level (TRL)



- 4.9.4 Global revenues to 2031
- 4.9.5 Product developers
- 4.10 COSMETICS AND SUNSCREENS
  - 4.10.1 Market drivers
  - 4.10.2 Markets and applications
  - 4.10.2.1 Products
  - 4.10.3 Technology Readiness Level (TRL)
  - 4.10.4 Global revenues to 2031
  - 4.10.5 Product developers
- 4.11 ELECTRONICS AND PHOTONICS
- 4.11.1 FLEXIBLE ELECTRONICS, CONDUCTIVE FILMS AND DISPLAYS
  - 4.11.1.1 Market drivers
  - 4.11.1.2 Applications
  - 4.11.1.3 Technology Readiness Level (TRL)
  - 4.11.1.4 Global revenues to 2031
  - 4.11.1.4.1 Touch panel and ITO replacement
  - 4.11.1.4.2 Displays
  - 4.11.1.5 Product developers
- 4.11.2 TRANSISTORS, INTEGRATED CIRCUITS AND OTHER COMPONENTS
- 4.11.2.1 Market drivers
- 4.11.2.2 Applications
- 4.11.2.3 Technology Readiness Level (TRL)
- 4.11.2.4 Global revenues to 2031
- 4.11.2.5 Product developers
- 4.11.3 MEMORY DEVICES
- 4.11.3.1 Market drivers
- 4.11.3.2 Applications
- 4.11.3.3 Technology Readiness Level (TRL)
- 4.11.3.4 Global revenues to 2031
- 4.11.3.5 Product developers
- 4.11.4 ELECTRONIC COATINGS
  - 4.11.4.1 Market drivers
  - 4.11.4.2 Applications
  - 4.11.4.3 Technology Readiness Level (TRL)
  - 4.11.4.4 Global revenues to 2031
  - 4.11.4.5 Product developers
- 4.11.5 PHOTONICS
- 4.11.5.1 Market drivers
- 4.11.5.2 Applications



- 4.11.5.2.1 Si photonics versus graphene
- 4.11.5.2.2 Optical modulators
- 4.11.5.2.3 Photodetectors
- 4.11.5.2.4 Plasmonics
- 4.11.5.2.5 Fiber lasers
- 4.11.5.3 Technology Readiness Level (TRL)
- 4.11.5.4 Global revenues to 2031
- 4.11.5.5 Product developers
- 4.12 FILTRATION
  - 4.12.1 Market drivers
  - 4.12.2 Applications
  - 4.12.2.1 Desalination and water filtration
  - 4.12.2.2 Airborne filters
  - 4.12.2.3 Gas separation
  - 4.12.3 Technology Readiness Level (TRL)
  - 4.12.4 Global revenues to 2031
  - 4.12.5 Product developers
- 4.13 FOOD AND AGRICULTURE
  - 4.13.1 Market drivers
  - 4.13.2 Markets and applications
  - 4.13.2.1 Food packaging
  - 4.13.2.2 Coatings
  - 4.13.2.3 Sensors
  - 4.13.2.4 Additives in food additives and supplements
  - 4.13.2.5 Agricultural production
  - 4.13.3 Technology Readiness Level (TRL)
  - 4.13.4 Global revenues to 2031
  - 4.13.5 Product developers

#### 4.14 FUEL CELLS

- 4.14.1 Market drivers
- 4.14.2 Markets and applications
- 4.14.2.1 Fuel cells
- 4.14.2.2 Hydrogen storage
- 4.14.3 Technology Readiness Level (TRL)
- 4.14.4 Global revenues to 2031
- 4.14.5 Product developers
- 4.15 HOUSEHOLD CARE AND SANITARY
  - 4.15.1 Market drivers
  - 4.15.2 Markets and applications



- 4.15.2.1 Anti-microbial coatings
- 4.15.2.2 Self-cleaning & easy clean coatings
- 4.15.2.3 Photocatalytic coatings
- 4.15.2.4 Anti-fingerprint nanocoatings
- 4.15.3 Technology Readiness Level (TRL)
- 4.15.4 Global revenues to 2031
- 4.15.5 Product developers
- 4.16 LIGHTING
  - 4.16.1 Market drivers
  - 4.16.2 Markets and applications
  - 4.16.3 Technology Readiness Level (TRL)
  - 4.16.4 Global revenues to 2031
  - 4.16.5 Product developers
- 4.17 LUBRICANTS
  - 4.17.1 Market drivers
  - 4.17.2 Markets and applications
  - 4.17.3 Technology Readiness Level (TRL)
  - 4.17.4 Global revenues to 2031
  - 4.17.5 Product developers
- 4.18 MARINE
  - 4.18.1 Market drivers
  - 4.18.2 Markets and applications
  - 4.18.3 Technology Readiness Level (TRL)
  - 4.18.4 Global revenues to 2031
  - 4.18.5 Product developers
- 4.19 OIL, GAS AND MINIING
  - 4.19.1 Market drivers
  - 4.19.2 Markets and applications
  - 4.19.2.1 Sensing and reservoir management
  - 4.19.2.2 Coatings
  - 4.19.2.3 Drilling fluids
  - 4.19.2.4 Sorbent materials
  - 4.19.2.5 Separation
  - 4.19.3 Technology Readiness Level (TRL)
  - 4.19.4 Global revenues to 2031
  - 4.19.5 Product developers
- 4.20 PACKAGING
  - 4.20.1 Market drivers
  - 4.20.2 Markets and applications



- 4.20.3 Technology Readiness Level (TRL)
- 4.20.4 Global revenues to 2031
- 4.20.5 Product developers

## 4.21 RUBBER

- 4.21.1 Market drivers
- 4.21.2 Markets and applications
- 4.21.3 Technology Readiness Level (TRL)
- 4.21.4 Global revenues to 2031
- 4.21.5 Product developers
- 4.22 SECURITY AND DEFENCE
  - 4.22.1 Market drivers
  - 4.22.2 Markets and applications
  - 4.22.2.1 Military textiles
  - 4.22.2.2 Military equipment
  - 4.22.2.3 Anti-counterfeiting
  - 4.22.2.4 Sensors and detection
  - 4.22.2.5 Ballistic protection
  - 4.22.3 Technology Readiness Level (TRL)
  - 4.22.4 Global revenues to 2031
  - 4.22.5 Product developers

#### 4.23 SENSORS

- 4.23.1 Market drivers
- 4.23.2 Markets and applications
  - 4.23.2.1 Gas sensors
  - 4.23.2.2 Strain sensors
  - 4.23.2.3 Biosensors
  - 4.23.2.4 Food sensors
  - 4.23.2.5 Image sensors
  - 4.23.2.6 Infrared (IR) sensors
  - 4.23.2.7 Optical sensors
  - 4.23.2.8 Pressure sensors
- 4.23.2.9 Humidity sensors
- 4.23.2.10 Acoustic sensors
- 4.23.2.11 Wireless sensors
- 4.23.3 Technology Readiness Level (TRL)
- 4.23.4 Global revenues to 2031
- 4.23.5 Product developers
- 4.24 SOLAR
  - 4.24.1 Market drivers





- 4.24.2 Markets and applications
- 4.24.2.1 Solar cells
- 4.24.2.2 Solar water splitting
- 4.24.2.3 Solar coatings
- 4.24.3 Technology Readiness Level (TRL)
- 4.24.4 Global revenues to 2031
- 4.24.5 Product developers
- 4.25 SUPERCAPACITORS
  - 4.25.1 Market drivers
  - 4.25.2 Markets and applications
  - 4.25.3 Technology Readiness Level (TRL)
  - 4.25.4 Global revenues to 2031
  - 4.25.5 Product developers
- 4.26 TEXTILES & APPAREL
  - 4.26.1 Market drivers
  - 4.26.2 Markets and applications
  - 4.26.2.1 Protective textiles
  - 4.26.2.2 Electronic textiles
  - 4.26.3 Technology Readiness Level (TRL)
  - 4.26.4 Global revenues to 2031
  - 4.26.5 Product developers
- 4.27 TOOLS & MANUFACTURING
  - 4.27.1 Market drivers
  - 4.27.2 Markets and applications
  - 4.27.3 Technology Readiness Level (TRL)
- 4.27.4 Global revenues to 2031
- 4.27.5 Product developers
- 4.28 3D PRINTING
  - 4.28.1 Markets and applications
- 4.28.2 Technology Readiness Level (TRL)
- 4.28.3 Global revenues to 2031
- 4.28.4 Product developers
- 4.29 OTHER MARKETS
- 4.29.1 CATALYSTS
  - 4.29.1.1 Markets and applications
- 4.29.1.2 Product developers
- 4.29.2 WIRE AND CABLE
- 4.29.2.1 Markets and applications
  - 4.29.2.1.1 Composites



4.29.2.1.2 Coatings

4.29.2.2 Product developers

- 4.29.3 SPORTING GOODS
  - 4.29.3.1 Markets and applications
  - 4.29.3.1.1 Composites
  - 4.29.3.1.2 Coatings
- 4.29.3.2 Product developers
- 4.29.4 WIND ENERGY
  - 4.29.4.1 Market drivers
  - 4.29.4.2 Markets and applications
  - 4.29.4.2.2 Product developers
- 4.29.5 THERMOELECTRICS
- 4.29.5.1 Market drivers
- 4.29.5.2 Markets and applications
- 4.29.5.3 Application and product developers

#### **5 REFERENCES**

LIST OF TABLES

Table 1. Technology Readiness Level (TRL) Examples.

Table 2. Categorization of nanomaterials.

Table 3. The Global market for nanomaterials in 2020-consumption, market characteristics and growth prospects.

Table 4. Global consumption of nanomaterials in metric tonnes (MT), 2010-2031.

Table 5. Market overview for aluminium oxide nanoparticles/powders -Selling grade particle diameter, usage, advantages, high volume applications, low volume applications and novel applications.

Table 6. Markets, benefits and applications of aluminium oxide nanoparticles/powders. Table 7. Global consumption of aluminium oxide nanoparticles/powders (MT), 2010-2031.

Table 8. Aluminium oxide nanoparticles/powders Market Share 2020 (MT)

Table 9. Aluminium oxide nanoparticles/powders market consumption 2031 (MT).

Table 10. Consumption of aluminium oxide nanoparticles/powders by region 2020 (MT).

Table 11. Consumption of aluminium oxide nanoparticles/powders by region 2031 (MT).

Table 12. Prices of aluminium oxide nanoparticles/powders from producers & distributors.

Table 13. Aluminium oxide nanoparticles/powders producer profiles.

Table 14. Market summary for antimony tin oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low,



volume applications and novel applications.

Table 15. Markets, benefits and applications of antimony tin oxide nanoparticles/powders

Table 16. Global consumption of antimony tin oxide, in metric tonnes, 2010-2031.

Table 17. Antimony tin oxide nanoparticles/powders Market Share 2020 (MT).

Table 18. Antimony tin oxide nanoparticles/powders market consumption 2031 (MT).

Table 19. Consumption of antimony tin oxide nanoparticles/powders by region 2020 (MT).

Table 20. Consumption of antimony tin oxide nanoparticles/powders by region 2031 (MT).

Table 21. Prices of antimony tin oxide nanoparticles/powders.

Table 22. Antimony tin oxide nanoparticles/powders/nanopowders producers and suppliers.

Table 23. Market overview bismuth oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 24. Markets, benefits and applications of aluminium oxide nanoparticles/powders Table 25. Global consumption of bismuth oxide nanoparticles/powders in metric tonnes, 2010-2031.

Table 26. Bismuth oxide nanoparticles/powders Market Share 2020 (MT).

Table 27. Bismuth oxide nanoparticles/powders Market Share 2031 (MT).

Table 28. Consumption of bismuth oxide nanoparticles/powders by region 2020 (MT).

Table 29. Consumption of bismuth oxide nanoparticles/powders by region 2031(MT).

Table 30. Prices of bismuth oxide nanoparticles/powders.

Table 31. Bismuth oxide nanoparticles/powders/nanopowders producers and suppliers.

Table 32. Market overview for nanocellulose-Selling grade particle diameter, usage,

advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 33. Properties of nanocellulose, by type.

Table 34. Markets and applications of nanocellulose.

Table 35. Nanocellulose-based commercial products.

Table 36. CNF production capacities and production process, by producer.

Table 37. Cellulose nanofibers (CNF) Market Share 2020 (MT).

Table 38. Cellulose nanofibers (CNF) Market Share 2031 (MT).

Table 39. Consumption of Cellulose nanofibers (CNF) by region 2020 (MT).

Table 40. Consumption of Cellulose nanofibers (CNF) by region 2031 (MT).

Table 41. Product/price/application matrix of cellulose nanofiber producers.

Table 42. Nanocellulose producers.

Table 43. Market overview for cerium oxide nanoparticles/powders-Selling grade



particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 44. Markets, benefits and applications of cerium oxide nanoparticles/powders.

Table 45. Global consumption of cerium oxide nanoparticles/powders (MT), 2010-2031.

Table 46. Cerium oxide nanoparticles/powders Market Share 2020 (MT).

Table 47. Cerium oxide nanoparticles/powders Market Share 2031 (MT).

Table 48. Consumption of Cerium Oxide Nanoparticles/powders by region 2020 (MT).

Table 49. Consumption of Cerium Oxide Nanoparticles/powders by region 2031 (MT).

Table 50. Prices of cerium oxide nanoparticles/powders.

Table 51. Cerium oxide nanoparticles/powders and nanopowders producers and suppliers.

Table 52. Market overview for cobalt oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 53. Markets, benefits and applications of cobalt oxide nanoparticles/powders.

Table 54. Global consumption of cobalt oxide nanoparticles/powders (MT), 2010-2031.

Table 55. Cobalt oxide nanoparticles/powders Market Share 2020 (MT).

Table 56. Cobalt oxide nanoparticles/powders Market Share 2031 (MT).

Table 57. Consumption of Cobalt Oxide Nanoparticles/powders by region 2020 (MT).

Table 58. Consumption of Cobalt Oxide Nanoparticles/powders by region 2031 (MT).

Table 59. Prices of cobalt oxide nanoparticles/powders.

Table 60. Market overview for copper oxide nanoparticles/powders -Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 61. Markets, benefits and applications of copper oxide nanoparticles/powders.

Table 62. Global consumption of copper oxide nanoparticles/powders (MT), 2010-2031.

Table 63. Copper oxide nanoparticles/powders Market Share 2020 (MT).

Table 64. Copper oxide nanoparticles/powders Market Share 2031 (MT).

Table 65. Consumption of copper oxide nanoparticles/powders by region 2020 (MT).

Table 66. Consumption of copper oxide nanoparticles/powders by region 2031 (MT).

Table 67. Example prices of copper oxide nanoparticles/powders.

Table 68. Copper and copper oxide nanoparticles/powders and nanopowders producers and suppliers.

Table 69. Market overview for dendrimers -Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 70. Types of dendrimer.

Table 71. Markets, benefits and applications of dendrimers.

Table 72. Global consumption of dendrimers in metric tonnes, 2010-2031.



- Table 73. Dendrimers Market Share 2020 (MT).
- Table 74. Dendrimers Market Share 2031 (MT).
- Table 75. Consumption of dendrimers by region 2020 (MT).
- Table 76. Consumption of dendrimers by region 2031 (MT).
- Table 77. Example prices of dendrimers.
- Table 78. Dendrimers producers.
- Table 79. Market overview for fullerenes-Selling grade particle diameter, usage,

advantages, average price/ton, high volume applications, low volume applications and novel applications.

- Table 80. Types of fullerenes and applications.
- Table 81. Products incorporating fullerenes.
- Table 82. Markets, benefits and applications of fullerenes.
- Table 83. Global consumption of fullerenes in metric tonnes, 2010-2031.
- Table 84. Fullerenes Market Share 2020 (MT).
- Table 85. Fullerenes Market Share 2031 (MT).
- Table 86. Consumption of fullerenes by region 2020 (MT).
- Table 87. Consumption of fullerenes by region 2031 (MT).
- Table 88. Example prices of fullerenes.
- Table 89. Fullerene producers and suppliers.
- Table 90. Market overview for gold nanoparticles/powders-Selling grade particle

diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

- Table 91. Markets, benefits and applications of gold nanoparticles/powders.
- Table 92. Global consumption of gold nanoparticles in metric tonnes, 2010-2031.
- Table 93. Gold nanoparticles/powders Market Share 2020 (MT).
- Table 94. Gold nanoparticles/powders Market Share 2031 (MT).
- Table 95. Consumption of gold nanoparticles by region 2020 (MT).
- Table 96. Consumption of gold nanoparticles by region 2031 (MT).
- Table 97. Price of gold nanoparticles/powders.
- Table 98. Gold nanoparticle producers and suppliers.
- Table 99. Market overview for graphene-Selling grade particle diameter, usage,

advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 100. Properties of graphene.

Table 101. Markets, benefits and applications of graphene.

Table 102. Products incorporating graphene.

Table 103. Main graphene producers by country, annual production capacities, types and main markets they sell into 2020.

Table 104. Consumption of graphene (tons), 2018-2031.



Table 105. Consumption of graphene by region 2020 (MT).

Table 106. Consumption of graphene by region 2031 (MT).

Table 107. Graphene types and cost per kg.

Table 108. Graphene producers and suppliers.

Table 109. Market overview for iron oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 110. Markets, benefits and applications of iron oxide nanoparticles/powders.

Table 111. Global consumption of iron oxide nanoparticles/powders in metric tonnes, 2010-2031.

Table 112. Iron oxide nanoparticles/powders Market Share 2020 (MT).

Table 113. Iron oxide nanoparticles/powders Market Share 2031 (MT).

Table 114. Consumption of iron oxide nanoparticles/powders by region 2020 (MT).

Table 115. Consumption of iron oxide nanoparticles/powders by region 2031 (MT).

Table 116. Example prices of iron oxide nanoparticles/powders.

Table 117. Iron oxide nanoparticle/nanopowder producers and suppliers.

Table 118. Market overview for magnesium oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, market estimates, high volume applications, low volume applications and novel applications.

Table 119. Markets, benefits and applications of magnesium oxide

nanoparticles/powders.

Table 120. Global consumption of magnesium oxide nanoparticles/powders in metric tonnes, 2010-2031.

Table 121. Magnesium oxide nanoparticles/powders Market Share 2020 (MT).

Table 122. Magnesium oxide nanoparticles/powders Market Share 2031 (MT).

Table 123. Consumption of magnesium oxide nanoparticles/powders by region 2020 (MT).

Table 124. Consumption of magnesium oxide nanoparticles/powders by region 2031 (MT).

Table 125. Example prices of magnesium oxide nanoparticles/powders/nanopowders.

Table 126. Magnesium oxid nanoparticle/nanopowder producers and suppliers.

Table 127. Market overview for manganese oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 128. Markets, benefits and applications of manganese oxide nanoparticles/powders.

Table 129. Global consumption of manganese oxide nanoparticles/powders in metric tonnes, 2010-2031, 2010-2031.

Table 130. Manganese oxide nanoparticles/powders Market Share 2020 (MT).



Table 131. Manganese oxide nanoparticles/powders Market Share 2031 (MT).

Table 132. Consumption of manganese oxide nanoparticles/powders by region 2020 (MT).

Table 133. Consumption of manganese oxide nanoparticles/powders by region 2031 (MT).

Table 134. Example prices of manganese oxide nanoparticles/powders.

Table 135. Manganese oxide nanoparticle/nanopowder producers and suppliers.

Table 136. Market overview for multi-walled carbon nanotubes-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 137. Properties of multi-walled carbon nanotubes and comparable materials.

Table 138. Markets, benefits and applications of multi-walled Carbon Nanotubes (MWCNT).

Table 139. Key MWCNT producers.

Table 140. Global consumption of multi-walled carbon nanotubes in metric tonnes, 2010-2031

Table 141. MWCNT Market Share 2020 (MT).

Table 142. MWCNT Market Share 2031 (MT).

Table 143. Consumption of MWCNT by region 2031 (MT).

Table 144. Consumption of MWCNT by region 2031 (MT).

Table 145. Carbon nanotubes pricing (MWCNTS, SWCNT etc.) by producer.

Table 146. Multi-walled carbon nanotube (MWCNT) producers and suppliers.

Table 147. Market overview for nanoclays -Selling grade particle diameter, usage,

advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 148. Markets, benefits and applications of nanoclays.

Table 149. Global consumption of nanoclays in metric tonnes, 2010-2031.

Table 150. Nanoclays Market Share 2020 (MT).

Table 151. Nanoclays Market Share 2031 (MT).

Table 152. Consumption of nanoclays by region 2020 (MT).

Table 153. Consumption of nanoclays by region 2031 (MT).

Table 154. Example prices of nanoclays.

Table 155. Main nanoclays producers and products.

Table 156. Market summary for nanodiamonds-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 157. Properties of nanodiamonds.

Table 158. Markets, benefits and applications of nanodiamonds.

Table 159. Nanodiamonds Market Share 2020 (MT).



Table 160. Nanodiamonds Market Share 2031 (MT).

Table 161. Consumption of nanodiamonds by region 2020 (MT).

Table 162. Consumption of nanodiamonds by region 2031 (MT).

Table 163. Pricing of nanodiamonds, by producer/distributor.

Table 164. Production methods, by main ND producers.

Table 165. Nanodiamond producers and suppliers.

Table 166. Market summary for nanofibers- Selling grade particle diameter, advantages,

average price/ton, high volume applications, low volume applications and novel applications.

Table 167. Nanofibers types, properties and applications.

Table 168. Applications of polymer, alumina, carbon and other nanofibers.

Table 169. Nanofibers Market Share 2020 (MT).

Table 170. Nanofibers Market Share 2031 (MT).

Table 171. Consumption of Nanofibers by region 2020 (MT).

Table 172. Consumption of Nanofibers by region 2031 (MT).

- Table 173. Nanofibers producers.
- Table 174. Market overview for nanosilver-Selling grade particle diameter, usage,

advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 175. Markets, benefits and applications of nanosilver.

Table 176. Global consumption of nanosilver in metric tonnes, 2010-2031.

- Table 177. Nanosilver Market Share 2020 (MT).
- Table 178. Nanosilver Market Share 2031 (MT).

Table 179. Consumption of nanosilver by region 2020 (MT).

- Table 180. Consumption of nanosilver by region 2031 (MT).
- Table 181. Prices of nanosilver.

Table 182. Nanosilver producers.

Table 183. Market overview for nickel nanoparticles/powders -Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 184. Markets, benefits and applications of nickel nanoparticles/powders.

Table 185. Global consumption of nickel nanoparticles/powders in metric tonnes, 2010-2031.

Table 186. Nickel nanoparticles/powders Market Share 2020 (MT).

Table 187. Nickel nanoparticles/powders Market Share 2031 (MT).

Table 188. Consumption of nickel nanoparticles/powders by region 2020 (MT).

Table 189. Consumption of nickel nanoparticles/powders by region 2031 (MT).

Table 190. Example prices of nickel nanoparticles/powders.

Table 191. Nickel nanoparticle/nanopowders producers and suppliers.



Table 192. Market overview for quantum dots -Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 193. Markets, benefits and applications of quantum dots.

Table 194. Quantum dot display products.

Table 195. Global consumption of quantum dots in metric tonnes, 2018-2031.

Table 196. Quantum dots Market Share 2020 (MT).

Table 197. Quantum dots Market Share 2031 (MT).

Table 198. Consumption of quantum dots by region 2020 (MT).

Table 199. Consumption of quantum dots by region 2020 (MT).

Table 200. Example prices of quantum dots.

Table 201. Quantum dot producers and suppliers.

Table 202. Market overview for silicon oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 203. Markets, benefits and applications of silicon oxide nanoparticles/powders.

Table 204. Global consumption of silicon oxide nanoparticles/powders in metric tonnes, 2010-2031

Table 205. Silicon oxide nanoparticles/powders Market Share 2020 (MT).

Table 206. Silicon oxide nanoparticles/powders Market Share 2031 (MT).

Table 207. Consumption of silicon oxide nanoparticles/powders by region 2020 (MT).

Table 208. Consumption of silicon oxide nanoparticles/powders by region 2031 (MT).

Table 209. Example prices of silicon oxide nanoparticles/powders.

Table 210. Silicon oxide nanoparticles/powders/nanopowders producers and suppliers.

Table 211. Market overview for single-walled carbon nanotubes-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 212. Properties of single-walled carbon nanotubes.

Table 213. Typical properties of SWCNT and MWCNT.

Table 214. Markets, benefits and applications of single-walled Carbon Nanotubes.

Table 215. SWCNT prices.

Table 216. Annual production capacity of the key SWCNT producers,

Table 217. Global consumption of SWCNTs in metric tonnes, 2018-2031.

Table 218. SWCNT producers.

Table 219. Market overview for titanium dioxide nanoparticles/powders -Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 220. Markets, benefits and applications of titanium dioxide nanoparticles/powders.



Table 221. Global consumption of titanium dioxide nanoparticles/powders in metric tonnes, 2010-2031.

Table 222. Titanium dioxide nanoparticles/powders Market Share 2020 (MT).

Table 223. Titanium dioxide nanoparticles/powders Market Share 2031 (MT).

Table 224. Consumption of titanium dioxide nanoparticles/powders by region 2020 (MT).

Table 225. Consumption of titanium dioxide nanoparticles/powders by region 2031 (MT).

Table 226. Titanium dioxide nanoparticles/powders/nanopowders producers and suppliers.

Table 227. Market overview for zinc oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 228. Markets and applications for zinc oxide nanoparticles/powders.

Table 229. Main Zinc oxide nanoparticles/powders-Suppliers, products, primary particle size.

Table 230. Global consumption of zinc oxide nanoparticles/powders in metric tonnes, 2010-2031.

Table 231. ZInc oxide nanoparticles/powders Market Share 2020 (MT).

Table 232. ZInc oxide nanoparticles/powders Market Share 2031 (MT).

Table 233. Consumption of zinc oxide nanoparticles/powders by region 2020 (MT).

Table 234. Consumption of zinc oxide nanoparticles/powders by region 2031 (MT).

Table 235. Zinc oxide nanoparticle/nanopowder producers and suppliers,

Table 236. Market overview for zirconium oxide nanoparticles/powders-Selling grade particle diameter, usage, advantages, average price/ton, high volume applications, low volume applications and novel applications.

Table 237. Markets, benefits and applications of zirconium oxide nanoparticles/powders.

Table 238. Global consumption of zirconium oxide nanoparticles/powders in metric tons, 2010-2031.

Table 239. Zirconium oxide nanoparticles/powders Market Share 2020 (MT).

Table 240. Zirconium oxide nanoparticles/powders Market Share 2031 (MT).

Table 241. Consumption of zirconium oxide nanoparticles/powders by region 2020 (MT).

Table 242. Consumption of zirconium oxide nanoparticles/powders by region 2031 (MT).

Table 243. Prices of zirconium oxide nanoparticles/powders.

Table 244. Zirconium oxide nanoparticles/powders/nanopowders producers and suppliers.



Table 245. Synthesis methods for cellulose nanocrystals (CNC).

Table 246. CNC sources, size and yield.

Table 247. CNC properties.

Table 248. Mechanical properties of CNC and other reinforcement materials.

Table 249. Applications of cellulose nanocrystals (CNC).

Table 250. Product/price/application matrix of cellulose nanocrystal producers.

Table 251: Cellulose nanocrystal production capacities and production process, by producer.

Table 252. Comparative properties of BNNTs and CNTs.

Table 253. Applications of BNNTs.

Table 254. BNNT pricing by producer.

Table 256. Erbium oxide nanoparticles/nanopowders-Properties, applications, prices and producers.

Table 257. Indium oxide nanoparticles/powders-Properties, applications, prices and producers.

Table 258. Molybdenum nanoparticles/powders-Properties, applications, prices and producers.

Table 259. Comparative properties of conventional QDs and Perovskite QDs.

- Table 260. Applications of perovskite QDs.
- Table 261. Development roadmap for perovskite QDs.
- Table 262. Properties of perovskite QLEDs comparative to OLED and QLED.
- Table 263. Applications of carbon quantum dots.
- Table 264. Comparison of graphene QDs and semiconductor QDs.

Table 265. Advantages and disadvantages of methods for preparing GQDs.

- Table 266. Applications of graphene quantum dots.
- Table 267. Graphene quantum dots companies.

Table 268. Market drivers for nanotechnology and nanomaterials in adhesives.

Table 269. Market overview for nanotechnology and nanomaterials in adhesives.

Table 270. Nanomaterials properties relevant to application in adhesives.

Table 271. Applications of nanomaterials in adhesives, by market.

Table 272: Applications in adhesives, by nanomaterials type.

Table 273. Market assessment for nanotechnology and nanomaterials in adhesives.

Table 274. Global revenues for nanotechnology and nanomaterials in adhesives,

2018-2031, conservative and optimistic estimates (millions USD) .

Table 275: Nanotechnology and nanomaterials product developers in adhesives.

Table 276. Market assessment for nanotechnology and nanomaterials in aerospace and aviation.

Table 277. Market drivers for nanotechnology and nanomaterials in aerospace and aviation.



Table 278. Market overview for nanotechnology and nanomaterials in aerospace and aviation.

Table 279. Applications in aerospace composites, by nanomaterials type and benefits thereof.

Table 280. Types of nanocoatings utilized in aerospace and application.

Table 281. Applications in aerospace coatings, by nanomaterials type and benefits thereof.

Table 282. Global revenues for nanotechnology and nanomaterials in aerospace and aviation, 2018-2031, millions USD.

Table 283. Nanotechnology and nanomaterials application and product developers in the aerospace and aviation industry.

Table 284. Market drivers for nanotechnology and nanomaterials in automotive.

Table 285. Market overview for nanotechnology and nanomaterials in automotive.

Table 286. Applications in automotive composites, by nanomaterials type and benefits thereof.

Table 287. Nanocoatings applied in the automotive industry.

Table 288: Applications in automotive tires, by nanomaterials type and benefits thereof.

Table 289. Market assessment for nanotechnology and nanomaterials in automotive.

Table 290. Global revenues for nanotechnology and nanomaterials in automotive,

2018-2031, millions USD.

Table 291. Nanotechnology and nanomaterials product developers in the automotive industry.

Table 292. Market drivers for nanotechnology and nanomaterials in batteries.

Table 293. Market overview for nanotechnology and nanomaterials in batteries.

Table 294. Applications in LIB, by nanomaterials type and benefits thereof.

Table 295. Applications in Li-S batteries, by nanomaterials type and benefits thereof.

Table 296. Applications in sodium-ion batteries, by nanomaterials type and benefits thereof.

Table 297. Applications in lithium-air batteries, by nanomaterials type and benefits thereof.

Table 298. Applications in magesium batteries, by nanomaterials type and benefits thereof.

Table 299. Market assessment for nanotechnology and nanomaterials in batteries.

Table 300. Global revenues for nanotechnology and nanomaterials in batteries, 2018-2031, millions USD.

Table 301. Nanotechnology and nanomaterials product developers in batteries.

Table 302. Market drivers for nanomaterials-based products in medical biosensors. Table 303. Applications in medical biosensors, by nanomaterials type and benefits thereof.



Table 304. Global revenues for nanotechnology and nanomaterials in medical biosensors, 2018-2031, millions USD.

Table 305. Nanotechnology and nanomaterials product developers in medical biosensors.

Table 306. Market drivers for nanomaterials-based products in drug formulation and delivery.

Table 307. Types of Nanocarriers.

Table 308. Applications in drug formulation and delivery, by nanomaterials type and benefits thereof.

Table 309. Types of nanoparticles and products thereof.

Table 310. Nanotechnology drug products.

Table 311. List of antigens delivered by using different nanocarriers.

Table 312. Global revenues for nanotechnology and nanomaterials in drug delivery, 2018-2031, millions USD.

Table 313. Nanotechnology and nanomaterials products developers in drug formulation and delivery.

Table 314. Market drivers for Nanotechnology and nanomaterials-based products in imaging and diagnostics.

Table 315: Applications in medical imaging and diagnostics, by nanomaterials type and benefits thereof.

Table 316. Global revenues for nanotechnology and nanomaterials in imaging and diagnostics, 2018-2031, millions USD.

Table 317. Nanotechnology and nanomaterials product developers in medical imaging and diagnositcs

Table 318. Market drivers for nanomaterials-based products in medical coatings and films.

Table 319. Nanocoatings applied in the medical industry-type of coating, nanomaterials utilized, benefits and applications.

Table 320. Nanomaterials utilized in medical coatings and films coatings-benefits and applications.

Table 321. Global revenues for nanomaterials in medical coatings, 2018-2031, millions USD.

Table 322: Nanomaterials-based products developers in medical coatings and films.

Table 323: Market drivers for nanomaterials-based products in medical implants.

Table 324. Applications in medical implants and devices, by nanomaterials type and benefits thereof.

Table 325. Global revenues for nanomaterials in medical implants 2018-2031, millions USD.

Table 326: Nanotechnology and nanomaterials product developers in medical implants,



and devices.

Table 327. Market drivers for nanotechnology and nanomaterials in wound care.

Table 328. Applications in wound care, by nanomaterials type and benefits thereof.

Table 329: Medical wound care products.

Table 330. Global revenues for nanotechnology and nanomaterials in wound care, 2018-2031, millions USD.

Table 331: Nanomaterials-based products and application developers in wound care.

Table 332. Market drivers for nanotechnology and nanomaterials-based products in dental.

Table 333: Applications in dental, by nanomaterials type and benefits thereof.

Table 334. Global revenues for nanotechnology and nanomaterials in dental, 2018-2031, millions USD.

Table 335. Nanomaterials-based product developers in dental.

Table 336. Market drivers in nanocoatings.

Table 337. Market overview for nanotechnology and nanomaterials in coatings and paints.

Table 338. Properties of nanocoatings.

Table 339. End user markets for nanocoatings.

Table 340. Anti-fingerprint nanocoatings companies.

Table 341. Anti-bacterial nanocoatings companies.

Table 342. Anti-corrosion nanocoatings coatings.

Table 343. Abrasion and wear resistant nanocoatings companies.

Table 344. Barrier nanocoatings companies.

Table 345. Anti-fogging nanocoatings companies.

Table 346. Anti-fouling and easy-to-clean nanocoatings companies.

Table 347. Self-cleaning (bionic) nanocoatings companies.

Table 348. Self-cleaning (photocatalytic) nanocoatings companies.

Table 349. UV-resistant nanocoatings companies.

Table 350. Thermal barrier and flame retardant nanocoatings companies.

Table 351. Anti-icing and de-icing nanocoatings companies.

Table 352. Anti-reflective nanocoatings companies.

Table 353. Market drivers for nanotechnology and nanomaterials in composites.

Table 354. Market overview for nanotechnology and nanomaterials in composites.

Table 355. Applications in polymer composites, by nanomaterials type and benefits thereof.

Table 356. Applications in thermal management composites, by nanomaterials type and benefits thereof.

Table 357. Applications in ESD and EMI shielding composites, by nanomaterials type and benefits thereof.



Table 358. Applications in flame retardants, by nanomaterials type and benefits thereof.

Table 359. Market assessment for nanotechnology and nanomaterials in composites.

Table 360. Global revenues for nanotechnology and nanomaterials in composites, 2018-2031, millions USD.

Table 361. Nanotechnology and nanomaterials-based application and product developers in composites.

Table 362. Comparative properties of conductive inks.

Table 363. Market drivers for nanotechnology and nanomaterials in conductive inks.

Table 364. Market overview for nanotechnology and nanomaterials in conductive inks.

Table 365. Applications in conductive inks by nanomaterials type and benefits thereof.

Table 366. Market assessment for nanotechnology and nanomaterials in conductive inks.

Table 367. Global revenues for nanotechnology and nanomaterials in conductive inks, 2017-2031, millions USD.

Table 368. Nanotechnology and Nanomaterials-based application and product developers in conductive inks.

Table 369. Market drivers for nanotechnology and nanomaterials in construction.

Table 370. Market overview for nanotechnology and nanomaterials in construction,

building protection and architectural coatings.

Table 371. Applications in insulation and heating, by nanomaterials type and benefits thereof.

Table 372. Nanomaterials-based product developers in insulation.

Table 373. Applications in exterior coatings by nanomaterials type and benefits thereof.

Table 374: Nanomaterials-based product developers in exterior coatings.

Table 375. Applications in smart windows by nanomaterials type and benefits thereof.

Table 376. Nanomaterials-based product developers in smart windows and glass products.

Table 377. Applications in VOC mitigation and filtration by nanomaterials type and benefits thereof.

Table 378: Nanomaterials-based product developers in VOC mitigation and filtration.

Table 379. Applications in concrete and cement by nanomaterials type and benefits thereof.

Table 380. Applications in self-healing construction materials by nanomaterials type and benefits thereof.

Table 381. Nanomaterials-based product developers self-healing construction materials.

Table 382. Nanomaterials for asphalt and bitumen.

Table 383. Global revenues for nanotechnology and nanomaterials in construction, 2018-2031, millions USD.

Table 384. Nanotechnology and nanomaterials-based application and product



developers in construction, building protection and architectural coatings.

Table 385: Market drivers for nanotechnology and nanomaterials in cosmetics and sunscreens.

Table 386: Applications in cosmetics and sunscreens, by nanomaterials type and benefits thereof.

Table 387. Cosmetics products incorporating nanomaterials/nanocarriers.

Table 388. Global revenues for nanotechnology and nanomaterials in cosmetics and sunscreens, 2018-2031, millions USD.

Table 389. Nanotechnology and nanomaterials-based product developers in cosmetics and sunscreens market.

Table 390. Market drivers for nanotechnology and nanomaterials in flexible electronics, conductive films and displays.

Table 391: Applications in flexible electronics, flexible conductive films and displays, by nanomaterials type and benefits thereof.

Table 392. Global revenues for nanomaterials in flexible electronics, 2018-2031.

Table 393. Global revenues for nanotechnology and nanomaterials in displays, 2018-2031.

Table 394: Nanotechnology and nanomaterials-based product developers in flexible electronics, flexible conductive films and displays.

Table 395. Market drivers for nanotechnology and nanomaterials in transistors, integrated circuits and other components.

Table 396: Applications in transistors, integrated circuits and other components, by nanomaterials type and benefits thereof.

Table 397. Global revenues for nanotechnology and nanomaterials in transistors, integrated circuits and other components, 2018-2031.

Table 398. Nanotechnology and Nanomaterials-based product developers in transistors, integrated circuits and other components.

Table 399. Market drivers for nanotechnology and nanomaterials in memory devices.

Table 400: Applications in memory devices, by nanomaterials type and benefits thereof.

Table 401. Global revenues for nanotechnology and nanomaterials in memory devices, 2018-2031.

Table 402: Nanotechnology and Nanomaterials-based product developers in memory devices.

Table 403. Market drivers for nanotechnology and nanomaterials in electronics coatings.

Table 404. Nanocoatings applied in the consumer electronics industry.

Table 405. Global revenues for nanotechnology and nanomaterials in electronics coatings, 2018-2031.

Table 406. Nanotechnology and Nanomaterials-based product developers in electronics



coatings.

Table 407. Market drivers for nanotechnology and nanomaterials in photonics.

Table 408. Applications in photonics, by nanomaterials type and benefits thereof.

Table 409: Graphene properties relevant to application in optical modulators.

Table 410. Global revenues for nanotechnology and nanomaterials in photonics, 2018-2031.

Table 411. Nanotechnology and Nanomaterials-based product developers in photonics. Table 412. Market drivers for nanotechnology and nanomaterials in filtration and environmental remediation.

Table 413. Types of filtration.

Table 414. Applications in desalination and water filtration, by nanomaterials type and benefits thereof.

Table 415. Applications in airborne filters, by nanomaterials type and benefits thereof.

Table 416. Applications in gas separation, by nanomaterials type and benefits thereof.

Table 417. Global revenues for nanotechnology and nanomaterials in filtration,

2018-2031, millions USD.

Table 418. Nanotechnology and Nanomaterials-based product developers in filtration and environmental remediation.

Table 419. Market drivers for nanotechnology and nanomaterials in food and agriculture.

Table 420: Applications in food packaging, by nanomaterials type and benefits thereof. Table 421: Food packaging products incorporating nanomaterials.

Table 422: Applications in food coatings, by nanomaterials type and benefits thereof.

Table 423: Applications in food additives and supplements, by nanomaterials type and benefits thereof.

Table 424: Applications in agricultural production, by nanomaterials type and benefits thereof.

Table 425. Global revenues for nanomaterials in food and agriculture, 2018-2031, millions USD.

Table 426: Nanotechnology and Nanomaterials-based product developers in food and agriculture.

Table 427. Market drivers for nanotechnology and nanomaterials in fuel cells and hydrogen storage.

Table 428: Applications in fuel cells, by nanomaterials type and benefits thereof.

Table 429: Applications hydrogen storage, by nanomaterials type and benefits thereof.

Table 430. Global revenues for nanotechnology and nanomaterials in fuel cells, 2018-2031, millions USD.

Table 431. Nanotechnology and Nanomaterials-based product developers in fuel cells and hydrogen storage.



Table 432: Market drivers for nanotechnology and nanomaterials in household care and sanitary.

Table 433: Applications in anti-microbial coatings, by nanomaterials type and benefits thereof.

Table 434. Applications in anti-fingerprint nanocoatings, by nanomaterials type and benefits thereof.

Table 435. Global revenues for nanotechnology and nanomaterials in household care and sanitary, 2018-2031, millions USD.

Table 436. Nanomaterials-based application and product developers in household care and sanitary.

Table 437: Market drivers for nanotechnology and nanomaterials in lighting.

Table 438: Applications in lighting, by nanomaterials type and benefits thereof.

Table 439. Global revenues for nanotechnology and nanomaterials in lighting, 2018-2031, millions USD.

Table 440: Nanotechnology and Nanomaterials-based product developers in lighting.

Table 441: Market drivers for nanotechnology and nanomaterials in lubricants.

Table 442. Nanomaterial lubricant products.

Table 443: Applications in lubricants, by nanomaterials type and benefits thereof.

Table 444. Global revenues for nanotechnology and nanomaterials in lubricants,

2018-2031, millions USD.

Table 445. Nanotechnology and Nanomaterials-based product developers in lubricants.

Table 446: Market drivers for nanotechnology and nanomaterials in the marine market.

Table 447. Nanocoatings applied in the marine industry-type of coating, nanomaterials utilized and benefits.

Table 448. Global revenues for nanotechnology and nanomaterials in the marine sector, 2018-2031, millions USD.

Table 449. Nanotechnology and Nanomaterials-based product developers in the marine industry.

Table 450. Market drivers for nanotechnology and nanomaterials in oil, gas and mining. Table 451. Applications in sensing and reservoir management, by nanomaterials type and benefits thereof.

Table 452. Applications in oil, gas and mining coatings, by nanomaterials type and benefits thereof.

Table 453. Applications in oil & gas exploration drilling fluids, by nanomaterials type and benefits thereof.

Table 454. Applications in oil & gas exploration sorbent materials, by nanomaterials type and benefits thereof.

Table 455. Applications in separation, by nanomaterials type and benefits thereof.Table 456. Global revenues for nanotechnology and nanomaterials in oil, gas and



mining, 2018-2031, millions USD.

Table 457. Nanotechnology and Nanomaterials-based product developers in oil & gas exploration.

Table 458. Market drivers for nanotechnology and nanomaterials in packaging.

Table 459. Application markets, competing materials, nanomaterials advantages and current market size in packaging.

Table 460. Applications in packaging, by nanomaterials type and benefits thereof.

Table 461. Global revenues for nanotechnology and nanomaterials in packaging, 2018-2031, millions USD.

Table 462: Nanotechnology and Nanomaterials-based product developers in packaging.

Table 463: Market drivers for nanotechnology and nanomaterials in rubber.

Table 464. Market overview for nanotechnology and nanomaterials in rubber.

Table 465. Applications in rubber and elastomers, by nanomaterials type and benefits thereof.

Table 466. Market assessment for nanotechnology and nanomaterials in rubber.

Table 467. Global revenues for nanotechnology and nanomaterials in rubber,

2018-2031, millions USD.

Table 468. Nanotechnology and Nanomaterials-based product developers in rubber.

Table 469. Market drivers for nanotechnology and nanomaterials in security and defence.

Table 470. Applications in military textiles, by nanomaterials type and benefits thereof.

Table 471. Applications in military equipment, by nanomaterials type and benefits thereof.

Table 472. Applications in anti-counterfeiting, by nanomaterials type and benefits thereof.

Table 473. Applications in security and defence sensors and detection, by nanomaterials type and benefits thereof.

Table 474. Applications in ballistic protection, by nanomaterials type and benefits thereof.

Table 476. Global revenues for nanotechnology and nanomaterials in security and defence, 2018-2031, millions USD.

Table 477: Nanotechnology and Nanomaterials-based product developers in security and defence.

Table 478. Market drivers for nanotechnology and nanomaterials in sensors.

Table 479. Graphene properties relevant to application in sensors.

Table 480. Applications in strain sensors, by nanomaterials type and benefits thereof.

Table 481: Applications in strain sensors, by nanomaterials type and benefits thereof.

Table 482: Applications in biosensors, by nanomaterials type and benefits thereof.

Table 483: Applications in food sensors, by nanomaterials type and benefits thereof.



Table 484: Applications in image sensors, by nanomaterials type and benefits thereof. Table 485: Applications in infrared (IR) sensors, by nanomaterials type and benefits thereof.

Table 486: Applications in optical sensors, by nanomaterials type and benefits thereof.

Table 487. Applications in pressure sensors, by nanomaterials type and benefits thereof.

Table 488. Applications in humidity sensors, by nanomaterials type and benefits thereof.

Table 489: Applications in acoustic sensors, by nanomaterials type and benefits thereof.

Table 490: Applications in wireless sensors, by nanomaterials type and benefits thereof.

Table 491. Global revenues for nanotechnology and nanomaterials in sensors,

2018-2031, millions USD.

Table 492: Nanotechnology and Nanomaterials-based product developers in sensors.

Table 493. Market drivers for nanotechnology and nanomaterials in solar.

Table 494. Applications in solar, by nanomaterials type and benefits thereof.

Table 495: Applications in solar water splitting, by nanomaterials type and benefits thereof.

Table 496: Applications in solar coatings, by nanomaterials type and benefits thereof.

Table 497. Global revenues for nanotechnology and nanomaterials in solar, 2018-2031, millions USD.

Table 498. Nanotechnology and nanomaterials-based products and application developers in solar.

Table 499. Market drivers for nanotechnology and nanomaterials in supercapacitors.

Table 500. Applications in supercapacitors, by nanomaterials type and benefits thereof.

Table 501. Global revenues for nanotechnology and nanomaterials in supercapacitors, 2018-2031, millions USD.

Table 502. Nanotechnology and Nanomaterials-based product developers in supercapacitors.

Table 503. Market drivers for nanotechnology and nanomaterials in textiles and apparel. Table 504: Desirable functional properties for the textiles industry afforded by the use of nanomaterials.

Table 505. Applications in textiles, by nanomaterials type and benefits thereof.

Table 506: Nanocoatings applied in the textiles industry-type of coating, nanomaterials utilized, benefits and applications.

Table 507. Global revenues for nanotechnology and nanomaterials in textiles and apparel, 2018-2031, millions USD.

Table 508. Nanotechnology and Nanomaterials-based product developers in textiles. Table 509. Market drivers for nanotechnology and nanomaterials in tools & manufacturing.

Table 510. Applications in tools & manufacturing, by nanomaterials type and benefits



thereof.

Table 511. Global revenues for nanotechnology and nanomaterials in tools and manufacturing, 2018-2031, millions USD.

Table 512. Nanotechnology and nanomaterials-based product developers in tools & manufacturing.

Table 513. Applications in 3D printing, by nanomaterials type and benefits thereof.

Table 514. Market assessment for nanotechnology and nanomaterials in 3D printing.

Table 515. Global revenues for nanotechnology and nanomaterials in 3D printing, 2018-2031, millions USD.

Table 516. Nanotechnology and Nanomaterials-based product developers in 3D printing.

Table 517: Applications in catalysts, by nanomaterials type and benefits thereof.

Table 518: Nanotechnology and Nanomaterials-based product developers in catalysts.

Table 519: Nanotechnology and Nanomaterials-based product developersin cabling.

Table 520: Nanotechnology and Nanomaterials-based product developersin sporting goods.

Table 521: Applications in wind energy nanocomposites, by nanomaterials type and benefits thereof.

Table 522: Applications in wind energy nanosensors, by nanomaterials type and benefits thereof.

Table 523: Applications in wind energy nanocoatings, by nanomaterials type and benefits thereof.

Table 524: Nanotechnology and Nanomaterials-based product developers in wind energy.

Table 525. Applications in thermoelectrics, by nanomaterials type and benefits thereof.

Table 526. Nanotechnology and nanomaterials product developers in thermoelectrics.



## **Figures**

## FIGURES

Figure 1. Global production volume of nanomaterials in metric tonnes (MT), 2010-2031.

Figure 2. Technology Readiness Level for aluminium oxide nanoparticles/nanopowders.

Figure 3. Global consumption of aluminium oxide nanopowders/particles (MT),

2010-2031.

Figure 4. Aluminium oxide nanoparticles/powders Market Share 2020 (%).

Figure 5. Aluminium oxide nanoparticles/powders Market Share 2031 (%).

Figure 6. Consumption of aluminium oxide nanoparticles/powders by region 2020 (%).

Figure 7. Consumption of aluminium oxide nanoparticles/powders by region 2031 (%).

Figure 8. Stage of commercial development for Antimony Tin Oxide

Nanoparticles/powders.

Figure 9. Global consumption of antimony tin oxide, in metric tonnes, 2010-2031.

Figure 10. Antimony tin oxide nanoparticles/powders Market Share 2020 (%).

Figure 11. Antimony tin oxide nanoparticles/powders Market Share 2031 (%).

Figure 12. Consumption of antimony tin oxide nanoparticles/powders by region 2020 (%).

Figure 13. Consumption of antimony tin oxide nanoparticles/powders by region 2031 (%).

Figure 14. Technology Readiness Level (TRL) for Bismuth Oxide

Nanoparticles/powders.

Figure 15. Global consumption of bismuth oxide nanoparticles/powders in metric tonnes, 2010-2031.

- Figure 16. Bismuth oxide nanoparticles/powders Market Share 2020 (%).
- Figure 17. Bismuth oxide nanoparticles/powders Market Share 2031 (%).

Figure 18. Consumption of bismuth oxide nanoparticles/powders by region 2020 (%).

Figure 19. Consumption of bismuth oxide nanoparticles/powders by region 2031 (%).

Figure 20. Dorayaki.

Figure 21. ENASAVE NEXT.

- Figure 22. GEL-KAYANO™.
- Figure 23. Kirekira! toilet wipes.

Figure 24. "Poise" series Super strong deodorant sheet.

Figure 25. SC-3 (B) speakers.

Figure 26. SE-MONITOR5 headphones.

Figure 27. "Skin Care Acty" series Adult diapers.

Figure 28. "SURISURI" Lotion.

Figure 29. Technology Readiness Level (TRL) for nanocellulose.



Figure 30. Global consumption of multi-walled carbon nanotubes in metric tonnes, 2010-2031.

Figure 31. Cellulose nanofibers (CNF) Market Share 2020 (%).

Figure 32. Cellulose nanofibers (CNF) Market Share 2031 (%).

Figure 33. Consumption of Cellulose nanofibers (CNF) by region 2020 (%)

Figure 34. Consumption of Cellulose nanofibers (CNF) by region 2031 (%)

- Figure 35. Technology Readiness Level (TRL)) for cerium oxide nanoparticles/powders.
- Figure 36. Global consumption of cerium oxide nanoparticles/powders (MT), 2010-2031.
- Figure 37. Cerium oxide nanoparticles/powders Market Share 2020 (%)
- Figure 38. Cerium oxide nanoparticles/powders Market Share 2031 (%)
- Figure 39. Consumption of Cerium Oxide Nanoparticles/powders by region 2020 (%).
- Figure 40. Consumption of Cerium Oxide Nanoparticles/powders by region 2031 (%).

Figure 41. Technology Readiness Level (TRL) for Cobalt Oxide Nanoparticles/powders.

- Figure 42. Global consumption of cobalt oxide nanoparticles/powders (MT), 2010-2031.
- Figure 43. Cobalt oxide nanoparticles/powders Market Share 2020 (%).
- Figure 44. Cobalt oxide nanoparticles/powders Market Share 2031 (%).
- Figure 45. Consumption of Cobalt Oxide Nanoparticles/powders by region 2020 (%).
- Figure 46. Consumption of Cobalt Oxide Nanoparticles/powders by region 2031 (%).
- Figure 47. Cobalt oxide nanoparticles/powders and nanopowders producers and

suppliers.

Figure 48. Technology Readiness Level (TRL) for copper oxide nanoparticles/powders.

Figure 49. Global consumption of copper oxide nanoparticles/powders (MT), 2010-2031.

- Figure 50. Copper oxide nanoparticles/powders Market Share 2020 (%).
- Figure 51. Copper oxide nanoparticles/powders Market Share 2031 (%).
- Figure 52. Consumption of copper oxide nanoparticles/powders by region 2020 (%).
- Figure 53. Consumption of copper oxide nanoparticles/powders by region 2020 (%).
- Figure 54. Dendrimer structure.
- Figure 55. Dendrimer schematic for application in biomedicine.
- Figure 56. Technology Readiness Level (TRL) for dendrimers.
- Figure 57. Global consumption of dendrimers in metric tonnes, 2010-2031.
- Figure 58. Dendrimers Market Share 2020 (%).
- Figure 59. Dendrimers Market Share 2031 (%).
- Figure 60. Consumption of dendrimers by region 2020 (%)
- Figure 61. Consumption of dendrimers by region 2031 (%)
- Figure 62. Technology Readiness Level (TRL) for fullerenes.
- Figure 63. Global consumption of fullerenes in metric tonnes, 2010-2031.
- Figure 64. Fullerenes Market Share 2020 (%).
- Figure 65. Fullerenes Market Share 2031 (%).



- Figure 66. Consumption of fullerenes by region 2020 (%).
- Figure 67. Consumption of fullerenes by region 2031 (%).
- Figure 68. Technology Readiness Level (TRL) for gold nanoparticles/powders.
- Figure 69. Global consumption of gold nanoparticles in metric tonnes, 2010-2031.
- Figure 70. Gold nanoparticles/powders Market Share 2020 (%).
- Figure 71. Gold nanoparticles/powders Market Share 2031 (%).
- Figure 72. Consumption of gold nanoparticles by region 2020 (%).
- Figure 73. Consumption of gold nanoparticles by region 2031 (%).
- Figure 74. Technology Readiness Level (TRL) for graphene.
- Figure 75. Consumption of graphene, 2018-2031, tons.
- Figure 76. Graphene Market Share 2020 (%)
- Figure 77. Graphene Market Share 2031 (%)
- Figure 78. Consumption of graphene by market, 2018-2031, by market (MTs).
- Figure 79. Consumption of graphene by region 2020 (%).
- Figure 80. Consumption of graphene by region 2031 (%)
- Figure 81. Technology Readiness Level (TRL) for iron oxide nanoparticles/powders.
- Figure 82. Global consumption of iron oxide nanoparticles/powders in metric tonnes, 2010-2031.
- Figure 83. Iron oxide nanoparticles/powders Market Share 2020 (%)
- Figure 84. Iron oxide nanoparticles/powders Market Share 2031 (%).
- Figure 85. Consumption of iron oxide nanoparticles/powders by region 2020 (%)
- Figure 86. Consumption of iron oxide nanoparticles/powders by region 2031 (%).
- Figure 87. Technology Readiness Level (TRL) for magnesium oxide
- nanoparticles/powders.
- Figure 88. Global consumption of magnesium oxide nanoparticles/powders in metric tonnes, 2010-2031.
- Figure 89. Magnesium oxide nanoparticles/powders Market Share 2020 (%).
- Figure 90. Magnesium oxide nanoparticles/powders Market Share 2031 (%).
- Figure 91. Consumption of magnesium oxide nanoparticles/powders by region 2020 (%).
- Figure 92. Consumption of magnesium oxide nanoparticles/powders by region 2031 (%).
- Figure 93. Technology Readiness Level (TRL) for manganese oxide nanoparticles/powders.
- Figure 94. Global consumption of manganese oxide nanoparticles/powders in metric tonnes, 2010-2031, 2010-2031.
- Figure 95. Manganese oxide nanoparticles/powders Market Share 2020 (%).
- Figure 96. Manganese oxide nanoparticles/powders Market Share 2031(%)
- Figure 97. Consumption of manganese oxide nanoparticles/powders by region 2020



(%).

Figure 98. Consumption of manganese oxide nanoparticles/powders by region 2031 (%).

Figure 99. Technology Readiness Level (TRL) for multi-walled Carbon Nanotubes by application.

Figure 100. Global consumption of multi-walled carbon nanotubes in metric tonnes, 2010-2031.

- Figure 101. MWCNT Market Share 2020 (%)
- Figure 102. MWCNT Market Share 2031 (%)
- Figure 103. Consumption of MWCNT by region 2020 (%).
- Figure 104. Consumption of MWCNT by region 2031 (%).
- Figure 105. Technology Readiness Level (TRL) for nanoclays.
- Figure 106. Global consumption of nanoclays in metric tonnes, 2010-2031.
- Figure 107. Nanoclays Market Share 2020 (%).
- Figure 108. Nanoclays Market Share 2031(%).
- Figure 109. Consumption of nanoclays by region 2020 (%).
- Figure 110. Consumption of nanoclays by region 2031 (%).
- Figure 111. Detonation Nanodiamond.
- Figure 112. DND primary particles and properties.
- Figure 113. Functional groups of Nanodiamonds.
- Figure 114. Technology Readiness Level (TRL) for nanodiamonds.
- Figure 115. Global consumption of nanodiamonds in metric tonnes, 2010-2031
- Figure 116. Nanodiamonds Market Share 2020 (%)
- Figure 117. Nanodiamonds Market Share 2031 (%)
- Figure 118. Consumption of nanodiamonds by region 2020 (%).
- Figure 119. Consumption of nanodiamonds by region 2031 (%).
- Figure 120. Technology Readiness Level (TRL) for nanofibers.
- Figure 121. Nanofibers Market Share 2020 (%)
- Figure 122. Nanofibers Market Share 2031 (%)
- Figure 123. Consumption of Nanofibers by region 2020 (%).
- Figure 124. Consumption of Nanofibers by region 2031 (%).
- Figure 125. Supply chain for nanosilver products.
- Figure 126. Technology Readiness Level (TRL) for nanosilver.
- Figure 127. Global consumption of nanosilver in metric tonnes, 2010-2031.
- Figure 128. Nanosilver Market Share 2020 (%).
- Figure 129. Nanosilver Market Share 2031(%)
- Figure 130. Consumption of nanosilver by region 2020 (%).
- Figure 131. Consumption of nanosilver by region 2031 (%).
- Figure 132. Technology Readiness Level (TRL) for nickel nanoparticles/powders.



Figure 133. Global consumption of nickel nanoparticles/powders in metric tonnes, 2010-2031.

Figure 134. Nickel nanoparticles/powders Market Share 2020 (%).

Figure 135. Nickel nanoparticles/powders Market Share 2031 (%).

Figure 136. Consumption of nickel nanoparticles/powders by region 2020 (%).

Figure 137. Consumption of nickel nanoparticles/powders by region 2031 (%)

Figure 138. Technology Readiness Level (TRL) for quantum dots.

Figure 139. Global consumption of quantum dots in metric tonnes, 2018-2031.

Figure 140. Quantum dots Market Share 2020 (%).

Figure 141. Quantum dots Market Share 2031 (%)

Figure 142. Consumption of quantum dots by region 2020 (%)

Figure 143. Consumption of quantum dots by region 2020 (%)

Figure 144. Technology Readiness Level (TRL) for silicon oxide nanoparticles/powders.

Figure 145. Global consumption of silicon oxide nanoparticles/powders in metric tonnes, 2010-2031

Figure 146. Silicon oxide nanoparticles/powders Market Share 2020 (%).

Figure 147. Silicon oxide nanoparticles/powders Market Share 2031 (%).

Figure 148. Consumption of silicon oxide nanoparticles/powders by region 2020 (%).

Figure 149. Consumption of silicon oxide nanoparticles/powders by region 2031 (%).

Figure 150. Technology Readiness Level (TRL) for Single-walled Carbon Nanotubes.

Figure 151. Global consumption of SWCNTs in metric tonnes, 2018-2031.

Figure 152. Technology Readiness Level (TRL) for Titanium Oxide

Nanoparticles/powders.

Figure 153. Global consumption of titanium dioxide nanoparticles/powders in metric tonnes, 2010-2031.

Figure 154. Titanium dioxide nanoparticles/powders Market Share 2020 (%).

Figure 155. Titanium dioxide nanoparticles/powders Market Share 2031 (%).

Figure 156. Consumption of titanium dioxide nanoparticles/powders by region 2020 (%).

Figure 157. Consumption of titanium dioxide nanoparticles/powders by region 2031 (%).

Figure 158. Technology Readiness Level (TRL) for zinc oxide nanoparticles/powders.

Figure 159. Global consumption of zinc oxide nanoparticles/powders in metric tonnes, 2010-2031.

Figure 160. Zinc oxide nanoparticles/powders Market Share 2020 (%).

Figure 161. Zinc oxide nanoparticles/powders Market Share 2031 (%).

Figure 162. Consumption of zinc oxide nanoparticles/powders by region 2020 (%).

Figure 163. Consumption of zinc oxide nanoparticles/powders by region 2031 (%).

Figure 164. Technology Readiness Level (TRL) for zirconium oxide nanoparticles/powders.

Figure 165. Global consumption of zirconium oxide nanoparticles/powders in metric



tons, 2010-2031.

Figure 166. Zirconium oxide nanoparticles/powders Market Share 2020 (%).

- Figure 167. Zirconium oxide nanoparticles/powders Market Share 2031 (%).
- Figure 168. Consumption of zirconium oxide nanoparticles/powders by region 2020 (%)
- Figure 169. Consumption of zirconium oxide nanoparticles/powders by region 2031 (%).
- Figure 170. Schematic representation of carbon nanohorns.
- Figure 171. Schematic illustration of three-chamber system for SWCNH production.
- Figure 172. TEM image of cellulose nanocrystals.
- Figure 173. CNC preparation.
- Figure 174. Extracting CNC from trees.

Figure 175. CNC slurry.

Figure 176: Schematic of Boron Nitride nanotubes (BNNTs). Alternating B and N atoms are shown in blue and red.

Figure 177. A pQLED device structure.

Figure 178: Perovskite quantum dots under UV light.

Figure 179. Carbon dots development.

Figure 180: Green-fluorescing graphene quantum dots.

Figure 181. 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 182. Graphene quantum dots.

Figure 183. Top-down and bottom-up methods.

Figure 184. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in adhesives.

Figure 185. Global revenues for nanotechnology and nanomaterials in adhesives,

2018-2031, conservative and optimistic estimates (millions USD).

Figure 186. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in aerospace and aviation.

Figure 187. Global revenues for nanotechnology and nanomaterials in aerospace and aviation, 2018-2031, millions USD.

Figure 188. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in automotive.

Figure 189. Global revenues for nanotechnology and nanomaterials in automotive, 2018-2031, millions USD.

Figure 190. Electrochemical performance of nanomaterials in LIBs.

Figure 191. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in batteries.

Figure 192. Global revenues for nanotechnology and nanomaterials in batteries, 2018-2031, millions USD.

Figure 193. Technology Readiness Level (TRL) for nanotechnology and nanomaterials



in medical biosensors.

Figure 194. Global revenues for nanotechnology and nanomaterials in medical biosensors, 2018-2031, Millions USD.

Figure 195. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in drug delivery.

Figure 196. Global revenues for nanotechnology and nanomaterials in drug delivery, 2018-2031, millions USD.

Figure 197. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in medical imaging and diagnostics

Figure 198. Global revenues for nanotechnology and nanomaterials in imaging and diagnostics, 2018-2031.

Figure 199. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in medical coatings and films.

Figure 200. Global revenues for nanomaterials in medical coatings 2018-2031, millions USD.

Figure 201. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in medical implants.

Figure 202. Global revenues for nanomaterials in medical implants, 2018-2031, millions USD.

Figure 203. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in medical wound care.

Figure 204. Global revenues for nanotechnology and nanomaterials in wound care,

2018-2031, millions USD.

Figure 205. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in dental.

Figure 206. Global revenues for nanotechnology and nanomaterials in dental,

2018-2031, millions USD.

Figure 207. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in coatings and paints.

Figure 208. Global revenues for nanotechnology and nanomaterials in coatings and paints, 2018-2031, millions USD.

Figure 209. Self-healing nanocoatings.

Figure 210. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in composites.

Figure 211. Global revenues for nanotechnology and nanomaterials in composites, 2018-2031, millions USD.

Figure 212. Global revenues for nanotechnology and nanomaterials in conductive inks, 2017-2031, millions USD.

Figure 213. Technology Readiness Level (TRL) for nanotechnology and nanomaterials,



in construction and buildings.

Figure 214. Global revenues for nanotechnology and nanomaterials in conostruction, 2018-2031, millions USD.

Figure 215. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in cosmetics and sunscreens.

Figure 216. Global revenues for nanotechnology and nanomaterials in cosmetics and sunscreens, 2018-2031, millions USD.

Figure 217. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in flexible electronics, conductive films and displays.

Figure 218: QD-LCD supply chain.

Figure 219. Global revenues for nanotechnology and nanomaterials in flexible electronics, 2018-2031.

Figure 220. Global revenues for nanomaterials in displays, 2018-2031.

Figure 221. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in transistors, integrated circuits and other components.

Figure 222. Global revenues for nanotechnology and nanomaterials in transistors, integrated circuits and other components, 2018-2031.

Figure 223. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in memory devices.

Figure 224. Global revenues for nanotechnology and nanomaterials in memory devices, 2018-2031.

Figure 225. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in electronics coatings.

Figure 226. Global revenues for nanotechnology and nanomaterials in electronics coatings, 2018-2031.

Figure 227. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in photonics.

Figure 228. Global revenues for nanotechnology and nanomaterials in photonics, 2018-2031.

Figure 229. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in filtration.

Figure 230. Global revenues for nanotechnology and nanomaterials in filtration,

2018-2031, millions USD.

Figure 231. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in food and agriculture.

Figure 232. Global revenues for nanomaterials in food and agriculture, 2018-2031, millions USD.

Figure 233. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in fuel cells.



Figure 234. Global revenues for nanotechnology and nanomaterials in fuel cells, 2018-2031, millions USD.

Figure 235. Technology Readiness Level (TRL) for nanotechnology and nanomaterials household care and sanitary.

Figure 236. Global revenues for nanotechnology and nanomaterials in household care and sanitary, 2018-2031, millions USD.

Figure 237. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in lighting.

Figure 238. Global revenues for nanotechnology and nanomaterials in lighting, 2018-2031, millions USD.

Figure 239. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in lubricants.

Figure 240. Global revenues for nanotechnology and nanomaterials in lubricants, 2018-2031, millions USD.

Figure 241. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in marine.

Figure 242. Global revenues for nanotechnology and nanomaterials in the marine sector, 2018-2031, millions USD.

Figure 243. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in oil, gas and mining.

Figure 244. Global revenues for nanotechnology and nanomaterials in oil, gas and mining, 2018-2031, millions USD.

Figure 245. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in packaging.

Figure 246. Global revenues for nanotechnology and nanomaterials in packaging,

2018-2031, millions USD.

Figure 247. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in rubber.

Figure 248. Global revenues for nanotechnology and nanomaterials in rubber,

2018-2031, millions USD.

Figure 249. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in security and defence.

Figure 250. Global revenues for nanotechnology and nanomaterials in security and defence, 2018-2031, millions USD.

Figure 251. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in sensors.

Figure 252. Global revenues for nanotechnology and nanomaterials in sensors, 2018-2031, millions USD.

Figure 253. Technology Readiness Level (TRL) for nanotechnology and nanomaterials



in solar.

Figure 254. Global revenues for nanotechnology and nanomaterials in solar,

2018-2031, millions USD.

Figure 255. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in supercapacitors.

Figure 256. Global revenues for nanotechnology and nanomaterials in supercapacitors, 2018-2031, millions USD.

Figure 257. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in textiles and apparel.

Figure 258. Global revenues for nanotechnology and nanomaterials in textiles and apparel, 2018-2031, millions USD.

Figure 259. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in tools & manufacturing.

Figure 260. Global revenues for nanotechnology and nanomaterials in tools and manufacturing 2018-2031, millions USD.

Figure 261. Technology Readiness Level (TRL) for nanotechnology and nanomaterials in 3D printing.

Figure 262. Global revenues for nanotechnology and nanomaterials in 3D printing, 2018-2031, millions USD.



## I would like to order

Product name: The Nanotechnology and Nanomaterials Global Market Report 2021-2031 Product link: <u>https://marketpublishers.com/r/NA43E8B9F4C6EN.html</u>

> Price: US\$ 3,500.00 (Single User License / Electronic Delivery) If you want to order Corporate License or Hard Copy, please, contact our Customer Service: <u>info@marketpublishers.com</u>

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <u>https://marketpublishers.com/r/NA43E8B9F4C6EN.html</u>

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

Custumer signature \_\_\_\_\_

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

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