

Quantum Dot Market by Material (Cadmium-based Quantum Dots, Cadmium-free Quantum Dots), Product (Displays, Lasers, Solar Cells/Modules, Medical Devices, Photodetectors/Sensors, LED Products), Display, Vertical and Region - Global Forecast to 2029

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Abstracts

The quantum dot market is projected to reach USD 23.9 billion by 2029 from USD 10.6 billion in 2024, at a CAGR of 17.7% from 2024 to 2029. The major factors driving the growth of quantum dot market includes the increasing integration of quantum dots in display products and increasing adoption of quantum dots in LED products. Moreover, emerging implementation of quantum dots in image sensor is expected to provide several growth opportunities for market players in the quantum dot market.

Other products segment is expected to witness the highest CAGR in the quantum dot market during the forecast period

The quantum dot based other products segment market which includes quantum dots lasers, solar cells/modules, LED products, photodetectors/sensors, batteries and energy storage devices, transistors, chips, and tags is poised to exhibit the highest CAGR during the forecast period. This is attributed to the increasing commercialization of technologies such as lasers, solar cells, LED products, and medical devices in the near future. Factors such as accelerating demand for LEDs that deliver higher brightness, efficiency and stability than phosphor LEDs, low cost and superior quality, rising need for solar energy and surging need for high output power and superior temperature stability fuels the market growth of quantum dots lasers, solar cells/modules, LED products and photodetectors/sensors.

Consumer vertical is expected to have the largest market size during the forecast period

The consumer vertical is expected to have the largest market size during the forecast period which is attributed to the growth driven by a rising demand for advanced displays and energy-efficient technologies. Quantum dot LEDs offer enhanced color brightness and lower power consumption compared to conventional LEDs. The growing adoption of displays of varying sizes in shopping malls and retail outlets is fuelling demand for quantum dot displays, particularly in the consumer and commercial sectors.

The break-up of profile of primary participants in the quantum dot market-

By Company Type: Tier 1 – 55%, Tier 2 – 25%, Tier 3 – 20%

By Designation Type: C Level – 25%, Director Level – 50%, Others – 25%

By Region Type: North America – 30%, Europe – 35%, Asia Pacific – 25%, Rest of the World (RoW) – 10%

The major players of quantum dot market are AUO Corporation (Taiwan), BOE Technology Group Co., Ltd. (China), SAMSUNG DISPLAY (South Korea), LG DISPLAY CO., LTD. (South Korea), and TCL China Star Optoelectronics Technology Co., Ltd. (China) among others.

Research Coverage

The report segments the quantum dot market and forecasts its size based on material, product, display, vertical and region. The report also provides a comprehensive review of drivers, restraints, opportunities, and challenges influencing market growth. The report also covers qualitative aspects in addition to the quantitative aspects of the market.

Reasons to buy the report:

The report will help the market leaders/new entrants in this market with information on the closest approximate revenues for the overall quantum dot market and related segments. This report will help stakeholders understand the competitive landscape and gain more insights to strengthen their position in the market and plan suitable go-to-

market strategies. The report also helps stakeholders understand the pulse of the market and provides them with information on key market drivers, restraints, opportunities, and challenges.

The report provides insights on the following pointers:

Analysis of key drivers (the increasing integration of quantum dots in display products and increasing adoption of quantum dots in LED products, and growing deployment of quantum dots in solar cells), restraints (limited availability of rare earth materials, and high efficacy of alternative display technologies), opportunities (emerging implementation of quantum dots in image sensors, and growing demand of quantum dots for biological and medical imaging), and challenges (presence of environmental regulations for quantum dots) influencing the growth of the quantum dot market.

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product launches in the quantum dot market.

Market Development: Comprehensive information about lucrative markets – the report analyses the quantum dot market across varied regions.

Market Diversification: Exhaustive information about new products, untapped geographies, recent developments, and investments in the quantum dot market

Competitive Assessment: In-depth assessment of market shares, growth strategies and product offerings of leading players like AUO Corporation (Taiwan), BOE Technology Group Co., Ltd. (China), SAMSUNG DISPLAY (South Korea), LG DISPLAY CO., LTD. (South Korea), and TCL China Star Optoelectronics Technology Co., Ltd. (China).

Contents

1 INTRODUCTION

1.1 STUDY OBJECTIVES

1.2 MARKET DEFINITION

1.3 STUDY SCOPE

1.3.1 MARKETS COVERED

FIGURE 1 QUANTUM DOT: MARKET SEGMENTATION

1.3.2 GEOGRAPHIC SCOPE

FIGURE 2 QUANTUM DOT MARKET: GEOGRAPHIC SCOPE

1.3.3 INCLUSIONS AND EXCLUSIONS AT COMPANY LEVEL

1.3.4 INCLUSIONS AND EXCLUSIONS AT MATERIAL LEVEL

1.3.5 INCLUSIONS AND EXCLUSIONS AT PRODUCT LEVEL

1.3.6 INCLUSIONS AND EXCLUSIONS AT VERTICAL LEVEL

1.3.7 INCLUSIONS AND EXCLUSIONS AT REGIONAL LEVEL

1.3.8 YEARS CONSIDERED

1.4 CURRENCY CONSIDERED

1.5 UNITS CONSIDERED

1.6 LIMITATIONS

1.7 STAKEHOLDERS

1.8 SUMMARY OF CHANGES

1.8.1 RECESSION IMPACT

2 RESEARCH METHODOLOGY

2.1 RESEARCH APPROACH

FIGURE 3 QUANTUM DOT MARKET: RESEARCH DESIGN

2.1.1 SECONDARY DATA

2.1.1.1 Major secondary sources

2.1.1.2 Key data from secondary sources

2.1.2 PRIMARY DATA

2.1.2.1 Primary interviews with experts

2.1.2.2 List of key primary interview participants

2.1.2.3 Breakdown of primaries

2.1.2.4 Key data from primary sources

2.1.3 SECONDARY AND PRIMARY RESEARCH

2.1.3.1 Key industry insights

2.2 MARKET SIZE ESTIMATION

2.2.1 BOTTOM-UP APPROACH

2.2.1.1 Approach to obtain market share using bottom-up analysis (demand side)

FIGURE 4 BOTTOM-UP APPROACH

2.2.2 TOP-DOWN APPROACH

2.2.2.1 Approach to obtain market share using top-down analysis (supply side)

FIGURE 5 TOP-DOWN APPROACH

2.3 FACTOR ANALYSIS

2.3.1 SUPPLY-SIDE ANALYSIS

FIGURE 6 MARKET SIZE ESTIMATION METHODOLOGY: SUPPLY-SIDE ANALYSIS (APPROACH 1)

FIGURE 7 MARKET SIZE ESTIMATION: SUPPLY-SIDE ANALYSIS (APPROACH 2)

2.3.2 GROWTH FORECAST ASSUMPTIONS

TABLE 1 MARKET GROWTH ASSUMPTIONS

2.4 RECESSION IMPACT

2.5 MARKET BREAKDOWN AND DATA TRIANGULATION

FIGURE 8 DATA TRIANGULATION

2.6 RESEARCH ASSUMPTIONS

2.7 RISK ASSESSMENT

TABLE 2 RISK ASSESSMENT: QUANTUM DOT MARKET

3 EXECUTIVE SUMMARY

FIGURE 9 QUANTUM DOT MARKET: GLOBAL SNAPSHOT

FIGURE 10 CADMIUM-FREE QUANTUM DOTS SEGMENT TO DOMINATE MARKET DURING FORECAST PERIOD

FIGURE 11 QUANTUM DOT DISPLAYS TO BE LARGER SEGMENT DURING FORECAST PERIOD

FIGURE 12 MINI-LED TO BE LARGEST SEGMENT DURING FORECAST PERIOD

FIGURE 13 CONSUMER SEGMENT TO ACCOUNT FOR LARGEST MARKET SIZE DURING FORECAST PERIOD

FIGURE 14 ASIA PACIFIC TO DOMINATE MARKET DURING FORECAST PERIOD

4 PREMIUM INSIGHTS

4.1 ATTRACTIVE GROWTH OPPORTUNITIES FOR PLAYERS IN QUANTUM DOT MARKET

FIGURE 15 INCREASE IN DEPLOYMENT OF QUANTUM DOT PHOTODETECTORS/SENSORS TO DRIVE MARKET GROWTH

4.2 QUANTUM DOT MARKET, BY VERTICAL

FIGURE 16 CONSUMER VERTICAL TO ACCOUNT FOR LARGEST SHARE OF QUANTUM DOT MARKET DURING FORECAST PERIOD

4.3 QUANTUM DOT MARKET, BY PRODUCT

FIGURE 17 QUANTUM DOT DISPLAYS TO BE LARGER SEGMENT OF QUANTUM DOT MARKET DURING FORECAST PERIOD

4.4 QUANTUM DOT MARKET, BY DISPLAY

FIGURE 18 MINI-LED SEGMENT TO BE LARGEST MARKET DURING FORECAST PERIOD

4.5 QUANTUM DOT MARKET, BY MATERIAL

FIGURE 19 CADMIUM-FREE QUANTUM DOTS TO DOMINATE QUANTUM DOT MARKET DURING FORECAST PERIOD

4.6 QUANTUM DOT MARKET IN ASIA PACIFIC, BY VERTICAL AND COUNTRY, 2024

FIGURE 20 CONSUMER VERTICAL AND CHINA HELD LARGEST MARKET SHARES IN QUANTUM DOT MARKET IN ASIA PACIFIC IN 2024

5 MARKET OVERVIEW

5.1 INTRODUCTION

5.2 MARKET DYNAMICS

FIGURE 21 DRIVERS, RESTRAINTS, OPPORTUNITIES, AND CHALLENGES IN QUANTUM DOT MARKET

5.2.1 DRIVERS

5.2.1.1 Growing deployment of quantum dots in display applications

5.2.1.2 Rising adoption of quantum dots in LED products

5.2.1.3 Increasing integration of quantum dots in solar cells

FIGURE 22 IMPACT ANALYSIS OF DRIVERS ON QUANTUM DOT MARKET

5.2.2 RESTRAINTS

5.2.2.1 Limited availability of rare earth materials

5.2.2.2 High efficacy of alternative display technologies

FIGURE 23 IMPACT ANALYSIS OF RESTRAINTS ON QUANTUM DOT MARKET

5.2.3 OPPORTUNITIES

5.2.3.1 Increasing use of quantum dots for biological and medical imaging

5.2.3.2 Emerging implementation of quantum dots in image sensors

FIGURE 24 IMPACT ANALYSIS OF OPPORTUNITIES ON QUANTUM DOT MARKET

5.2.4 CHALLENGES

5.2.4.1 Presence of environmental regulations for quantum dots

FIGURE 25 IMPACT ANALYSIS OF CHALLENGES ON QUANTUM DOT MARKET

5.3 SUPPLY CHAIN ANALYSIS

FIGURE 26 SUPPLY CHAIN ANALYSIS: QUANTUM DOT MARKET

TABLE 3 QUANTUM DOT MARKET: SUPPLY CHAIN ANALYSIS

5.4 ECOSYSTEM/MARKET MAP

FIGURE 27 QUANTUM DOT MARKET: ECOSYSTEM

5.5 INVESTMENT AND FUNDING SCENARIO

FIGURE 28 INVESTMENT AND FUNDING SCENARIO, 2019–2024

5.6 TRENDS/DISRUPTIONS IMPACTING CUSTOMER BUSINESS

FIGURE 29 REVENUE SHIFTS FOR QUANTUM DOT MARKET

5.7 TECHNOLOGY ANALYSIS

5.7.1 KEY TECHNOLOGIES

5.7.1.1 Self-emitting quantum dot displays

5.7.1.2 Quantum dot in image sensors

5.7.2 COMPLEMENTARY TECHNOLOGIES

5.7.2.1 Micro-LED

5.7.3 ADJACENT TECHNOLOGIES

5.7.3.1 QD-LCD

5.7.3.2 QD-OLED

5.8 PRICING ANALYSIS

5.8.1 AVERAGE SELLING PRICE OF PRODUCTS OFFERED BY KEY PLAYERS

FIGURE 30 AVERAGE SELLING PRICE OF PRODUCTS OFFERED BY KEY PLAYERS

TABLE 4 AVERAGE SELLING PRICE OF QUANTUM DOT DISPLAYS OFFERED BY KEY PLAYERS

5.8.2 AVERAGE SELLING PRICE TREND OF QUANTUM DOTS, BY REGION

FIGURE 31 AVERAGE SELLING PRICE TREND FOR MINI-LED DISPLAYS, BY REGION

5.9 KEY STAKEHOLDERS & BUYING CRITERIA

5.9.1 KEY STAKEHOLDERS IN BUYING PROCESS

FIGURE 32 INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS OF TOP THREE END-USE VERTICALS

TABLE 5 INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS OF TOP THREE END-USE VERTICALS

5.9.2 BUYING CRITERIA

FIGURE 33 KEY BUYING CRITERIA FOR TOP THREE END-USE VERTICALS

TABLE 6 KEY BUYING CRITERIA FOR TOP THREE END-USE VERTICALS

5.10 PORTER'S FIVE FORCES ANALYSIS

TABLE 7 QUANTUM DOT MARKET: PORTER'S FIVE FORCES ANALYSIS

FIGURE 34 QUANTUM DOT MARKET: PORTER'S FIVE FORCES ANALYSIS, 2023

FIGURE 35 IMPACT OF PORTER'S FIVE FORCES ON QUANTUM DOT MARKET,

2023

5.10.1 THREAT OF NEW ENTRANTS

5.10.2 THREAT OF SUBSTITUTES

5.10.3 BARGAINING POWER OF SUPPLIERS

5.10.4 BARGAINING POWER OF BUYERS

5.10.5 INTENSITY OF COMPETITIVE RIVALRY

5.11 CASE STUDIES

5.11.1 USING NANOCO'S QUANTUM DOTS TO MANUFACTURE WAH HONG INDUSTRIAL CORPORATION'S FILMS FOR USAGE IN TV AND MONITOR PRODUCTS

5.11.2 EXPLORING POTENTIAL OF UBIQD'S QUANTUM DOTS TO MANUFACTURE FIRST SOLAR'S ADVANCED SOLAR MODULES

5.11.3 INCORPORATING QUANTUM SOLUTIONS' QUANTUM DOTS TO MANUFACTURE QDOT PEROVSKITE CSPBBR3 SINGLE CRYSTALS FOR X-RAY SENSORS

5.11.4 ENHANCING PICTURE QUALITY OF LG'S ULTRA HD TV BY INCORPORATING DOW'S QUANTUM DOTS

5.12 TRADE ANALYSIS

TABLE 8 IMPORT DATA FOR HS CODE 8541, BY COUNTRY, 2019–2023 (USD BILLION)

FIGURE 36 IMPORT DATA FOR HS CODE 8541, 2019–2023

TABLE 9 EXPORT DATA FOR HS CODE 8541, BY COUNTRY, 2019–2023 (USD BILLION)

FIGURE 37 EXPORT DATA FOR HS CODE 8541, 2019–2023

5.13 LIST OF KEY PATENTS AND INNOVATIONS

TABLE 10 PATENTS FILED DURING REVIEW PERIOD

FIGURE 38 NUMBER OF PATENTS GRANTED FOR QUANTUM DOT

FIGURE 39 TOP 10 COMPANIES WITH HIGHEST NUMBER OF PATENTS GRANTED DURING REVIEW PERIOD

TABLE 11 TOP 20 PATENT OWNERS, 2013–2023

TABLE 12 KEY PATENTS RELATED TO QUANTUM DOT

5.14 REGULATORY LANDSCAPE PERTAINING TO QUANTUM DOT MARKET

5.14.1 GLOBAL

5.14.2 EUROPE

5.14.3 ASIA-PACIFIC

5.14.4 NORTH AMERICA

5.14.5 GOVERNMENT REGULATIONS

5.14.5.1 Asia Pacific

5.14.5.2 North America

5.14.5.3 Europe

5.15 KEY CONFERENCES & EVENTS, 2024—2025

TABLE 13 QUANTUM DOT MARKET: DETAILED LIST OF CONFERENCES & EVENTS

6 QUANTUM DOT MARKET, BY DISPLAY

6.1 INTRODUCTION

6.2 DISPLAY TECHNOLOGY

TABLE 14 QUANTUM DOT MARKET, BY DISPLAY TYPE, 2020–2023 (USD MILLION)
FIGURE 40 MINI-LED DISPLAY TO BE LARGEST SEGMENT DURING FORECAST PERIOD

TABLE 15 QUANTUM DOT MARKET, BY DISPLAY TYPE, 2024–2029 (USD MILLION)

TABLE 16 QUANTUM DOT MARKET, BY DISPLAY TYPE, 2020–2023 (MILLION UNITS)

TABLE 17 QUANTUM DOT MARKET, BY DISPLAY TYPE, 2024–2029 (MILLION UNITS)

6.2.1 QUANTUM DOT LCDS (QD LCDS)

6.2.1.1 Growing need for enhanced color accuracy to drive market

6.2.2 MINI-LEDS

6.2.2.1 Rising demand for enhanced color accuracy, brightness, and energy efficiency to drive market

6.2.3 QUANTUM DOT OLED (QD-OLED)

6.2.3.1 Growing preference for QD-OLEDs in high-end displays to drive market

6.3 DISPLAY PANEL TYPE

6.3.1 QUANTUM DOT ENHANCEMENT FILM (QDEF) DISPLAYS

6.3.2 QUANTUM DOT COLOR FILTER (QD-CF) DISPLAYS

6.3.3 SELF-EMITTING/TRUE QLED DISPLAYS

7 QUANTUM DOT MARKET, BY MATERIAL

7.1 INTRODUCTION

TABLE 18 QUANTUM DOT MARKET, BY MATERIAL, 2020–2023 (USD MILLION)

FIGURE 41 CADMIUM-FREE QUANTUM DOTS TO BE LARGER SEGMENT DURING FORECAST PERIOD

TABLE 19 QUANTUM DOT MARKET, BY MATERIAL, 2024–2029 (USD MILLION)

7.2 CADMIUM-BASED QUANTUM DOTS

7.2.1 GROWING INTEGRATION OF CADMIUM-BASED QUANTUM DOTS IN MEDICAL DEVICES AND PHOTODETECTORS/SENSORS

- 7.2.2 CADMIUM SELENIDE QUANTUM DOTS
- 7.2.3 CADMIUM SULFIDE QUANTUM DOTS
- 7.2.4 CADMIUM TELLURIDE QUANTUM DOTS
- 7.2.5 CADMIUM ZINC SELENIDE QUANTUM DOTS
- 7.3 CADMIUM-FREE QUANTUM DOTS
 - 7.3.1 GROWING DEMAND FOR SAFER AND MORE SUSTAINABLE QUANTUM DOTS TO DRIVE MARKET
 - 7.3.2 INDIUM ARSENIDE QUANTUM DOTS
 - 7.3.3 SILICON QUANTUM DOTS
 - 7.3.4 GRAPHENE QUANTUM DOTS
 - 7.3.5 PEROVSKITE QUANTUM DOTS
 - 7.3.6 LEAD SULFIDE QUANTUM DOTS
 - 7.3.7 LEAD SELENIDE QUANTUM DOTS
 - 7.3.8 OTHER QUANTUM DOTS

8 QUANTUM DOT MARKET, BY PRODUCT

8.1 INTRODUCTION

TABLE 20 QUANTUM DOT MARKET, BY PRODUCT TYPE, 2020–2023 (USD MILLION)

FIGURE 42 QUANTUM DOT DISPLAYS TO ACCOUNT FOR LARGER MARKET SIZE DURING FORECAST PERIOD

TABLE 21 QUANTUM DOT MARKET, BY PRODUCT TYPE, 2024–2029 (USD MILLION)

TABLE 22 QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 23 QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

8.2 QUANTUM DOT DISPLAYS

8.2.1 INCREASING DEMAND FOR NARROW SPECTRUM AND HIGH STABILITY TO DRIVE MARKET

TABLE 24 QUANTUM DOT DISPLAY MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

FIGURE 43 CONSUMER VERTICAL TO ACCOUNT FOR LARGEST MARKET SIZE DURING FORECAST PERIOD

TABLE 25 QUANTUM DOT DISPLAY MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

8.3 QUANTUM DOT LASERS

8.3.1 GROWING DEMAND FOR HIGH OUTPUT POWER AND SUPERIOR TEMPERATURE STABILITY TO DRIVE MARKET

TABLE 26 QUANTUM DOT LASERS MARKET, BY VERTICAL, 2020–2023 (USD

MILLION)

TABLE 27 QUANTUM DOT LASERS MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

8.4 QUANTUM DOT SOLAR CELLS/MODULES

8.4.1 RISING NEED TO CAPTURE SOLAR ENERGY MORE COST-EFFECTIVELY TO DRIVE MARKET

TABLE 28 QUANTUM DOT SOLAR CELLS/MODULES MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

FIGURE 44 CONSUMER VERTICAL TO ACCOUNT FOR LARGEST SHARE IN QUANTUM DOT SOLAR CELLS/MODULES MARKET DURING FORECAST PERIOD

8.5 QUANTUM DOT MEDICAL DEVICES

8.5.1 DIVERSE APPLICATIONS TO DRIVE MARKET

TABLE 29 QUANTUM DOT MEDICAL DEVICES MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

8.6 QUANTUM DOT PHOTODETECTORS/SENSORS

8.6.1 GROWING DEMAND FOR PHOTODETECTORS/SENSORS THAT DELIVER LOW COST AND SUPERIOR QUALITY TO DRIVE MARKET

TABLE 30 QUANTUM DOT PHOTODETECTORS/SENSORS MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

8.7 QUANTUM DOT LED PRODUCTS

8.7.1 RISING DEMAND FOR LEDS THAT DELIVER HIGHER BRIGHTNESS, EFFICIENCY, AND STABILITY TO DRIVE MARKET

TABLE 31 QUANTUM DOT LED PRODUCTS MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

TABLE 32 QUANTUM DOT LED PRODUCTS MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

8.8 OTHER PRODUCTS

TABLE 33 QUANTUM DOT OTHER PRODUCTS MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

9 QUANTUM DOT MARKET, BY PRODUCTION TECHNIQUE

9.1 INTRODUCTION

9.2 COLLOIDAL SYNTHESIS

9.3 PLASMA SYNTHESIS

9.4 FABRICATION

9.4.1 LITHOGRAPHY

9.4.1.1 Electron-beam lithography

9.4.1.2 Soft lithography

9.4.1.3 Stencil lithography

9.4.1.4 Nanolithography

9.4.1.5 Photopatternable array

9.5 BIO-MOLECULAR SELF-ASSEMBLY

9.6 VIRAL ASSEMBLY

9.7 ELECTROCHEMICAL ASSEMBLY

9.8 BULK MANUFACTURING

10 QUANTUM DOT MARKET, BY VERTICAL

10.1 INTRODUCTION

TABLE 34 QUANTUM DOT MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

FIGURE 45 CONSUMER VERTICAL TO DOMINATE QUANTUM DOT MARKET DURING FORECAST PERIOD

TABLE 35 QUANTUM DOT MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

10.2 CONSUMER

10.2.1 GROWING DEMAND FOR HIGH-QUALITY DISPLAYS TO DRIVE MARKET

TABLE 36 CONSUMER VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 37 CONSUMER VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 38 CONSUMER VERTICAL: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

FIGURE 46 ASIA PACIFIC TO ACCOUNT FOR LARGEST MARKET SIZE FOR CONSUMER VERTICAL DURING FORECAST PERIOD

TABLE 39 CONSUMER VERTICAL: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 40 NORTH AMERICA: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 41 NORTH AMERICA: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 42 EUROPE: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 43 EUROPE: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 44 ASIA PACIFIC: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 45 ASIA PACIFIC: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 46 ROW: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY REGION, 2020–2023 (USD MILLION)

TABLE 47 ROW: QUANTUM DOT MARKET FOR CONSUMER VERTICAL, BY REGION, 2024–2029 (USD MILLION)

10.3 COMMERCIAL

10.3.1 GROWING DEMAND FOR QUANTUM DOT-BASED KIOSKS AND INTERACTIVE SCREENS TO DRIVE MARKET

TABLE 48 COMMERCIAL VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 49 COMMERCIAL VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 50 COMMERCIAL VERTICAL: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 51 COMMERCIAL VERTICAL: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 52 NORTH AMERICA: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 53 NORTH AMERICA: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 54 EUROPE: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 55 EUROPE: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 56 ASIA PACIFIC: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 57 ASIA PACIFIC: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 58 ROW: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY REGION, 2020–2023 (USD MILLION)

TABLE 59 ROW: QUANTUM DOT MARKET FOR COMMERCIAL VERTICAL, BY REGION, 2024–2029 (USD MILLION)

10.3.2 RETAIL

10.3.3 CORPORATE

10.3.4 HOSPITALITY

10.4 HEALTHCARE

10.4.1 INCREASING DEMAND FOR ENHANCED EFFICIENCY AND BRIGHTNESS TO DRIVE MARKET

TABLE 60 HEALTHCARE VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

FIGURE 47 QD DISPLAYS TO ACCOUNT FOR LARGEST MARKET SIZE FOR HEALTHCARE VERTICAL DURING FORECAST PERIOD

TABLE 61 HEALTHCARE VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 62 HEALTHCARE VERTICAL: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 63 HEALTHCARE VERTICAL: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 64 NORTH AMERICA: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 65 NORTH AMERICA: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 66 EUROPE: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 67 EUROPE: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 68 ASIA PACIFIC: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 69 ASIA PACIFIC: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 70 ROW: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY REGION, 2020–2023 (USD MILLION)

TABLE 71 ROW: QUANTUM DOT MARKET FOR HEALTHCARE VERTICAL, BY REGION, 2024–2029 (USD MILLION)

10.4.2 BIOLOGICAL IMAGING

10.4.3 CELLULAR LABELING

10.4.4 DNA LABELING

10.4.5 CANCER DIAGNOSIS

10.5 DEFENSE

10.5.1 INCREASING DEMAND FOR HIGH PHOTOSTABILITY AND BRIGHTNESS TO DRIVE MARKET

TABLE 72 DEFENSE VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 73 DEFENSE VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 74 DEFENSE VERTICAL: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 75 DEFENSE VERTICAL: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 76 NORTH AMERICA: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 77 NORTH AMERICA: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 78 EUROPE: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 79 EUROPE: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 80 ASIA PACIFIC: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 81 ASIA PACIFIC: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 82 ROW: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY REGION, 2020–2023 (USD MILLION)

TABLE 83 ROW: QUANTUM DOT MARKET FOR DEFENSE VERTICAL, BY REGION, 2024–2029 (USD MILLION)

10.6 TELECOMMUNICATIONS

10.6.1 ONGOING RESEARCH TOWARD INTEGRATION OF QUANTUM DOTS IN TELECOMMUNICATIONS TO DRIVE MARKET

TABLE 84 TELECOMMUNICATIONS VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 85 TELECOMMUNICATIONS VERTICAL: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 86 TELECOMMUNICATIONS VERTICAL: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 87 TELECOMMUNICATIONS VERTICAL: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 88 NORTH AMERICA: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 89 NORTH AMERICA: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 90 EUROPE: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 91 EUROPE: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 92 ASIA PACIFIC: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 93 ASIA PACIFIC: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 94 ROW: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY REGION, 2020–2023 (USD MILLION)

TABLE 95 ROW: QUANTUM DOT MARKET FOR TELECOMMUNICATIONS VERTICAL, BY REGION, 2024–2029 (USD MILLION)

10.7 OTHER VERTICALS

10.7.1 GROWING INTEGRATION OF QUANTUM DOT DISPLAYS AND LED PRODUCTS TO DRIVE MARKET

TABLE 96 OTHER VERTICALS: QUANTUM DOT MARKET, BY PRODUCT, 2020–2023 (USD MILLION)

TABLE 97 OTHER VERTICALS: QUANTUM DOT MARKET, BY PRODUCT, 2024–2029 (USD MILLION)

TABLE 98 OTHER VERTICALS: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 99 OTHER VERTICALS: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 100 NORTH AMERICA: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 101 NORTH AMERICA: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 102 EUROPE: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 103 EUROPE: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 104 ASIA PACIFIC: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 105 ASIA PACIFIC: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 106 ROW: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY REGION, 2020–2023 (USD MILLION)

TABLE 107 ROW: QUANTUM DOT MARKET FOR OTHER VERTICALS, BY REGION, 2024–2029 (USD MILLION)

10.7.2 MANUFACTURING

10.7.3 TRANSPORTATION

10.7.4 EDUCATION

10.7.5 SPORTS & ENTERTAINMENT

10.7.6 AGRICULTURE/HORTICULTURE LIGHTING

11 QUANTUM DOT MARKET, BY REGION

11.1 INTRODUCTION

FIGURE 48 CANADIAN QUANTUM DOT MARKET TO GROW AT HIGHEST CAGR DURING FORECAST PERIOD

TABLE 108 QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 109 QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

11.2 NORTH AMERICA

FIGURE 49 NORTH AMERICA: QUANTUM DOT MARKET SNAPSHOT

TABLE 110 NORTH AMERICA: QUANTUM DOT MARKET, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 111 NORTH AMERICA: QUANTUM DOT MARKET, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 112 NORTH AMERICA: QUANTUM DOT MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

TABLE 113 NORTH AMERICA: QUANTUM DOT MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

11.2.1 RECESSION IMPACT

11.2.2 US

11.2.2.1 Increasing awareness and integration of quantum dot technology to drive market

11.2.3 CANADA

11.2.3.1 Presence of developers and manufacturers to drive market

11.2.4 MEXICO

11.2.4.1 Growing demand for quantum dots to drive growth

11.3 EUROPE

FIGURE 50 EUROPE: QUANTUM DOT MARKET SNAPSHOT

TABLE 114 EUROPE: QUANTUM DOT MARKET, BY COUNTRY, 2020–2023 (USD MILLION)

TABLE 115 EUROPE: QUANTUM DOT MARKET, BY COUNTRY, 2024–2029 (USD MILLION)

TABLE 116 EUROPE: QUANTUM DOT MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

TABLE 117 EUROPE: QUANTUM DOT MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

11.3.1 RECESSION IMPACT

11.3.2 UK

11.3.2.1 Presence of major companies to drive market

11.3.3 GERMANY

11.3.3.1 Increasing development of public infrastructure and healthcare industry to drive growth

11.3.4 FRANCE

11.3.4.1 Growing integration of display and digital signage products to drive market

11.3.5 ITALY

11.3.5.1 Rising demand for quantum dot displays to drive market

11.3.6 SPAIN

11.3.6.1 Growing demand for signage products to drive market

11.3.7 REST OF EUROPE

11.4 ASIA PACIFIC

FIGURE 51 ASIA PACIFIC: QUANTUM DOT MARKET SNAPSHOT

TABLE 118 ASIA PACIFIC: QUANTUM DOT MARKET, BY COUNTRY, 2020–2023
(USD MILLION)

TABLE 119 ASIA PACIFIC: QUANTUM DOT MARKET, BY COUNTRY, 2024–2029
(USD MILLION)

TABLE 120 ASIA PACIFIC: QUANTUM DOT MARKET, BY VERTICAL, 2020–2023
(USD MILLION)

TABLE 121 ASIA PACIFIC: QUANTUM DOT MARKET, BY VERTICAL, 2024–2029
(USD MILLION)

11.4.1 RECESSION IMPACT

11.4.2 CHINA

11.4.2.1 Advancements in display market to drive growth

11.4.3 JAPAN

11.4.3.1 Increasing deployment of displays and quantum dot lasers for telecommunication to drive market

11.4.4 SOUTH KOREA

11.4.4.1 Presence of several established display manufacturers to drive market

11.4.5 INDIA

11.4.5.1 Rising demand for displays to drive growth

11.4.6 REST OF ASIA PACIFIC

11.5 REST OF THE WORLD (ROW)

TABLE 122 ROW: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 123 ROW: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

TABLE 124 ROW: QUANTUM DOT MARKET, BY VERTICAL, 2020–2023 (USD MILLION)

TABLE 125 ROW: QUANTUM DOT MARKET, BY VERTICAL, 2024–2029 (USD MILLION)

11.5.1 RECESSION IMPACT

11.5.2 MIDDLE EAST & AFRICA

11.5.2.1 Growing developments to expand in region to drive market

11.5.2.1.1 GCC Countries

11.5.2.1.1.1 Increasing market expansions by quantum dot display manufacturers to drive market

11.5.2.1.2 Rest of Middle East & Africa

11.5.2.1.2.1 Expanding retail, corporate, transportation, and commercial sectors to drive market

TABLE 126 MIDDLE EAST & AFRICA: QUANTUM DOT MARKET, BY REGION, 2020–2023 (USD MILLION)

TABLE 127 MIDDLE EAST & AFRICA: QUANTUM DOT MARKET, BY REGION, 2024–2029 (USD MILLION)

11.5.3 SOUTH AMERICA

11.5.3.1 Increasing demand for sensors, transistors, and lasers to drive market

12 COMPETITIVE LANDSCAPE

12.1 INTRODUCTION

12.2 MARKET EVALUATION FRAMEWORK

TABLE 128 OVERVIEW OF STRATEGIES DEPLOYED BY KEY QUANTUM DOT PLAYERS

FIGURE 52 COMPANIES ADOPTED COLLABORATIONS, AGREEMENTS, PRODUCT LAUNCHES, AND ACQUISITIONS AS KEY GROWTH STRATEGIES, 2020–2024

12.2.1 ORGANIC/INORGANIC GROWTH STRATEGIES

12.2.2 PRODUCT PORTFOLIO

12.2.3 GEOGRAPHIC PRESENCE

12.2.4 MANUFACTURING FOOTPRINT

12.3 MARKET SHARE ANALYSIS, 2023

TABLE 129 MARKET SHARE ANALYSIS OF KEY COMPANIES IN QUANTUM DOT MARKET, 2023

12.4 COMPANY VALUATION AND FINANCIAL METRICS

FIGURE 53 COMPANY VALUATION, 2024 (USD BILLION)

FIGURE 54 FINANCIAL METRICS (EV/EBITDA), 2024

12.5 BRAND/PRODUCT COMPARISON

FIGURE 55 BRAND/PRODUCT COMPARISON

12.6 HISTORICAL REVENUE ANALYSIS OF MAJOR MARKET PLAYERS

12.7 HISTORICAL REVENUE ANALYSIS, 2019–2023

FIGURE 56 HISTORICAL REVENUE ANALYSIS OF MAJOR COMPANIES IN QUANTUM DOT MARKET, 2019–2023 (USD BILLION)

12.8 COMPANY EVALUATION MATRIX

12.8.1 STARS

12.8.2 EMERGING LEADERS

12.8.3 PERVASIVE PLAYERS

12.8.4 PARTICIPANTS

FIGURE 57 QUANTUM DOT MARKET (GLOBAL): COMPANY EVALUATION MATRIX, 2023

12.9 STARTUP/SME EVALUATION MATRIX

12.9.1 PROGRESSIVE COMPANIES

12.9.2 RESPONSIVE COMPANIES

12.9.3 DYNAMIC COMPANIES

12.9.4 STARTING BLOCKS

FIGURE 58 QUANTUM DOT MARKET (GLOBAL): STARTUP/SME EVALUATION MATRIX, 2023

12.9.5 COMPETITIVE BENCHMARKING

TABLE 130 QUANTUM DOT MARKET: DETAILED LIST OF KEY STARTUPS/SMES

TABLE 131 COMPETITIVE BENCHMARKING FOR STARTUPS/SMES: MATERIAL

TABLE 132 COMPETITIVE BENCHMARKING FOR STARTUPS/SMES: PRODUCT

TABLE 133 COMPETITIVE BENCHMARKING FOR STARTUPS/SMES: VERTICAL

TABLE 134 COMPETITIVE BENCHMARKING OF STARTUP/SMES: REGION

12.9.6 COMPANY FOOTPRINT

12.9.6.1 Company product footprint

TABLE 135 COMPANY MATERIAL TYPE FOOTPRINT

TABLE 136 COMPANY PRODUCT FOOTPRINT

TABLE 137 COMPANY VERTICAL FOOTPRINT

TABLE 138 COMPANY REGION FOOTPRINT

12.10 COMPETITIVE SITUATIONS AND TRENDS

12.10.1 PRODUCT LAUNCHES

TABLE 139 QUANTUM DOT MARKET: PRODUCT LAUNCHES, NOVEMBER 2020–APRIL 2024

12.10.2 DEALS

TABLE 140 QUANTUM DOT MARKET: DEALS, AUGUST 2020–JANUARY 2024

13 COMPANY PROFILES

13.1 INTRODUCTION

(Business Overview, Products/Services/Solutions Offered, MnM View, Key Strengths and Right to Win, Strategic Choices Made, Weaknesses and Competitive Threats, Recent Developments)*

13.2 KEY PLAYERS

13.2.1 SAMSUNG DISPLAY

TABLE 141 SAMSUNG DISPLAY: COMPANY OVERVIEW

FIGURE 59 SAMSUNG ELECTRONICS: COMPANY SNAPSHOT

TABLE 142 SAMSUNG DISPLAY: PRODUCTS OFFERED

TABLE 143 SAMSUNG DISPLAY: PRODUCT LAUNCHES

13.2.2 LG DISPLAY CO., LTD.

TABLE 144 LG DISPLAY CO., LTD.: COMPANY OVERVIEW

FIGURE 60 LG DISPLAY: COMPANY SNAPSHOT

TABLE 145 LG DISPLAY CO., LTD.: PRODUCTS OFFERED

TABLE 146 LG DISPLAY CO., LTD.: PRODUCT LAUNCHES

13.2.3 BOE TECHNOLOGY GROUP CO., LTD.

TABLE 147 BOE TECHNOLOGY GROUP CO., LTD.: COMPANY OVERVIEW

FIGURE 61 BOE TECHNOLOGY GROUP CO., LTD.: COMPANY SNAPSHOT

TABLE 148 BOE TECHNOLOGY GROUP CO., LTD.: PRODUCTS OFFERED

TABLE 149 BOE TECHNOLOGY GROUP CO., LTD.: PRODUCT LAUNCHES

13.2.4 AUO CORPORATION

TABLE 150 AUO CORPORATION: COMPANY OVERVIEW

FIGURE 62 AUO CORPORATION: COMPANY SNAPSHOT

TABLE 151 AUO CORPORATION: PRODUCTS OFFERED

13.2.5 TCL CHINA STAR OPTOELECTRONICS TECHNOLOGY CO., LTD.

TABLE 152 TCL CHINA STAR OPTOELECTRONICS TECHNOLOGY CO., LTD.:
COMPANY OVERVIEW

TABLE 153 TCL CHINA STAR OPTOELECTRONICS TECHNOLOGY CO., LTD.:
PRODUCTS OFFERED

13.2.6 SHOEI CHEMICAL, INC. (NANOSYS, INC.)

TABLE 154 SHOEI CHEMICAL, INC.: COMPANY OVERVIEW

TABLE 155 SHOEI CHEMICAL, INC.: PRODUCTS OFFERED

TABLE 156 SHOEI CHEMICAL, INC.: DEALS

13.2.7 AMERICAN ELEMENTS

TABLE 157 AMERICAN ELEMENTS: COMPANY OVERVIEW

TABLE 158 AMERICAN ELEMENTS: PRODUCTS OFFERED

TABLE 159 AMERICAN ELEMENTS: PRODUCT LAUNCHES

13.2.8 HANSOLCHEMICAL

TABLE 160 HANSOLCHEMICAL: COMPANY OVERVIEW

FIGURE 63 HANSOLCHEMICAL: COMPANY SNAPSHOT

TABLE 161 HANSOLCHEMICAL: PRODUCTS OFFERED

13.2.9 NANOCO GROUP PLC

TABLE 162 NANOCO GROUP PLC: COMPANY OVERVIEW

FIGURE 64 NANOCO GROUP PLC: COMPANY SNAPSHOT

TABLE 163 NANOCO GROUP PLC: PRODUCTS OFFERED

TABLE 164 NANOCO GROUP PLC: DEALS

13.2.10 AVANTAMA AG

TABLE 165 AVANTAMA AG: COMPANY OVERVIEW

TABLE 166 AVANTAMA AG: PRODUCTS OFFERED

13.2.11 NNCRYSTAL US CORPORATION

TABLE 167 NNCRYSTAL US CORPORATION: COMPANY OVERVIEW

TABLE 168 NNCRYSTAL US CORPORATION: PRODUCTS OFFERED

13.2.12 OCEAN NANOTECH

TABLE 169 OCEAN NANOTECH.: COMPANY OVERVIEW

TABLE 170 OCEAN NANOTECH: PRODUCTS OFFERED

13.2.13 QUANTUM MATERIALS CORP

TABLE 171 QUANTUM MATERIALS CORP: COMPANY OVERVIEW

TABLE 172 QUANTUM MATERIALS CORP: PRODUCTS OFFERED

13.2.14 QUANTUM SOLUTIONS

TABLE 173 QUANTUM SOLUTIONS: COMPANY OVERVIEW

TABLE 174 QUANTUM SOLUTIONS: PRODUCTS OFFERED

TABLE 175 QUANTUM SOLUTIONS: PRODUCT LAUNCHES

TABLE 176 QUANTUM SOLUTIONS: DEALS

13.2.15 MERCK KGAA

TABLE 177 MERCK KGAA: COMPANY OVERVIEW

FIGURE 65 MERCK KGAA: COMPANY SNAPSHOT

TABLE 178 MERCK KGAA: PRODUCTS OFFERED

*Business Overview, Products/Services/Solutions Offered, MnM View, Key Strengths and Right to Win, Strategic Choices Made, Weaknesses and Competitive Threats, Recent Developments might not be captured in case of unlisted companies.

13.3 OTHER PLAYERS

13.3.1 STREM

13.3.2 SUZHOU XINGSHUO NANOTECH CO. LTD.

13.3.3 UBIQD, INC.

13.3.4 NANOSHEL LLC

13.3.5 NANORH

13.3.6 ACS MATERIAL

13.3.7 NANOOPTICAL MATERIALS INC

13.3.8 NANOCHEMAZONE

13.3.9 THE DOW CHEMICAL COMPANY

13.3.10 QUSTOMDOT BV

13.3.11 DUXERIALS EUROPE B.V.

- 13.3.12 NANOLUMI PTE. LTD.
- 13.3.13 RINA TECHNOLOGY CO., LTD.
- 13.3.14 WAH HONG INDUSTRIAL CORP.
- 13.3.15 EFUN TECHNOLOGY

14 APPENDIX

- 14.1 INSIGHTS OF INDUSTRY EXPERTS
- 14.2 DISCUSSION GUIDE
- 14.3 KNOWLEDGESTORE: MARKETSandMARKETS' SUBSCRIPTION PORTAL
- 14.4 CUSTOMIZATION OPTIONS
- 14.5 RELATED REPORTS
- 14.6 AUTHOR DETAILS

About

This report refers to the QD technology market, which caters to the wide range of applications, products and materials. QD technology products cover QD film, QD display, QDLED, QD panels, QD solar cells, and QD laser; QD technology-based application areas cover biotechnology, biological, clinical, defense, computing, solar, optoelectronics, and security. QD technology based materials cover cadmium selenide, cadmium sulphide, cadmium telluride, indium arsenide, graphene, and silicon.

It is observed that out of all of these applications and products, QD technology is partially commercialized and, in many of the application areas and products, it is still undergoing research.

The most common application areas in the field of QD technology are 'Biotech' and 'Optoelectronics'.

QD-based market research report takes an insight into the market through market sizes, revenue forecasts, value chain, market & product trends, competitive landscape, leading participants and their key developments, strategies, and profiles. It also analyzes the market by product, application, material, and geography.

Quantum dots are minute particles sized from 2 nm to 10 nm diameter, in the field of nano- technology. Quantum dots possess controlled excitation properties and the ability to reflect in three dimensions. They emit pure red, green, and blue light by changing the core size of the dot; this factor is also known as the 'size quantization effect". Their physical properties do not depend on the material from which they are prepared but on their size. Their notable property of absorption and transmission has evolved them into the desired material to be used in the field of Nano-technology.

In the base year, it was observed that many applications are focusing on quantum dot technology to provide better comprehensive offerings; however, most of the applications are still at the R&D phase or at the pilot stage. From a commercialization stand point, it has been found that optoelectronics has developed its market in the field of quantum dot based television. Another major notable progress expected in the phase of commercialization would be that of the "non- colloidal (epitaxial) QD based lasers".

From the medical device and health care industry prospective, it has been found that, in the current base year (2013), 'biological labelling' has commercialized its products

based on quantum dots.

From the immediate future commercialization stand point, it is anticipated that solar cells, QD sensors, and lighting will showcase significant increase in its revenue and market share in the forecast period.

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