NANOCO GROUP PLC

NANOCO GROUP PLC

NEEDHAM GROWTH CONFERENCE

JANUARY 2019

DISCLAIMER

The following presentation is being made only to, and is only directed at, persons to whom such presentation may lawfully be communicated ("relevant persons"). Any person who is not a relevant person should not act or rely on this presentation or any of its contents. This presentation does not constitute an offering of securities or otherwise constitute an invitation or inducement to any person to underwrite, subscribe for or otherwise acquire securities in Nanoco Group PLC or any of its subsidiaries ("Nanoco").

It should be noted that past performance cannot be relied on as a guide to future performance. This presentation contains forward-looking statements with respect to Nanoco's plans and objectives regarding its financial conditions, results of operations and businesses.

The financial information referenced in this presentation does not contain sufficient detail to allow a full understanding of Nanoco's results. For more detailed information, the entire text of the preliminary results announcement for the full year ended 31 July 2018, can be found on the Investor Relations section of the Nanoco website (www.nanocogroup.com).

PRESENTERS

Dr Michael Edelman - Chief Executive Officer

Nanoco has been led by Dr Michael Edelman since September 2004. Michael led the initial fundraising, spun Nanoco out of the University of Manchester, floated the Group on the London Stock Exchange in 2009 and grew Nanoco into the world-leading quantum dot player it is today.

Prior to Nanoco, Michael held a number of executive roles, including having responsibility for licensing the technology developed by GE/Bayer joint venture Exatec LLP, Vice President and Managing Director at yet2.com, Commercial Director at Colloids Ltd and Business Manager at Brunner Mond & Co Ltd.

Michael started his career with ICI and has a PhD in Organometallic Chemistry from the University of Sussex, UK, and an undergraduate degree in Classics and Chemistry from Tufts University, Boston, MA, USA.

Brian Tenner - Chief Operating Officer and Chief Financial Officer

Brian joined the Board as Chief Operating Officer and Chief Financial Officer on 20 August 2018. He also serves as the Company Secretary.

Prior to joining Nanoco, Brian held a number of senior finance positions with both publicly listed and private multinational companies, often in hi-tec markets. His roles have typically focused on broad ranging operational finance with an emphasis on leading change and transformation programs. Brian's previous roles include interim CEO and subsequently CFO of NCC from 2017 to 2018 (cyber security professional services), CFO of Renold plc (engineering manufacturing) from 2010 to 2016, Scapa plc (speciality chemicals) from 2007 to 2010 and British Nuclear Group (hi-tec chemicals and large scale decommissioning projects) from 2003 to 2007.

Brian qualified as a Chartered Accountant with PwC in 1994 and holds a law degree (LLB Hons) from Edinburgh University.

NANOCO AT A GLANCE

OVERVIEW

Founded in 2001

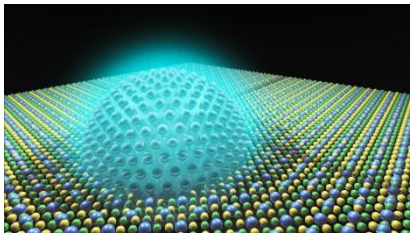
Status: Public (LON: NANO / Mkt Cap: ~$160mm)

Headquarters: Manchester, UK

Employees: ~100

- A pioneer in the the research, development, licensing, and manufacture of heavy-metal free quantum dots and semiconductor nanoparticles for use in various commercial applications
- Key strengths:
  - ✓ Cadmium-Free Quantum Dots (CFQD®)
  - ✓ Intellectual Property (~700 Patents)
  - ✓ Mass Production Capabilities

KEY MARKETS



Nano-materials

Display

Lighting

Biomedical

CURRENT PARTNERS

DOW Electronic Materials

Wah Hong

Large U.S. Strategic

LARGE & GROWING ADDRESSABLE MARKETS

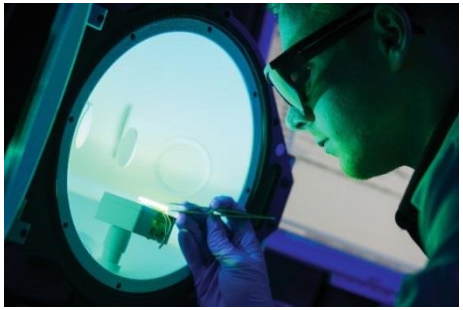
	Nano-materials	Display	Lighting	Biomedical
				
Application	Infrared Sensing	LCD backlighting	Horticulture Lighting	Biological imaging In-vivo & in-vitro diagnostic
Technology	Infrared Quantum Dots	CFQD® quantum dots CFQD® quantum dots resin	CFQD® quantum dots film	Water soluble CFQD® quantum dots Functionalized CFQD® quantum dots
Business Model / Timing	Manufacture and sell materials	License & materials sales	License & material sales	Partner license with upfront fees / Longer term
Addressable Market	~$8B for both Human-machine sensors and autonomous vehicles	$7.5B in 2022[1]	~8.5B in 2022[2]	QDs in healthcare = c.$1B in 2022[1]
Opportunity Timing	H1 FY2020	H2 FY2019	H2 FY2020	H1 FY2022

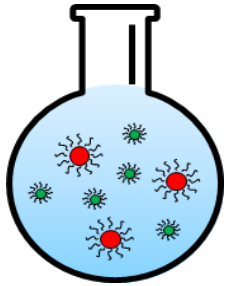
(1) Market&Markets – Quantum Dots Market by Product, Application, Material & Geography – Forecast & Analysis (2013 – 2022), Markets&Markets 2012
(2) Yole – Horticultural LED Lighting Technology, Industry, and Market Trends 2017

NANO-MATERIALS – A GAME CHANGING OPPORTUNITY

WHY NANOCO QUANTUM DOTS?

- Nano-materials dramatically improve the performance of devices in which they are incorporated
- Nano-material development is a core competency of Nanoco
  - Complex particle design and development - ability to tune nano-materials to specific end market applications
  - Mass production - solved fundamental problem of scale by developing patented process to volume produce nano-materials
- Currently re-focusing of R&D and operational resources to support new opportunities in the electronics markets
    - Focus on new generations of quantum dots, 2D materials

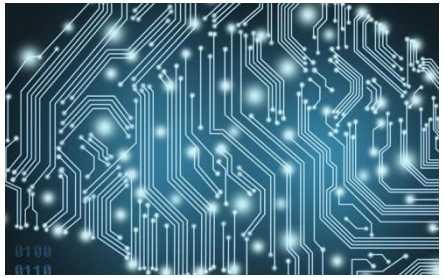




APPLICATIONS

Autonomous Vehicles

- LIDAR
- Infra-red sensing
- Human – car interface



Advanced Electronics

- Human machine interface
- Facial recognition
- Motion control

Medical Devices

- Advanced blood monitoring
- Photo-dynamic therapy

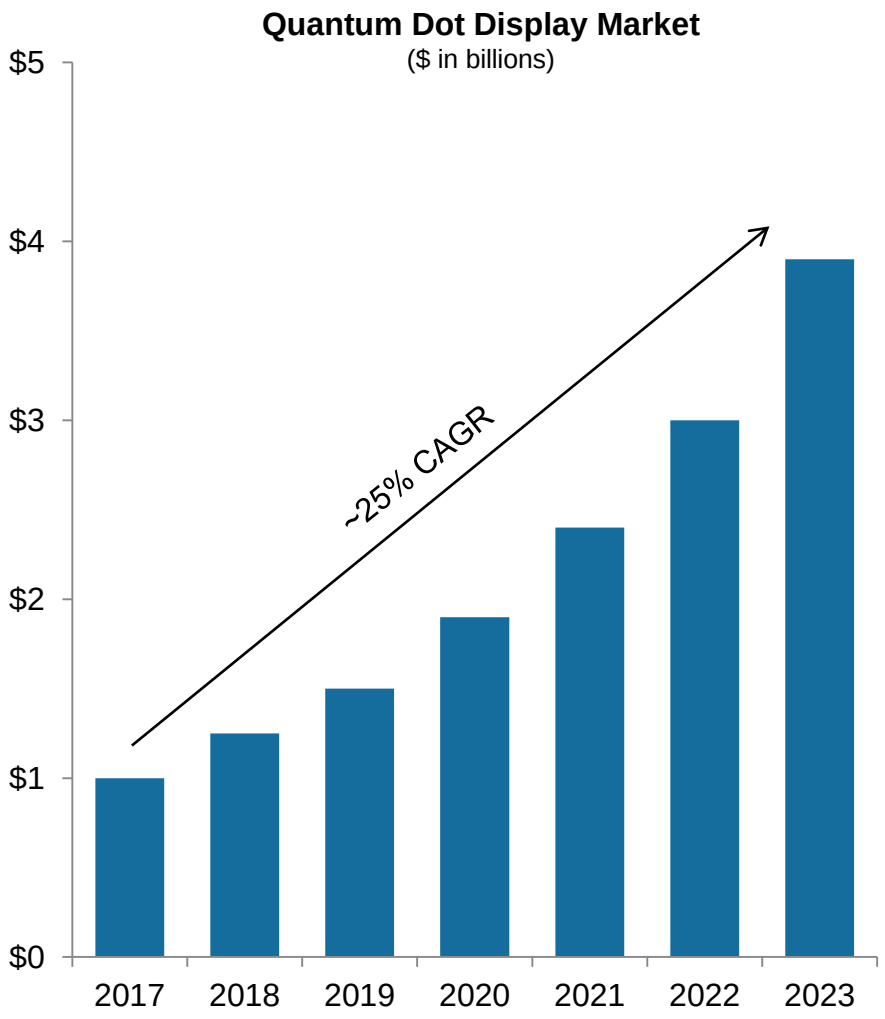
A number of commercial research and development opportunities under discussion for delivery in FY19

DEEP AND STRENGTHENING RELATIONSHIP WITH U.S. STRATEGIC PARTNER

Program on track and exploring additional commercial opportunities

WELL-POSITIONED TO ADDRESS THE DISPLAY MARKET

LARGE AND GROWING MARKET



Source: Market Research Future - Quantum Dot Display Market Research Report- Global Forecast 2023

THE NANOCO ADVANTAGE

- ✓ Cadmium free quantum dots are RoHS compliant
- ✓ Improved color saturation, color gamut and accuracy vs phosphors and OLED
- ✓ Energy efficient
- ✓ Fits within existing LCD manufacturing infrastructure
- ✓ Patented “seeding process” enables mass production

HOWEVER, QD ADOPTION IN DISPLAY HAS BEEN SLOWER THAN ANTICIPATED

- Protracted RoHS ruling has allowed cadmium QD to persist, especially in China
  - October 2019 – cadmium exemption ends in Europe
  - China currently using cadmium QD for local Chinese market, exploring CFQD for export to Western markets in Europe and North America

- Initial adoption on high end TVs where volumes are lower than forecast and dominated by Samsung
- QLED / OLED battle for high end TVs driven by Samsung and LG

SAMSUNG	LG	**LCD Market**
~ 2 million* QD TVs shipped in 2017	1.7 million OLED panels shipped in 2017	Total LCD TV market ~240 million* units, 90% below $1000

- Critical to success will be penetration of the sub $1000 mass TV market - CFQD can differentiate product for OEMs
- TV design cycles longer than anticipated

Critical to success will be penetration of the sub-$1000 mass TV market where CFQD can differentiate product for OEMs

*Nanoco estimates

CONTINUOUS INNOVATION CRITICAL TO SUCCESS

- *Nanoco has led the development of CFQD technology with rapid improvements in quality, performance, yield*
- *New generations of QD enabled displays such as hybrid OLED / QD displays entering the market*

QD Film

- Continuous improvement in CFQD quality to meet display demands
- Aggressive reduction of COGS

QD Colour Conversion

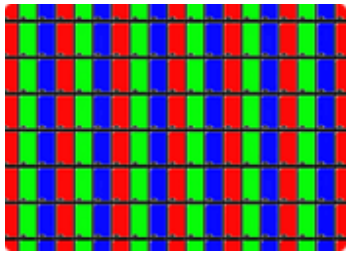
- QD / OLED hybrid displays (Plessey)
- QD color filter
- Improved colour gamut, brightness and viewing angle

QLED

- EL QD
- Nanoco / Kyulux agreement
- Direct competitor to OLED

Current technology

1 – 3 years away



3+ years away

Partners

Dow

plessey

Kyulux

MULTI-CHANNEL STRATEGY FOR DISPLAY

Working with non-exclusive licensees to serve display customers worldwide

NANOCO GROUP PLC

Technology License

Technology License

- Focus on 2nd & 3rd generation QD display tech
- Nanoco supplying CFQD® quantum dots to Merck
- Supporting Merck with technology

Nanoco Runcorn Production

- Wah Hong (Taiwan film coater)
- Nanoco working closely with Wah Hong to develop direct sales to display market
- Allows Nanoco to understand display market needs

- Dow focused on large OEMs
- Nanoco supporting with technology

Display Customers

Display Customers

Display Customers

QUANTUM DOTS FOR HORTICULTURE LIGHTING

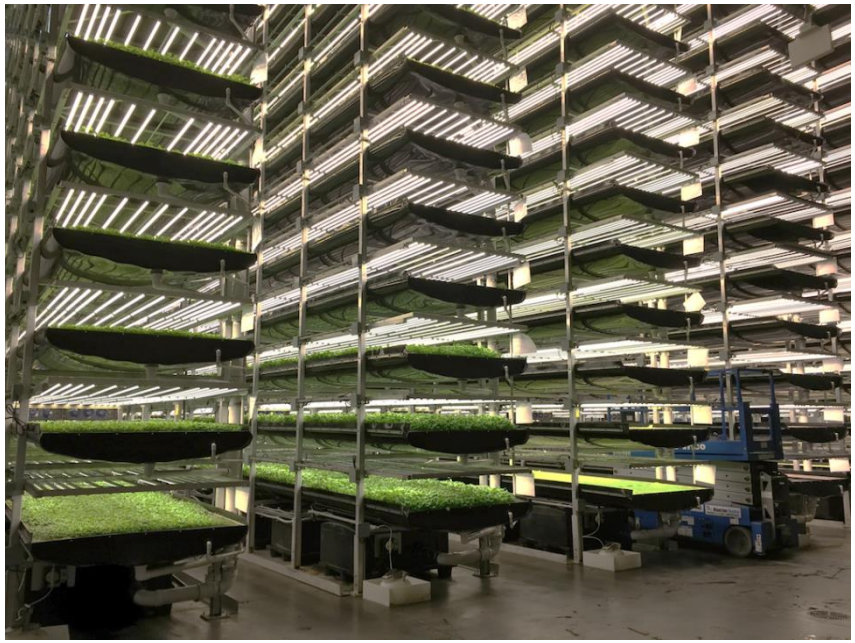
AN ATTRACTIVE MARKET OPPORTUNITY

Why quantum dots?

- The horticultural lighting market is forecast to grow from $3.8bn in 2017 to $17.0bn in 2027 due to
  - Growing populations
  - Increased awareness of environmentally-friendly farming practices
  - Urbanization
- Cd-free QDs are ideal candidates for optimizing plant growth systems, as QDs deliver the precise spectrum light that triggers plant flowering, growth, and reproduction
- Nanoco is uniquely positioned to deliver QD solutions and has already developed several partnerships with top developers such as GE Mirai and leading UK growers

Next Steps

- Nanoco supplying Cd-free film components to lighting manufacturers to assemble into QD-lights
- Negotiating a number of supply and license agreements with lighting manufacturers
- Push technology out to the global market



Source: Yole – Horticultural LED Lighting Technology, Industry, and Market Trends 2017

QUANTUM DOTS IN HEALTHCARE

AN ATTRACTIVE MARKET OPPORTUNITY

Why quantum dots?

- The need for increased information in healthcare is driving adoption of quantum dots for diagnosis, prognosis, and treatment in medicine
- Quantum dots have distinct advantages over organic dyes and fluorescent proteins that have traditionally been used
  - Tunable emission spectra
  - Greater brightness
  - Superior photostability
  - Simultaneous excitation of multiple fluorescence colors
- Nanoco's quantum dots are non-toxic because they are heavy metal free and suitable for healthcare applications

Next Steps

- File Investigational New Drug Application (IND) with FDA

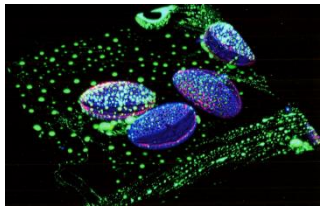
Nanoco Partnerships

COVANCE
charles river
CANCER RESEARCH UK
UCL

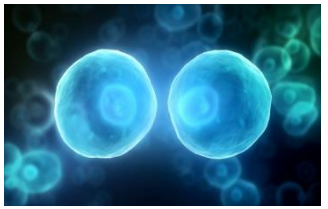
The QD market for healthcare is a $1 billion market by 2022

Source: Markets and Markets research

APPLICATIONS



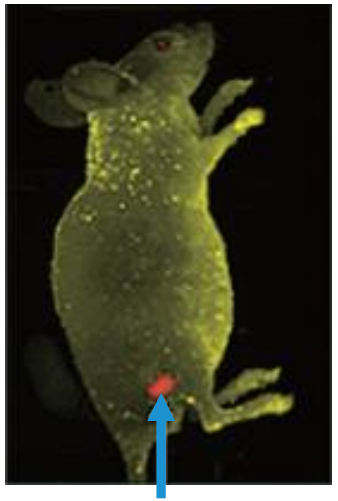
Biological imaging



Cellular labeling

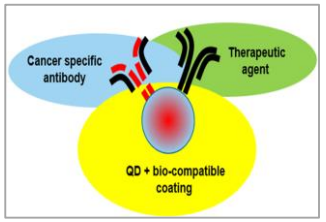
DNA labeling

Cancer diagnosis



Targeted tumor imaging using quantum dots antibody conjugates

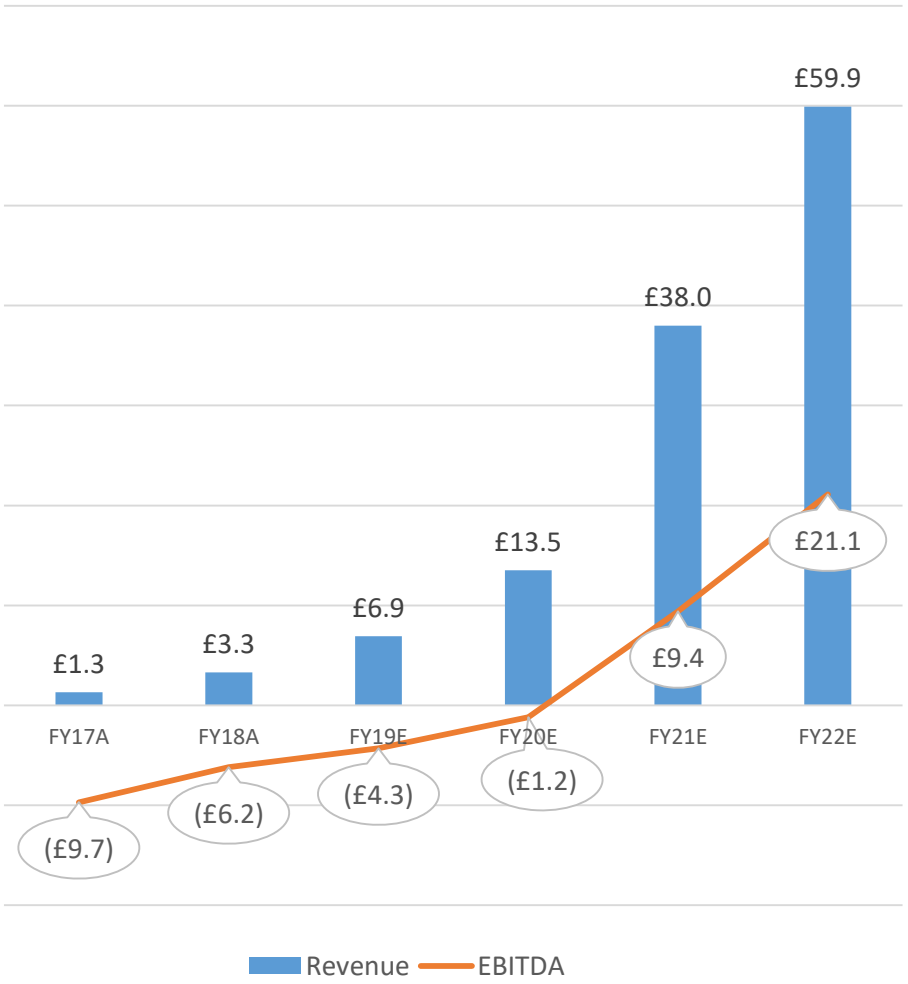
Image guided surgery



Targeted therapy

NANOCO FINANCIAL SUMMARY

Wall Street Consensus Financial Projections (£mm)

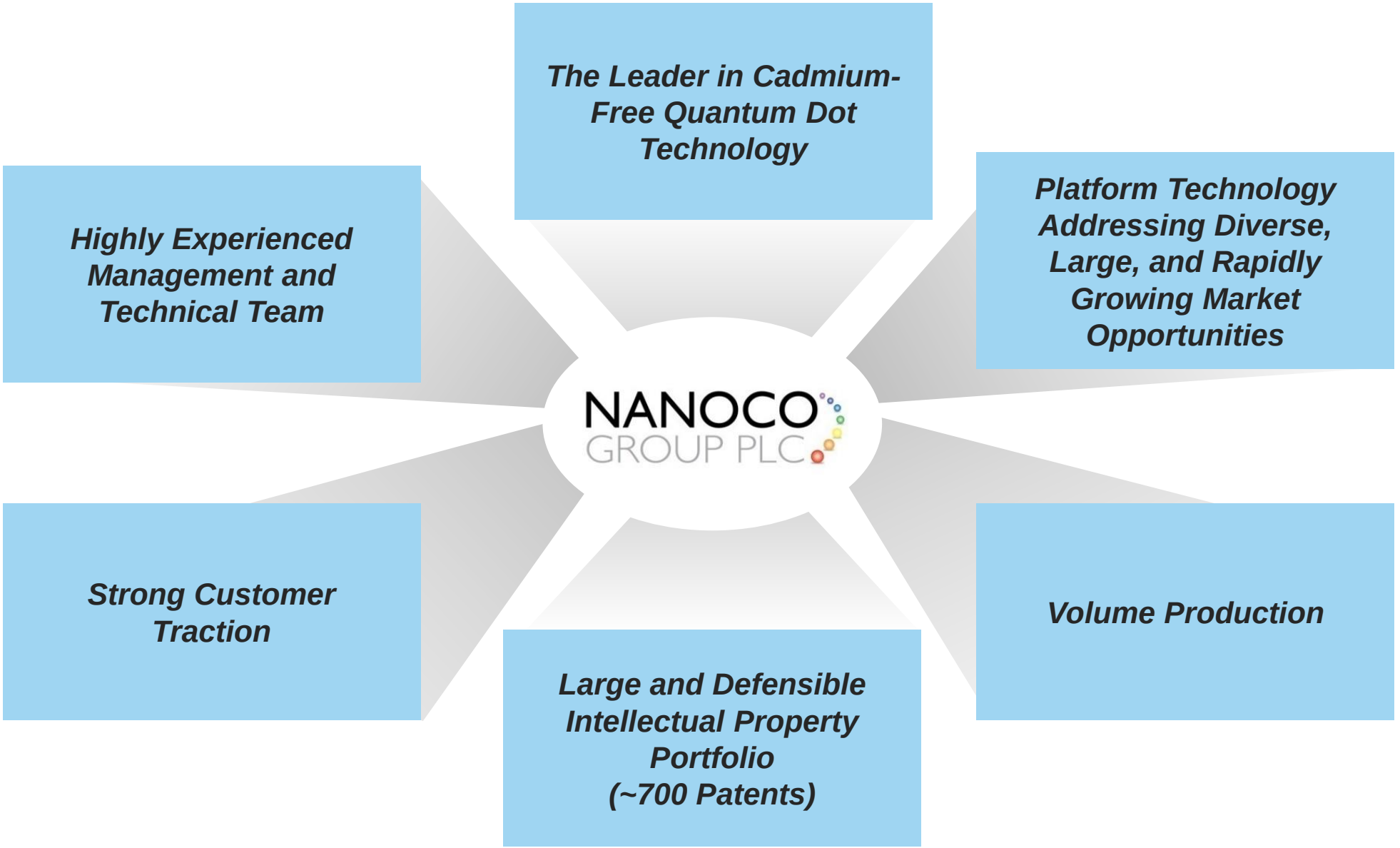


RAMPING FINANCIAL PROFILE

- Key revenue driver in short term from nano-materials for U.S. strategic partner
  - Growing pipeline of commercial opportunities will support revenue in FY19, around double that of FY18
- Also generating revenue from sale of materials and licensing for display and horticulture lighting
  - Display licensing and lighting revenue begins to ramp from H2-FY20
- Attractive long term operating model
- Cash flow positive in FY2020
- Cash resources in place to fund business beyond commercial production H1 FY20

Note: FYE July 31
Source: Wall Street Research

SUMMARY



NANOCO GROUP PLC

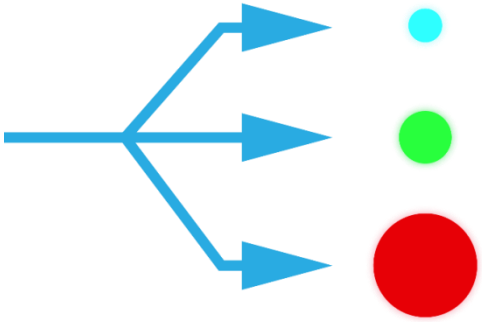
APPENDIX

WHAT IS A QUANTUM DOT?

- Tiny particles of a fluorescent semiconductor material
- 1 to 10 nanometers in diameter
- Size of the quantum dot determines the spectrum of light emitted
- Smaller = blue; larger = red
- Quantum dots can also be tuned to light beyond visible light into the Infra-red or ultra-violet parts of the spectrum

ADVANTAGES TO THE PHYSICAL PROPERTIES OF QUANTUM DOTS

- More energy efficient than conventional phosphors
- Emit light in precisely-controlled wavelengths
- Nanosecond lifetime enables increased modulation
- Improved color gamut for displays
- QD technology can reduce manufacturing cost and complexity



ROHS UPDATE

- The European Commission (EC) revised the RoHS exemption last year so that it immediately ceased for lighting and will end on 31st October 2019 for display products, after which the normal RoHS limit of 100ppm will apply
- The exemption is subject to a final review by the EC as one European lighting company and one Chinese QD company requested an extension in April.
- Nanoco expects that regulations in other key markets, including China, will fall in line with RoHS in future
- Meanwhile, our contacts with display companies indicate that most already accept the need for new display products to be cadmium-free - especially the world leading brands in both television, computer monitor and laptop displays
- The EC has also started a project to review the list of toxic substances that are restricted under RoHS regulations and to how to evaluate Exemption requests
- Indium Phosphide (InP) is included in materials to be considered for future RoHS restricted materials list because it is rated as a probable carcinogen. However, it is far less harmful than Cadmium and does not persist in the environment
- Nanoco does not use InP in its CFQD®, which have been tested and shown to be non-toxic for potential medical use in cancer treatments
- The EC has also included in this package of work one new request for cadmium based QD to be used in 'on-chip' LED lighting applications
- Nanoco is actively participating in the review process for the proposed RoHS changes and continues to champion the use of safer alternatives to cadmium-based QD

Market leader Samsung promotes their cadmium-free quantum dots QLED TV range at CES 2018

LEADERSHIP TEAM

Dr Christopher Richards Non-Executive Chairman	• CEO, Non-Executive chairman, Arysta LifeSciences • 20 years of increasing management roles at Syngenta • Executive chairman of Plant Health Care • NED of Origin Enterprises plc
Dr Michael Edelman CEO	• Led spin-out of Nanoco from University of Manchester • GE/Bayer JV, founded www.yet2.com Europe, commercial director Colloids Ltd, Brunner Mond, ICI
Dr Nigel Picket Co-founder & CTO	• Inventor of Nanoco's key patented scale-up technology • Leading expert on semi-conducting nano-crystals • Japanese Government, St. Andrews University, Georgia Tech
Brian Tenner CFO / COO	• Experienced Quoted Company CFO with strong operational and transformation experience • Previously Board Member and CFO of British Nuclear Group Ltd, Scapa Group plc, Renold Plc, NCC Group PLC • NED and Chair of Audit Committee at AIM listed Velocity Composites plc
Brendan Cummins Senior Non-Executive	• 40 years of industry experience mostly with Ciba Geigy, last role was CEO of Ciba and led the sale of Ciba to BASF • Board of US Headquartered, Ashland Inc., Chair of Governance and Nominations Committees and member of Audit Committee • Board of Perstorp AB, Sweden
Dr Alison Fielding Non-Executive	• IP Group • NED of Getech Group plc • Astra Zeneca, followed McKinsey & Co, then co-founded Techtran Group Limited which was acquired by IP Group in 2005 and subsequently held the role of director and COO at IP Group • Board member and advisor of several early stage and quoted IP Group backed technology companies

SHAREHOLDER ANALYSIS (AS AT 31 OCTOBER 2018)

Name	Shareholding	Percentage
Lombard Odier	51,527,660	18.02%
Hargreaves Lansdown Asset Management	24,452,640	8.55%
M&G Investment Management	20,854,357	7.29%
Miton	16,735,185	5.85%
Baillie Gifford & Co	15,787,825	5.52%
Dr Nigel Pickett (CTO)	11,112,347	3.89%
Interactive Investor	10,488,182	3.67%
Dr Michael Edelman (CEO)	3,124,350	1.09%
Total of shareholdings above	**154,082,546**	**53.88%**

Notes: The total number of voting rights in the Company is 285,934,927

Nanoco Group PLC

46 Grafton Street, Manchester, M13 9NT, United Kingdom,
Tel: +44 161 603 7900 | Fax: +44 161 603 7901
info@nanocotechnologies.com
www.nanocogroup.com