

NANOTECHNOLOGY PARTNERSHIP FORUM

September 13, 2010

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Gaithersburg, MD 20899



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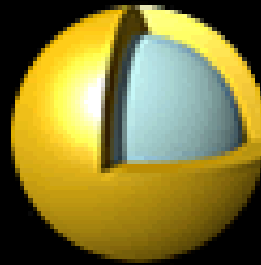
KEY MESSAGES

- **Already, we are beginning to see the promise manifest itself in meaningful products and profitable companies that point to the economic potential for entrepreneurs and investors alike.**
- **In time, the “hype” of nanotechnology will be born out. As courageous entrepreneurs transform nanoscience into nanotech enabled products, it will profoundly reshape the world around us for the better.**

NEW INSTRUMENTATION TECHNOLOGY MAKES NANOTECH POSSIBLE....



IMPROVED CANCER THERAPIES...



Nanospectra



NANOTECH WILL ENABLE COST EFFECTIVE SOLAR ENERGY...



- New cost structure (target of \$1 / peak watt)
- Flexible packaging and form factor
- Scalable manufacturing processes

AND EFFICIENT LIGHTING WITH REDUCED ENERGY LOSS...



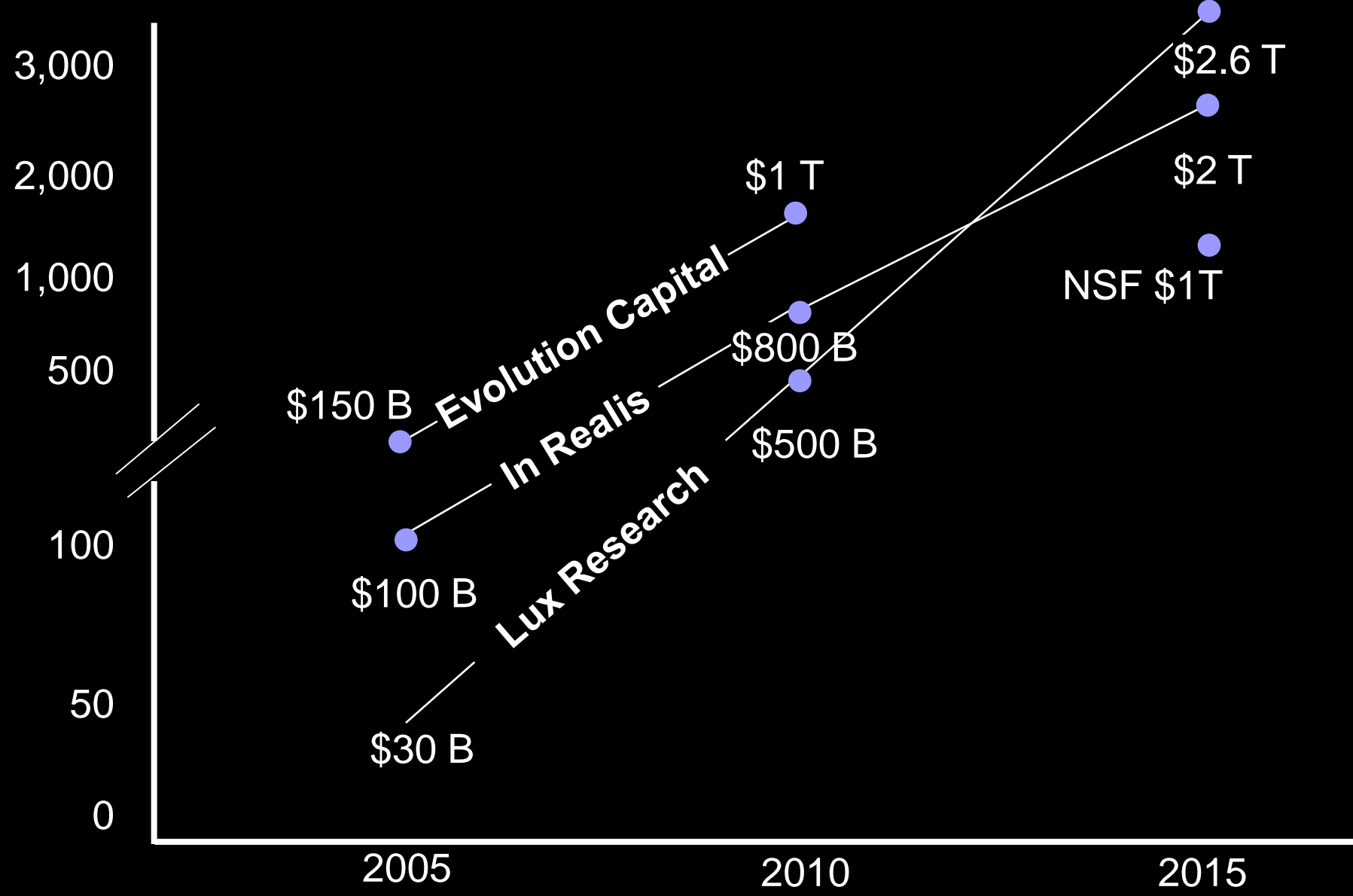
- At present, electricity use accounts for about one-third of total energy consumption in the United States
- Of that, about 20% of all electricity consumed goes for lighting
- Incandescent lights are about 5% efficient in converting electrical energy to visible light.
- Cutting the amount of electricity needed for lighting in half would result in a savings of 4×10^{11} kilowatt-hours of energy per year – roughly equivalent to the annual energy production of 50 nuclear reactors.

KEY MESSAGES

- **Already, we are beginning to see the promise manifest itself in meaningful products and profitable companies that point to the economic potential for entrepreneurs and investors alike.**
- **In time, the “hype” of nanotechnology will be born out. As courageous entrepreneurs transform nanoscience into nanotech enabled products, it will profoundly reshape the world around us for the better.**
- **But, nanotech innovators face many substantial challenges as well. The emergence of products reaching the marketplace has engendered overwhelming negative hype from the NGO sector. Calls for new regulations abound.**
- **The NanoBusiness Alliance is actively communicating with our elected leaders and regulatory officials to ensure a positive and informed policy climate. The NanoBusinesses community can and will realize the promise of nanotechnology by adopting proactive, open, and thoughtful approaches to bringing new products to market.**

THE PROJECTED ECONOMIC IMPACT IS HUGE

\$ Billions

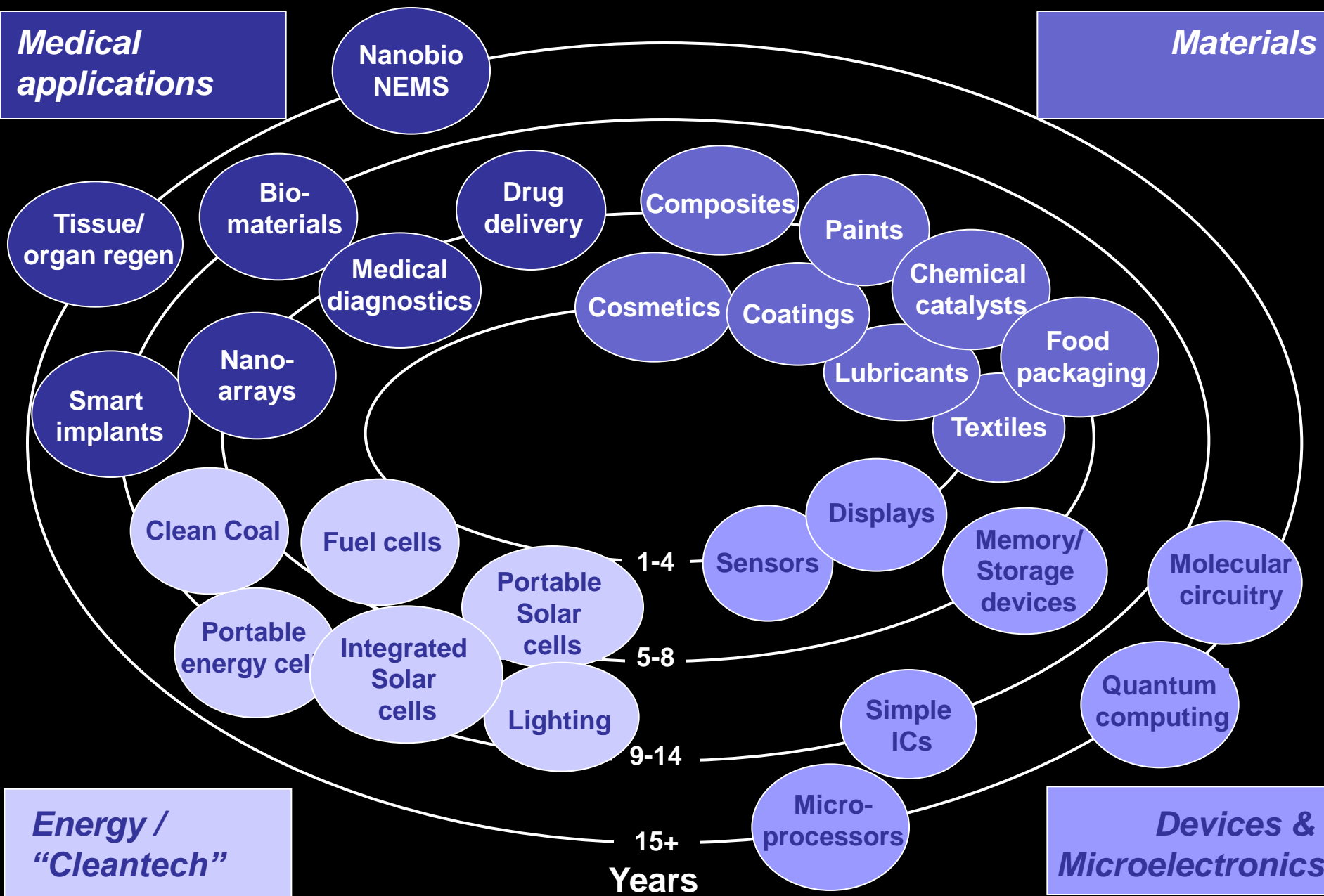


Source: CMP Cientifica, NanoBusiness Alliance. Evolution Capital, NSF, In Realis, McKinsey analysis

KEY FACTORS WILL DRIVE RATE OF PRODUCT DEVELOPMENT AND INTRODUCTION...

Consideration	Effect	Examples
Technological complexity	Integration requirements and interdependency delay penetration for complementary designs	<ul style="list-style-type: none">• New chip architectures require integration with peripheral providers
Product life cycle	Limits integration of new and improved components into systems	<ul style="list-style-type: none">• Automobile models (3 - 4 years)• Aerospace (decades)
Regulatory limitations	Rigorous regulatory approval process limits adoption, success rate	<ul style="list-style-type: none">• FDA approval• FAA approval
Investment requirements	Creates significant switching cost, raising required value for innovation to penetrate	<ul style="list-style-type: none">• CMOS chip fabrication facilities (> \$ 2B)

AND THUS MARKET PENETRATION...



THE NANOBUSINESS ALLIANCE AGENDA...

- **Capital Formation and Commercialization**
 - Lower the cost and increase the availability of capital for nanotech innovators.
 - Encourage goal oriented basic research to translate fundamental discoveries into viable technologies.
- **Regulation and Public Awareness**
 - Advocate for sufficient resources to develop a scientific foundation for regulation
 - Develop a prioritization for regulatory initiatives
 - Support the creation of publicly accessible fact-bases that allow consumers to make informed decisions

A PROACTIVE APPROACH TO POLICY SHOULD FOCUS ON DATA GATHERING

- **Create a strategic roadmap that quantifies, prioritizes and assigns the tasks required to advance metrology, characterization and standards development**
- **Adequately fund these efforts using government-industry partnerships to share the burden of discovery**
- **Work with NIOSH and EPA in their voluntary programs to collaborate on workplace best practices and establish pre-manufacture data gathering and testing requirements**

KEYS TO SUCCESS

- 1) Access to Capital
- 2) Strategic Vision of Products into Market Segment
- 3) Access to Market



REASONS FOR FAILURE

- LACK OF CAPITAL
- NO CLEAR DIRECTION AS TO PRODUCTS; IE, PLATFORM TECHNOLOGY
- BARRIERS TO ENTRY



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NANOTECH LEADERS:

**A123 SYSTEMS
ABRAXIS BIOSCIENCE
AMERICAN SUPERCONDUTOR
ASPEN AEROGELS
ELAN CORPORATION
KONARKA TECHNOLOGIES
LUNA
MOLECULAR IMPRINTS
NANOSOLAR
NANOLINK
NANOPHASE
NANOSPHERE
NANO-TEX
NANTERO
NEOPHOTONICS
NOVOMER
NVE CORPORATION
QD VISION**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

A123 SYSTEMS

WEBSITE:

WWW.A123systems.com

CORE TECHNOLOGY:

Nanostructured Lithium Iron Phosphate Batteries



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

ABRAXIS BIOSCIENCE

WEBSITE:

www.abraxisbio.com

CORE TECHNOLOGY:

NANOSCALE CHEMOTHERAPEUTIC COMPOUNDS



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

AMERICAN SUPERCONDUCTOR CORPORATION

WEBSITE:

www.amsc.com

CORE TECHNOLOGY:

**Nanodot dispersion in coating for better
performance**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

ASPEN AEROGELS

WEBSITE:

www.Aerogel.com

CORE TECHNOLOGY:

Nanoporous silica aerogels



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

ELAN CORPORATIN, PLC

WEBSITE:

www.elan.com

CORE TECHNOLOGY:

**Nanocrystal technology for enchanced bioavailability
of drugs creating more effective and convenient
dosage**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

KONARKA TECHNOLOGIES, INC.

WEBSITE:

www.konarka.com

CORE TECHNOLOGY:

Thin film photovoltaics. . Polymer solar cells formed by the print method deposition of nanostructures: fullerenes and quantum dots. Over 350 patents and applications.



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

LUNA INNOVATIONS

WEBSITE:

www.lunainnovations.com

CORE TECHNOLOGY:

**New-generation products for healthcare,
telecommunications, energy and defense
markets.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

MOLECULAR IMPRINTS, INC.

WEBSITE:

www.molecularimprints.com

CORE TECHNOLOGY:

Nano-Imprint Lithography



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANOSOLAR

WEBSITE:

www.nanosolar.com

CORE TECHNOLOGY:

**CIGS solar cells via a roll printing technique
utilizing novel forms of nanoparticles
dispersed into NanoSolar's proprietary ink
formulation.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANOGRAM CORPORATION

WEBSITE:

www.nanogram.com

CORE TECHNOLOGY:

**Laser pyrolysis process for nanoparticle
synthesis and deposition.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NanoInk

WEBSITE:

www.nanoink.net

CORE TECHNOLOGY:

Nanometer-scale manufacturing and applications development for the life sciences, engineering, pharmaceutical and education industries.



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANOPHASE

WEBSITE:

www.nanophase.com

CORE TECHNOLOGY:

Dispersion technology, Nanoparticle surface
treatment, nanoparticle production technology



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANOSPECTRA BIOSCIENCES

WEBSITE:

www.nanospectra.com

CORE TECHNOLOGY:

- 1) Gold nanoshells for cancer treatment**
- 2) Biosensing assays**
- 3) Defense applications**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANOSPHERE, INC.

WEBSITE:

www.nanosphere.us

CORE TECHNOLOGY:

Advance molecular diagnostics system utilizing nanoparticles for rapid, highly specific detection of genes.



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

**NAME:
NANO-TEX, INC**

**WEBSITE:
www.nano-tex.com**

**CORE TECHNOLOGY:
Nano-Tex has a suite of technologies to protect and maintain fabrics based on Nanowhiskers which can repel most liquids and improve other textile performance improvements.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NANTERO, INC.

WEBSITE:

www.nantero.com

CORE TECHNOLOGY:

**Carbon nanotube fabrics and switches using
CMOS compatible methods.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NEOPHOTONICS

WEBSITE:

www.neophotonics.com

CORE TECHNOLOGY:

Platform of technologies allowing nanomaterials to be utilized for the optics and mems industries.



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

**NAME:
NOVOMER**

**WEBSITE:
www.novomer.com**

**CORE TECHNOLOGY:
A series of metallic catalysts which enables the
production of polymeric materials from
renewable feedstocks.**



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

NVE CORPORATION

WEBSITE:

www.nve.com

CORE TECHNOLOGY:

Spintronics for MRAM



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NANOTECHNOLOGY LEADERS CORPORATE PROFILES

NAME:

QD VISION

WEBSITE:

www.qdvision.com

CORE TECHNOLOGY:

Quantum Dot LEDs

Light fixtures based on light-emitting diodes



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