

# 量子点技术地位及市场前景发展分析研究报告

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## 一、报告简介

观研报告网发布的《量子点技术地位及市场前景发展分析研究报告》涵盖行业最新数据，市场热点，政策规划，竞争情报，市场前景预测，投资策略等内容。更辅以大量直观的图表帮助本行业企业准确把握行业发展态势、市场商机动向、正确制定企业竞争战略和投资策略。本报告依据国家统计局、海关总署和国家信息中心等渠道发布的权威数据，以及我中心对本行业的实地调研，结合了行业所处的环境，从理论到实践、从宏观到微观等多个角度进行市场调研分析。

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## 二、报告目录及图表目录

### 摘要INTRODUCTIONMOTIVATION

Among the many subsets of nanomaterials, quantum dots (QDs) are like no other. At dimensions typically below 10 nanometers, nanocrystalline (nc) semiconductors (SC), metals, and magnetic materials can all exhibit extraordinary quantum confinement phenomenon. Basically, at these dimensions, their physical size encroaches upon the fundamental quantum confinement dimensions of orbiting electrons that are uniquely prescribed by their atomic nucleus. Within the regime of these critical dimensions, QDs exhibit distinctly different behavior from their bulk form, which manifests itself, for example, in distinctly different optical, electronic, and magnetic properties.

Today, scientists can precisely synthesize nanocrystalline materials at these critical dimensions and thereby systematically tune their quantum confining behavior. As a result there is currently enormous interest to exploit and capitalize on the unique properties exhibited by QD materials. As a harbinger for future business developments, colloidal QD-bioconjugates are among the first wave of commercial product applications stimulating market interest. Primarily, these have quickly established a niche market in the life sciences and biomedical communities, where they provide unrivalled cellular imaging and therapeutic detection capabilities. Other promising prototype developments of SC QDs now on the commercial-horizon range include: a new generation of flash memory devices; nanomaterial enhancements for improving the performance of flexible organic light-emitting diodes (LEDs), as well as solid-state white-LED lighting; and a core technology used in flexible solar panel coatings.

With these impending commercial developments and their enormous business potential, this report provides a timely assessment of quantum dot materials—where they are currently at, and where they might be in the foreseeable future.

### STUDY GOAL AND OBJECTIVES

The primary objective of this report is threefold: to assess the current state-of-the-art in synthesizing QDs; to identify the current market players seeking to exploit QD behavior; and to evaluate actual or potential markets in terms of application, type, and projected

market revenues.

## SCOPE OF REPORT

Since their parallel discovery in Russia and the U.S. almost 25 years ago, SC QDs, until quite recently, have resided exclusively in the domain of solid state physics, where they have been fabricated using expensive and sophisticated molecular beam epitaxy (MBE) or chemical vapor deposition (CVD) equipment. However, in a relatively short time frame this situation has changed dramatically with the recent commercial availability of colloidal QDs synthesized by less expensive wet-chemical processes. Practically, the availability of QDs in a colloidal dispersed form will help demystify these somewhat esoteric materials. Most importantly, colloidal-QDs now provide access to a much broader audience, which promises to further widen their potential market exploitation.

Current and future applications of QDs impact a broad range of industrial markets. These include, for example, biology and biomedicine; computing and memory; electronics and displays; optoelectronic devices such as LEDs, lighting, and lasers; optical components used in telecommunications; and security applications such as covert identification tagging or biowarfare detection sensors.

This report probes in considerable depth the early pioneers and champions in this field both in industry, government, and academic laboratories. The most active organizations, promising technical applications, and developments realizable within the next 5 years, will all be highlighted.

## CONTRIBUTIONS OF THE STUDY AND TARGET AUDIENCE

This report represents a major update of the BCC Research report Quantum Dots: Technologies and Commercial Prospects, published in April 2005. The most significant revisions in the new edition include:

An extensive updated patent analysis

An in-depth assessment of the unfolding commercial markets

Progress in the synthesis and commercial scaleup by QD producers

Updated company profiles of the synthesizers and end users dictating market development

Updated 5-year market projection analysis of the emerging QD market

It represents the second exclusive report to focus on QD nanomaterials from the perspective of their technology, applications, and future business prospects. Thus, this up-to-date technical assessment and business analysis should prove an especially valuable resource to individuals and organizations seeking more insight into the current status of QDs, their stand-alone capabilities within the spectrum of nanomaterials, and time-to-market commercial development. This comprehensive technical and business assessment on the current status of the QD-based industry should prove informative to nanomaterials manufacturers, investors seeking near-term commercialization opportunities, technologists confronted with nanomaterial device integration issues, and companies specifically interested in exploiting QDs for biological, biomedical, electronic, energy storage, optics, optoelectronics, and security applications.

## METHODOLOGY AND SOURCES OF INFORMATION

This report is primarily derived from the enormous amount of patent and technical literature relating to QDs disclosed in the public domain. In addition, complementary information has also been drawn from the business community, such as company investment news, company profiles, press releases, and personal telephone interviews with selected companies.

## ABOUT THE AUTHOR

John Oliver, the author of this report, is the founder of Innov8 Solutions, which provides advanced materials consultation services to various clients. He has over 30 years of industrial research and development (R&D) experience in surface and colloid science, spanning a wide range of materials technology. Primarily, working as a senior scientist at Xerox Research Centre of Canada, he developed an invaluable understanding in advanced materials used in digital printing technologies such as xerography and ink-jet printing. More recently, through his involvements with the Alberta Research Council and several local universities, his interests have evolved into the realm of nanomaterials and microsystems device integration. He has a Ph.D. in Physical Chemistry from McGill University, a BSc degree in Chemistry from Surrey University, U.K. His publications include more than 40 technical articles, 20 patents, and one technical book. 目录及图表Chapter-1: SUMMARY

SUMMARY TABLE GLOBAL MARKET GROWTH FOR QUANTUM DOTS IN PROMISING TECHNOLOGY SECTORS, THROUGH 2013 (\$ MILLIONS)	0
SUMMARY FIGURE GLOBAL MARKET GROWTH FOR QUANTUM DOTS IN PROMISING COMMERCIAL MARKET SECTORS, 2008 – 2013 (\$ MILLIONS)	0
Chapter-2: OVERVIEW	
HISTORY OF QUANTUM DOTS	2
TABLE 1 CHRONOLOGICAL EVOLUTION OF QDS: FROM RESEARCH CURIOSITY THROUGH COMMERCIAL DEVELOPMENT	2
PROPERTIES OF QUANTUM DOTS	3
FIGURE 1 LUMINESCENCE SIZE REGIMES FOR DIFFERENT SEMICONDUCTOR AND METAL QUANTUM DOTS	3
TABLE 2 COMPARISON OF EMISSION WAVELENGTH OF SC AND METAL NC QUANTUM DOTS AS A FUNCTION OF THEIR SIZE	4
QUANTUM DOT INDUSTRY	5
TABLE 3 OTHER PROPERTIES OF QUANTUM DOTS	5
APPLICATIONS AND STRUCTURAL TYPES OF QUANTUM DOTS	6
STRUCTURAL TYPES	6
TABLE 4 HIERARCHY AND VARIOUS STRUCTURAL TYPES OF QDS	6
TABLE 4 (CONTINUED)	7
TABLE 4 (CONTINUED)	8
COMMERCIAL APPLICATIONS	8
TABLE 5 QD MATERIAL TYPES AND THEIR COMMERCIAL APPLICATIONS	8
TABLE 5 (CONTINUED)	9
KEY TECHNOLOGIES	9
TABLE 6 KEY QUANTUM DOT TECHNOLOGIES AND APPLICATIONS	9
TABLE 6 (CONTINUED)	10
Patent Analysis	11
Chapter-3: TECHNOLOGY	
SYNTHESIS OF METAL CHALCOGENIDE QUANTUM DOTS	12
VAPOR PHASE	12
TABLE 7 QUANTUM DOT PRODUCTION METHODS	13
TABLE 7 (CONTINUED)	14
Aerosol Drop Method	14
Melt Atomization	15
Chemical Vapor Deposition	15
Physical Vapor Deposition	15

Molecular Beam Epitaxy	15
LIQUID PHASE (“WET” COLLOID CHEMISTRY)	16
Colloid	17
Batch Process	17
Continuous Flow	18
Precipitation	19
SYNTHESIS OF NANOCRYSTALLINE SILICON QDS	19
LIQUID PHASE SYNTHESIS	20
TABLE 8 VARIOUS METHODS USED FOR SI-NC SYNTHESIS	20
TABLE 8 (CONTINUED)	21
SOLID-PHASE SYNTHESIS	22
VAPOR-PHASE SYNTHESIS	22
SYNTHESIS OF NANOCRYSTALLINE METALS AND QDS	23
TABLE 9 VARIOUS SYNTHETIC METHODS AND PHOTOPHYSICAL BEHAVIOR OF METAL-NCS	24
TABLE 9 (CONTINUED)	25
ASSEMBLY OF QUANTUM DOT STRUCTURES	25
TABLE 10 QUANTUM DOT STRUCTURE ASSEMBLY METHODS	26
LITHOGRAPHY	26
Conventional Methods	26
Nanolithography	27
BOTTOM-UP SELF ASSEMBLY	27
Cast Film	27
Langmuir-Blodgett	28
Layer-by-Layer	28
Metamaterials	29
Biomolecular Self-Assembly	29
OTHER TECHNIQUES	30
Digital Printing	30
Digital Printing (Continued)	31
Nanoporous Templates	32
Chapter-4: PATENT ANALYSIS	
RATIONALE	33
U.S. PATENT & TRADEMARK OFFICE (USPTO) SEARCH	34
CHRONOLOGICAL GROWTH TRENDS IN USPTO ACTIVITY	34
FIGURE 2 U.S. QD PATENTS ISSUED, 1986 – DECEMBER 31, 2007 (CUMULATIVE	

TOTAL: 1,620) 34

FIGURE 2 (CONTINUED) 35

FIGURE 3 COMPARISON OF U.S. QD PATENTS ISSUED AND PENDING, 2001 – 2007  
(NUMBER OF U.S. PATENTS) 35

FIGURE 3 (CONTINUED) 36

USPTO ACTIVITY CLASSIFIED BY INDUSTRIAL APPLICATION SECTOR 36

FIGURE 4 BREAKDOWN (%) FOR THE MAIN INDUSTRY/ APPLICATION SECTORS  
EMERGING FROM QD-PATENTS ISSUED, 2005 – 2007 (%) 37

TABLE 11 INDUSTRIAL SECTORS AND EXEMPLARY APPLICATIONS EMERGING  
FROM ISSUED U.S. QD-PATENTS, 2005 – 2007 38

FIGURE 5 BREAKDOWN (%) FOR THE MAIN INDUSTRY/ APPLICATION SECTORS  
EMERGING FROM QD-PATENTS ISSUED, 1998 – 2004 (%) 38

FIGURE 5 (CONTINUED) 39

FIGURE 6 U.S. VERSUS FOREIGN QD PATENTS ISSUED, CLASSIFIED BY  
APPLICATION SECTOR, 2005 – 2007 (CUMULATIVE TOTAL: 857) 40

USPTO ACTIVITY: ASIAN, EUROPEAN, AND OTHER COUNTRIES 40

FIGURE 7 U.S. QD PATENTS ISSUED ASSIGNED TO FOREIGN COUNTRIES,  
2005 – 2007 (TOTAL 234) 41

FIGURE 8 U.S. QD PATENTS ISSUED ASSIGNED TO FOREIGN COUNTRIES, FOR  
THE PERIOD 1998 – AUGUST 31, 2004 (TOTAL 194) 42

FIGURE 9 U.S. QD PATENT APPLICATIONS ASSIGNED TO FOREIGN COUNTRIES,  
2005 – 2007 (TOTAL 249) 43

USPTO ACTIVITY: SMALL U.S. COMPANIES 43

TABLE 12 LEADING U.S. SMALL BUSINESSES GRANTED MULTIPLE PATENTS FOR  
QD-RELATED TECHNOLOGY, 2005 – 2007 44

TABLE 12 (CONTINUED) 45

TABLE 13 OTHER U.S. SMALL BUSINESSES GRANTED TWO OR LESS PATENTS  
FOR QD-RELATED TECHNOLOGY, 2005 – 2007 45

TABLE 13 (CONTINUED) 46

USPTO ACTIVITY: LARGE U.S. COMPANIES 46

TABLE 14 LEADING U.S. LARGE BUSINESSES GRANTED MULTIPLE PATENTS IN QD-  
RELATED TECHNOLOGY, 2005 – 2007 47

USPTO ACTIVITY: U.S. ACADEMIC, GOVERNMENT, OTHER INSTITUTIONS 48

TABLE 15 U.S. ACADEMIC INSTITUTIONS GRANTED MULTIPLE PATENTS IN QD-  
RELATED TECHNOLOGY, 2005 – 2007 48



TABLE 15 (CONTINUED) 49

TABLE 16 U.S. GOVERNMENT & OTHER INSTITUTIONS GRANTED MULTIPLE PATENTS IN QD-RELATED TECHNOLOGY, 2005 – 2007 49

USPTO ACTIVITY: ACCORDING TO FOREIGN OWNERSHIP 50

Asia 50

TABLE 17 JAPANESE ORGANIZATIONS GRANTED MULTIPLE PATENTS IN QD-RELATED TECHNOLOGY, 2005 – 2007 50

TABLE 18 LEADING ORGANIZATIONS IN OTHER ASIAN COUNTRIES GRANTED PATENTS IN QD-RELATED TECHNOLOGY, 2005 – 2007 51

European and Other Countries 51

TABLE 19 LEADING ORGANIZATIONS IN EUROPE AND OTHER COUNTRIES GRANTED PATENTS IN QD-RELATED TECHNOLOGY, 2005 – 2007 52

EUROPEAN AND WORLDWIDE INTERNATIONAL PATENT OFFICES 53

FIGURE 10 WORLDWIDE DATABASE QD PATENTS FILED ACCORDING TO COUNTRY BETWEEN EARLY 2005 – MARCH 11, 2008 54

TABLE 20 WORLDWIDE QD PATENTS FOR LEADING COUNTRIES COMPILED ACCORDING TO FOREIGN PATENT OFFICE: 2005 – MARCH 11, 2008 55

ASIAN PATENT ACTIVITY BY INDUSTRIAL APPLICATION SECTOR 55

FIGURE 11 QD FOREIGN PATENT ACTIVITY FOR LEADING ASIAN COUNTRIES CLASSIFIED BY INDUSTRIAL APPLICATION SECTOR 55

FIGURE 11 (CONTINUED) 56

LEADING ORGANIZATIONS BY COUNTRY 56

Asian Countries 56

TABLE 21 LEADING CHINESE ORGANIZATIONS GRANTED MULTIPLE DOMESTIC PATENTS FOR QD-RELATED TECHNOLOGY, 2005 – 2007 57

TABLE 22 LEADING JAPANESE ORGANIZATIONS GRANTED MULTIPLE DOMESTIC PATENTS FOR QD-RELATED TECHNOLOGY, 2005 – 2007 57

TABLE 22 (CONTINUED) 58

TABLE 23 LEADING KOREAN ORGANIZATIONS GRANTED MULTIPLE DOMESTIC PATENTS FOR QD-RELATED TECHNOLOGY, 2005 – 2007 58

TABLE 23 (CONTINUED) 59

TABLE 24 LEADING TAWAINESE ORGANIZATIONS GRANTED MULTIPLE DOMESTIC PATENTS FOR QD-RELATED TECHNOLOGY, 2005 – 2007 59

Other Countries 60

TABLE 25 LEADING ORGANIZATIONS FROM OTHER COUNTRIES WITH QD-PATENTS

FILED WITH FOREIGN PATENT OFFICES, 2005 – 2007 60

FUNDING 60

TABLE 26 MAJOR U.S. GOVERNMENT AGENCIES FUNDING QD-BASED RESEARCH

61

NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY (NIST) 61

NATIONAL SCIENCE FOUNDATION (NSF) \* 61 Chapter-5: MARKETS BY APPLICATION

TABLE 27 COMMERCIALY PROMISING SECTORS WITH FIRST-GENERATION POSSIBILITIES FOR QD-BASED PRODUCTS 62

BIOTECHNOLOGY 64

BIOLABEL SYNTHESIS 64

TABLE 28 ADVANTAGES OF QUANTUM DOTS AS BIOLOGICAL LABELS 64

TABLE 29 U.S. PATENTS ISSUED AND FILED ON QD BIOLABEL SYNTHESIS, 2001 – 2003 65

TABLE 29 (CONTINUED) 66

QD-TAGGED MICROBEADS 67

LIVE CELL IMAGING 67

Live Cell Imaging (Continued) 67

Live Cell Imaging (Continued) 68

Live Cell Imaging (Continued) 68

MOLECULAR SPECIES DIAGNOSIS/DETECTION 69

TABLE 30 U.S. PATENTS ISSUED AND FILED ON QD BIOTECHNOLOGY—MOLECULAR SPECIES DIAGNOSIS/DETECTION, 2001 – 2003 69

ANALYTICAL/INSTRUMENTS METHODS 70

TABLE 31 U.S. PATENTS ISSUED ON QD BIOTECHNOLOGY APPLICATIONS ON ANALYTICAL/INSTRUMENT METHODS, 2001 – 2003 70

SENSOR AND MICROARRAY APPLICATIONS 71

TABLE 32 U.S. PATENTS ISSUED ON QD-BIOTECHNOLOGY APPLICATIONS ON SENSOR AND MICRO-ARRAY APPLICATIONS, 2001 – 2003 71

MORE RECENT DEVELOPMENTS IN BIOLOGICAL APPLICATIONS 71

TABLE 33 LEADING COMPANIES ACTIVELY INVOLVED IN QD-BIOTECHNOLOGY APPLICATIONS ACCORDING TO U.S. PATENTS ISSUED, 2005 – 2008 72

TABLE 33 (CONTINUED) 73

TABLE 34 THE MOST ACTIVE UNIVERSITIES INVOLVED IN QD-BIOTECHNOLOGY APPLICATIONS ACCORDING TO U.S. PATENTS ISSUED, 2005 – 2007 73

TABLE 34 (CONTINUED) 74

COMPANY PROFILES—BIOLOGICAL APPLICATIONS 74

Affymetrix, Inc. (Santa Clara, CA) 74

Amnis Corporation, (Seattle, WA) 74

Applera Corporation (Foster City, CA) 75

Biocrystal Ltd. (Westerville, OH) 75

Clinical Micro Sensors, Inc./ Osmetech Molecular Diagnostics (Pasadena, CA) 76

Clontech Laboratories, Inc. (Palo Alto, CA) 77

Genoptix, Inc. (San Diego, CA) 77

Helicos BioSciences Corporation (Cambridge, MA) 78

Illumina, Inc. (San Diego, CA) 78

Intel Corporation (Santa Clara, CA) 78

Integrated Raman Bioanalyzer System 79

MEMS-Based Hydrodynamic Focusing 80

LI-COR Incorporated (Lincoln, NE) 80

Luminex Corporation (Austin, TX) 81

Nanosphere, Inc. (Northbrook, IL) 81

U.S. Genomics, Inc. (Woburn, MA) 82

BIOMEDICINE 83

DEVELOPMENTS IN BIOMEDICAL APPLICATIONS 83

TABLE 35 QD MEDICAL APPLICATIONS DERIVED FROM U.S. PATENTS, 2000 – 2004  
83

TABLE 35 (CONTINUED) 84

MORE RECENT DEVELOPMENTS IN BIOMEDICAL APPLICATIONS 84

TABLE 36 QD MEDICAL APPLICATIONS DERIVED FROM U.S. PATENTS: 2005 – 2007  
85

CANCER THERAPY AND DIAGNOSTICS 86

Cancer Therapy and Diagnostics (Continued) 87

DIAGNOSTIC TOOLS 88

DISEASE SCREENING 88

IMPLANTABLE DEVICES 89

Motorola Inc. 89

QinetiQ Plc 90

SURGICAL AIDS 91

Spectros Corporation 91

Teledyne Lighting	92
Advanced Magnetics, Inc.	92
ELECTRONICS	92
TABLE 37 NOVEL QD-BASED DEVICES AND APPLICATIONS IN ELECTRONICS	92
TABLE 37 (CONTINUED)	93
LIMITATIONS OF CONVENTIONAL ELECTRONIC DEVICE FABRICATION	93
Top-Down QD Electronic Device Assembly	94
TABLE 38 U.S. PATENT-BASED DEVELOPMENTS IN QD INTEGRATION USING CONVENTIONAL MICROELECTRONIC TECHNOLOGY, 1999 – 2004	94
TABLE 38 (CONTINUED)	95
TABLE 39 U.S. PATENT-BASED DEVELOPMENTS IN QD INTEGRATION USING CONVENTIONAL MICROELECTRONIC TECHNOLOGY, 2005 – 2007	96
Bottom-Up QD Electronic Device Assembly—Molecular Electronics	96
TABLE 40 U.S. PATENT-BASED DEVELOPMENTS IN QD INTEGRATION INTO UNCONVENTIONAL NANOELECTRONIC TECHNOLOGY	97
TABLE 40 (CONTINUED)	98
TABLE 41 U.S. PATENT-BASED DEVELOPMENTS IN QD INTEGRATION USING UNCONVENTIONAL MICROELECTRONIC TECHNOLOGY, 2005 – 2007	98
QUANTUM COMPUTERS AND CRYPTOGRAPHY	99
Quantum Computing and Information Processing	99
Quantum Cryptography	99
PATENT ACTIVITY	100
TABLE 42 U.S. PATENT-BASED QD DEVELOPMENTS IN QUANTUM COMPUTERS: 1999 – 2004	100
TABLE 43 U.S. PATENT-BASED QD DEVELOPMENTS IN QUANTUM COMPUTERS AND QUANTUM CRYPTOGRAPHY, 2005 – 2007	101
Credence Systems Corporation (Milpitas, CA)	102
D-Wave Systems (Vancouver, Canada)	102
MagiQ Technologies, Inc. (New York, NY)	103
Toshiba Research Europe Ltd., Cambridge Research Laboratory, U.K.	103
STORAGE/MEMORY DEVICES	104
TABLE 44 U.S. PATENT-BASED QD DEVELOPMENTS IN MEMORY DEVICES, 1999 – 2004	104
TABLE 45 U.S. PATENT-BASED QD DEVELOPMENTS IN MEMORY DEVICES, 2005 – 2007	105

OPTOELECTRONICS 105

LEDS 106

DISPLAYS 106

TABLE 46 U.S. PATENT-BASED QD DEVELOPMENTS IN DISPLAY TECHNOLOGIES, 2005 – APRIL 2008 107

Boeing Company (Chicago, IL) 107

E Ink Corporation (Waltham, MA) 108

Eastman Kodak Company (Rochester, NY) 108

Goldeneye, Inc. (Carlsbad, CA) 109

Massachusetts Institute of Technology (Cambridge, MA) 110

Microvision, Inc. (Redmond, WA) 111

QD Vision, Inc. (Watertown, MA) 112

TABLE 47 BENEFITS OF QD-LEDS OVER OTHER DISPLAY TECHNOLOGIES 112

Samsung Electronics Company, Ltd. (Suhan, Korea) 113

Solexant Corporation (San Jose, CA) 114

Superimaging, Inc. (Freemont, CA) 114

FLEXIBLE DISPLAY INDUSTRY 115

TABLE 48 PROFILE OF SOME EMERGING FLEXIBLE DISPLAY MARKET PLAYERS 115

TABLE 48 (CONTINUED) 116

COMPLEMENTARY FABRICATION TECHNOLOGY 116

Ink-jet Printing 116

Mist Deposition 117

LASERS 117

TABLE 49 U.S. PATENT-BASED QD DEVELOPMENTS IN LASERS AND LASER DIODES AND RELATED DEVICES AMONG U.S. ORGANIZATIONS, 2005 – 2007 118

TABLE 50 U.S. PATENT-BASED QD DEVELOPMENTS IN LASER DIODES AND RELATED DEVICES AMONG FOREIGN ORGANIZATIONS, 2005 – 2007 119

Finisar Corporation (Sunnyvale, CA) 120

Innolume GmbH (Dortmund, Germany, and Santa Clara, CA) 120

TABLE 51 ADVANTAGES OF QD DIODE LASERS 121

QD Laser, Inc. (Tokyo, Japan) 121

LEDS AND LIGHTING 122

TABLE 52 ROADMAP RECOMMENDATIONS FOR SSL-LED TECHNOLOGY/LAMP TARGETS 123

TABLE 53 IMPORTANT PLAYERS IN GROWING WLED SSL INDUSTRY	124
TABLE 54 U.S. PATENT-BASED QD DEVELOPMENTS IN LEDS AND RELATED DEVICES AMONG U.S. ORGANIZATIONS, 2005 – 2007	125
TABLE 54 (CONTINUED)	126
TABLE 55 U.S. PATENT-BASED QD DEVELOPMENTS IN LEDS AND RELATED DEVICES AMONG FOREIGN ORGANIZATIONS, 2005 – 2007	126
TABLE 55 (CONTINUED)	127
Avago Technologies Limited (Singapore)	127
Evident Technologies, Inc. (Troy, NY)	127
Group IV Semiconductor Inc. (Ottawa, Canada)	128
Kopin Corporation (Waltham, MA)	129
Los Alamos National Laboratory (Los Alamos, NM)	129
3M Company (St. Paul, MN)	130
Osram Opto Semiconductors GmbH (Regensburg, Germany)	132
Philips Lumileds Lighting Company (San Jose, CA)	132
Philips Lumileds Lighting Company (Continued)	133
Innovalight, Inc (Santa Clara, CA)	134
Sandia National Laboratories (Albuquerque, NM)	134
TABLE 56 PROPERTY COMPARISON OF COLLOIDAL QDS AND CONVENTIONAL LED PHOSPHORS	135
Challenges Facing Solid-State LED Development	136
TABLE 57 COLLOIDAL QD-BASED SOLID-STATE WHITE LIGHTING: ENABLING FEATURES AND FUTURE TECHNICAL CHALLENGES	137
OPTICAL COMPONENTS	138
BACKGROUND	138
PATENT ACTIVITY	139
TABLE 58 U.S. PATENT-BASED QD DEVELOPMENTS IN OPTICAL COMPONENTS AND RELATED DEVICES: 1999 – 2004	139
MORE RECENT PATENT ACTIVITY	140
TABLE 59 RECENT U.S. PATENT-BASED QD DEVELOPMENTS IN OPTICAL COMPONENTS, 2005 – 2008	140
Trackdale Ltd. (U.K.)	141
University of Toronto (Canada)	141
Virginia Polytechnic Institute and Lambda Instruments, Inc. (Blacksburg, VA)	142
SECURITY	142

RATIONALE FOR QDS AS AN ENABLING TECHNOLOGY 142

QDs versus Organic Fluorescent Dyes 143

Market Drivers 143

Counterfeiting 144

ORGANIZATIONS EXPLOITING QD-BASED SECURITY TECHNOLOGY 144

TABLE 60 KEY ORGANIZATIONS INVOLVED IN SECURITY APPLICATIONS OF QDS  
OR COMPETITIVE MARKING MATERIALS 145

MORE RECENT SECURITY APPLICATIONS DEVELOPMENTS 145

TABLE 61 QD SECURITY APPLICATIONS DERIVED FROM U.S. PATENTS, 2005 – 2008  
146

BioCrystal Ltd. (Westerville, OH) 146

Center for Forensic Studies, Texas Technical University (Lubbock, TX) 147

Digimarc Corporation (Beaverton, OR) 147

Evident Technologies (Troy, NY) 148

Honeywell International Inc. (Morristown, NJ) 148

Massachusetts Institute of Technology (Cambridge, MA) 149

Nanosolutions GmbH (Hamburg, Germany) 150

National Research Council (Ottawa, Canada) 150

NCR Corporation (Dayton, OH) 151

New Light Industries, Ltd. (Spokane, WA) 151

Oxonica Inc/Nanoplex Technologies, Inc. (Mountain View, CA) 152

Quantum Dot Corporation (Hayward, CA) 154

Spectra Systems Corporation (Providence, RI) 154

Veritec Verification Technologies, Inc. (Essex, CT) 155

BUSINESS PROGNOSIS OF THE SECURITY MARKET 155

TABLE 62 RECENT INTERNATIONAL CONFERENCES FOCUSING ON NEW  
SECURITY DEVELOPMENTS 156

Market Size 156

Digital Security Printing 156

DVDs 157

Counterfeit Drugs 157

SUSTAINABLE ENERGY 158

CHEMICAL REACTION ENERGY CONVERSION 158

SOLAR ENERGY 159

Solar Energy (Continued) 159

ORGANIC DYE-BASED SOLAR CELLS 160

TABLE 63 ADVANTAGES OF FLEXIBLE POLYMER-BASED OVER CONVENTIONAL RIGID SOLAR CELL DESIGNS 160

ORGANIC QD-BASED SOLAR CELLS 162

TABLE 64 SOME ADVANTAGES OF COLLOIDAL QDS OVER ORGANIC DYES USED IN PHOTOVOLTAIC SOLAR CELLS 162

TABLE 65 MAJOR PLAYERS INVOLVED IN PATENTING AND DEVELOPMENT OF QD SOLAR CELLS 163

Agfa-Gevaert (Belgium) 164

Harvard University 164

Los Alamos National Laboratory 164

Lund University, Sweden 164

Nanosys Inc. (Palo Alto, CA) 165

National Renewable Energy Laboratory (NREL) 166

University of California (Santa Barbara, CA) 167

University of Idaho 167

University of Rochester 168

MORE RECENT DEVELOPMENTS 168

TABLE 66 MORE RECENT DEVELOPMENTS BY MAJOR PLAYERS INVOLVED IN QD SOLAR CELLS AND COMPETITIVE TECHNOLOGIES, 2005 – 2008 168

TABLE 66 (CONTINUED) 169

THERMOELECTRIC ENERGY CONVERSION 169

TABLE 67 RECENT DEVELOPMENTS IN QD ENHANCEMENTS USED IN THERMOELECTRIC ENERGY (TE) CONVERSION, 2005–2008 170 Chapter-6:

INDUSTRY STRUCTURE AND COMPETITIVE ANALYSIS

QUANTUM DOT PRODUCERS 171

WET CHEMICAL-BASED SYNTHESIS 171

Open Market 171

TABLE 68 CURRENT COMMERCIAL OPEN MARKET COLLOIDAL-QD PRODUCERS 172

American Elements (Los Angeles, CA) 173

Bayer Technology Services GmbH (Leverkusen, Germany) 173

Bayer Technology Services GmbH (Leverkusen, Germany) 174

Crystalplex Corporation (Pittsburgh, PA) 175

Evident Technologies (Troy, NY) 175



TABLE 69 EVIDENT TECHNOLOGY COMMERCIAL PRODUCTS 176

TABLE 70 RECENT BUSINESS DEVELOPMENTS AT EVIDENT TECHNOLOGIES 177

TABLE 70 (CONTINUED) 178

Hanwha Chemical Corporation (Seoul, South Korea) 178

Invitrogen Corporation (Carlsbad, CA) 179

Quantum Dor Corporation 180

BioCrystal/BioPixels Limited 181

Nanoco Technologies, Ltd. (Manchester, U.K.) 182

Nanoco Technologies, Ltd. (Manchester, U.K.) (Continued) 183

Nanosquare Company Ltd. (Seoul, South Korea) 183

NN-Labs Inc, Fayetteville, AR 184

NN-Labs Inc, Fayetteville, AR (Continued) 185

Northern Nanotechnologies, Inc. (Toronto, Canada) 186

Ocean NanoTech LLC (Fayetteville, AR) 187

Oxonica Limited (U.K.) 188

PlasmaChem GmbH (Berlin, Germany) 189

Selah Technologies (Pendleton, SC) 189

Voxtel Inc. (Beaverton, OR) 190

Closed Market 191

TABLE 71 COMPANIES EXPLORING OTHER PRODUCT APPLICATIONS AND DEVELOPMENT OF COLLOIDAL-QDS OR SIMILAR SYSTEMS 192

Nanosphere Inc. (Northbrook, IL) 192

Nanosphere Inc. (Northbrook, IL) (Continued) 193

Nanosys Inc. (Palo Alto, CA, and Medford, MA) 194

Nanosys Inc. (Continued) 195

TABLE 72 NANOSYS LATEST BUSINESS DEVELOPMENTS 196

TABLE 72 (CONTINUED) 197

SOLID STATE-BASED SYNTHESIS 197

TABLE 73 U.S. COMPANIES LEADING IN COMMERCIAL DEVELOPMENT OF SOLID-STATE – BASED SYNTHESIS OF QUANTUM DOTS 197

FOREIGN COMPETITION IN QUANTUM DOTS 198

WET CHEMICAL-BASED SYNTHESIS 198

SOLID-STATE – BASED SYNTHESIS 198

TABLE 74 ASIAN COMPANIES CURRENTLY LEADING IN COMMERCIALY DEVELOPING SOLID-STATE – BASED SYNTHESIZED QDS 198

TABLE 74 (CONTINUED) 199

TABLE 75 EUROPEAN AND OTHER FOREIGN ORGANIZATIONS CURRENTLY INVOLVED IN COMMERCIALY DEVELOPING SOLID-STATE – BASED SYNTHESIZED QDS 199

DRIVING FORCES IMPACTING QD INDUSTRY 200

SPECIALTY AND POTENTIAL FOR COMMODITY QD APPLICATIONS 200

SOLAR ENERGY 201

IMPORTANT FACTORS NURTURING GROWTH 201

DEVICE FABRICATION 201

TOP-DOWN IN SITU LITHOGRAPHIC FABRICATION 202

BOTTOM-UP ASSEMBLY 203

Solid State Synthesis 203

Wet Colloid Synthesis 203

BUILDING OF QUANTUM DOT DEVICES 204

TABLE 76 PROCESS SYNTHESIS AND DEVICE FABRICATION PARADIGMS FOR COLLOIDAL-QDS 204

CHALLENGES AND ISSUES FACING THE QD INDUSTRY 205

TABLE 77 MAJOR ISSUES AND CHALLENGES FACING THE COLLOID QD INDUSTRY 205

NANOTOXICITY 206

RoHS Directive 207

PRODUCTION SCALE-UP OF QDS 207

SURFACE CHEMICAL PASSIVATION 208

TRADE PRACTICES/REGULATORY ISSUES AND INFORMATION 208

REGULATORY ISSUES 209

Toxicity Studies 209

Environmental Studies 210

GREEN CHEMISTRY 210

EVOLUTIONARY STAGE OF INDUSTRY 211

COLLOIDAL QDS 211

Colloidal QDs versus Epitaxial QDs 211

MARKET ANALYSIS 213

QD COMMERCIAL PRODUCERS 213

LEADING COLLOIDAL QD PRODUCERS 213

TABLE 78 LEADING U.S. COLLOIDAL QD PRODUCERS: CURRENT PRODUCT

PORTFOLIO AND COMMERCIAL MARKET APPLICATIONS	214
TABLE 78 (CONTINUED)	215
TABLE 79 FOREIGN COLLOIDAL QD PRODUCERS: CURRENT PRODUCT PORTFOLIO AND COMMERCIAL MARKET APPLICATIONS	215
TABLE 79 (CONTINUED)	216
COMPARISON WITH SOLID-STATE SYNTHESIZED QDS	216
MAJOR PRODUCTION CHALLENGES	217
TABLE 80 MAJOR CHALLENGES FACING COMMERCIAL QD PRODUCERS	217
TABLE 81 MARKET FORECASTS FOR COLLOIDAL SC QDS: RATIONALE FOR SELECTING PROMISING SECTORS	218
TABLE 81 (CONTINUED)	219
MARKET PROSPECTS FOR QDS IN BIOLOGY AND BIOMEDICINE	219
POTENTIAL MARKET SIZE	219
EVOLUTION OF NC MATERIALS IN BIOLOGICAL DETECTION	219
MORE RECENT STUDIES	220
DIAGNOSTIC INSTRUMENTS: DEVELOPMENTS AND PARTNERSHIPS	221
PUBLIC AND PRIVATE INVESTMENT	222
TABLE 82 GOVERNMENT SPONSORSHIPS AND COMMERCIAL PARTNERSHIPS AIDING DEVELOPMENT OF NEW BIOLOGICAL AND BIOMEDICAL APPLICATIONS OF QDS	223
TABLE 82 (CONTINUED)	224
EMERGING MARKETS FOR SMALL NANOCRYSTALLINE MATERIALS	224
Standalone Bioconjugate-QD Materials Market	224
TABLE 83 PREDICTED REVENUE GROWTH IN STANDALONE QDS (BIOCONJUGATE AND OTHER) TARGETED FOR ALL IMPENDING MARKET APPLICATIONS, THROUGH 2013 (\$ MILLIONS)	225
Diagnostic Instrument/QD Integration Applications	226
MARKET PROSPECTS FOR QDS IN MEMORY APPLICATIONS	226
TABLE 84 SOME FUTURE NANOMATERIALS-BASED MEMORY ARCHITECTURES	226
TABLE 84 (CONTINUED)	227
FLASH, THE MEMORY OF CHOICE	228
Freescale Semiconductor Inc. (Austin, TX)	228
Freescale Semiconductor Inc....Continued	229
Other Near-Term Competitive Technologies	230

Projected Growth in QD-Based Memory Market 230

FIGURE 12 TOTAL WORLDWIDE FLASH MEMORY GROWTH PROJECTION 231

TABLE 85 PROJECTED MARKET REVENUES GENERATED BY FREESCALE'S QD-BASED MEMORY PRODUCTS, THROUGH 2013 (\$ MILLIONS) 231

Hewlett-Packard (Palo Alto, CA) 232

IBM (Yorktown Heights, NY) 232

Micron Technology Inc. (Boise, ID) 233

Nanosys Inc. (Palo Alto, CA) 233

Technical University of Berlin (Germany) 234

University of California, Los Angeles 234

University of Cambridge (U.K.) 235

Other Foreign Competition 235

MARKET PROSPECTS FOR QDS IN OPTOELECTRONICS 235

RIGID LED WHITE LIGHTING 235

TABLE 86 MAJOR ISSUES CONFRONTING THE IMPENDING USE OF QDS IN SSL WLED TECHNOLOGY 236

TABLE 86 (CONTINUED) 237

North American Interests 237

Foreign Interests 238

Market Prediction 239

TABLE 87 PROJECTED RIGID AND FLEXIBLE LED LIGHTING REVENUES GENERATED BY QD-BASED PRODUCTS, THROUGH 2013 (\$ MILLIONS) 239

FLEXIBLE LEDS 239

Market Prediction 240

RIGID AND FLEXIBLE DISPLAYS 241

TABLE 88 MAJOR PERFORMANCE ISSUES CONFRONTING OLED DISPLAY TECHNOLOGY AND POTENTIAL ENHANCEMENTS PROVIDED BY QDS 241

Rigid and Flexible Displays...(Continued) 242

TABLE 89 PROJECTED RIGID AND FLEXIBLE DISPLAY REVENUES GENERATED BY QD-BASED PRODUCTS, THROUGH 2013 (\$ MILLIONS) 244

MARKET PROSPECTS FOR QDS IN OPTICAL COMMUNICATION 244

DOPED FIBER OPTICS 244

LASERS 245

Finisar Corporation (Sunnyvale, CA) 245

Innolume GmbH (Dortmund, Germany, and Santa Clara, CA) 246

QD Laser, Inc. (Tokyo, Japan)	246
OPTICAL COMPONENTS	246
Evident Technologies, Inc. (Troy, NY)	246
Trackdale Ltd. (Framingham, U.K.)	247
QUANTUM CRYPTOGRAPHY	248
PROJECTED GROWTH FOR QDS IN OPTICAL COMMUNICATION	248
TABLE 90 PROJECTED OPTICAL COMMUNICATIONS REVENUES GENERATED BY QD-BASED PRODUCTS, 2010 – 2013 (\$ MILLIONS)	249
MARKET PROSPECTS FOR QDS IN SECURITY APPLICATIONS	249
TABLE 91 CLASSIFICATION OF COVERT QD SECURITY APPLICATIONS BY MARKET SECTOR	249
TABLE 91 (CONTINUED)	250
MARKET PROSPECTS FOR QDS IN SOLAR CELL TECHNOLOGY	251
INITIAL COMMERCIAL DEVELOPMENTS	251
RESEARCH AND DEVELOPMENT	252
MAJOR ISSUES	253
TABLE 92 MAJOR ISSUES CONFRONTING THE IMPENDING USE OF COLLOIDAL QDS IN SOLAR CELL TECHNOLOGY	253
MORE RECENT DEVELOPMENTS	253
Impending QD-Based Solar Products	254
Cyrium Technologies, Inc. (Ottawa, Canada)	254
Innovalight, Inc. (Santa Clara, CA)	254
Nanosys, Inc. (Palo Alto, CA)	255
Competitive and Parallel Developments Impacting QD-Solar Cells	256
TABLE 93 MOST RECENT DEVELOPMENTS SHAPING COMMERCIAL DEVELOPMENTS IN SOLAR PHOTOVOLTAICS	256
TABLE 93 (CONTINUED)	257
First-Generation—Bulk Crystalline Silicon Solar Cells	257
Second-Generation—Inorganic Thin Film Silicon Solar Cells	258
Third-Generation—Organic Thin Film Solar Cells	258
Third-Generation—Organic Thin Film Solar Cells (Continued)	259
PROJECTED GROWTH IN QD-BASED SOLAR MARKET	260
FIGURE 13 PROJECTED WORLDWIDE GROWTH IN PV SOLAR SYSTEMS	261
TABLE 94 PROJECTED SOLAR CELL MARKET REVENUES GENERATED BY QD-BASED PRODUCTS, 2010 – 2013 (\$ MILLIONS)	261

MARKET PROSPECTS FOR QDS IN OTHER PROMISING SECTORS 261

FLEXIBLE ELECTRONICS 261

Flexible Electronics (Continued) 262

Chapter-7: APPENDIX 15

ACRONYMS AND ABBREVIATIONS 263

UNITS 264

TABLE 95 NATIONAL SCIENCE FOUNDATION ACTIVE AWARDS RELATING TO  
QUANTUM DOT RESEARCH 265

TABLE 95 (CONTINUED) 266

TABLE 95 (CONTINUED) 267

TABLE 95 (CONTINUED) 268

TABLE 95 (CONTINUED) 269

TABLE 95 (CONTINUED) 270

TABLE 95 (CONTINUED) 271

TABLE 95 (CONTINUED) 272

TABLE 95 (CONTINUED) 273

TABLE 95 (CONTINUED) 274

TABLE 95 (CONTINUED) 275

TABLE 95 (CONTINUED) 276

TABLE 95 (CONTINUED) 277

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