The Nanotech Economy

Tim Harper, Cientifica Ltd, London
• Cientifica is a world leader in providing consulting, as well as technical, scientific and industrial information on emerging technologies, with a specialization in nanotechnology;

• Cientifica combines a profound knowledge of science and business with an advanced data management system;

• Cientifica provides companies, governmental institutions and venture capitalists all over the world with accurate and critical business information.
London based Cientifica Ltd

- Provides contract research and development outsourcing via facilities in India and Singapore;
- Provides global nanotechnology business intelligence and consulting services to industry and investors worldwide;
- Organises world class global events such as the World Nano-Economic Congress;
- Coordinates EU research programs from electronics to toxicology, regulation and legislation;
- Provides expert advice to governments and companies worldwide.
The Benefit of Understanding of the Science
Think Globally…

- Offices
- Associates
- Global Headquarters (London)
…Act Locally

Cientifica Consulting Clients
Nano Activity?
Number of Companies by Activity

- Chemicals and advanced materials
- Energy
- Aerospace and Defense
- Agriculture and Food
- Construction
- Automotive /transport
- Environment
- Water
- Textiles
- Packaging
- Medical and Pharma
- Information technology and telecoms

Source: Cientifica Ltd
Nano Numbers?
Government Funding of Nanotechnologies

Source: Cientifica Ltd
Private Nanotech Spend by Country 2005

Source: Cientifica Ltd
Private Nanotech R&D Spend by Sector

Source: Cientifica Ltd
Venture Capital Deals 2005 - Viable Nanotech Companies?

Source: Cientifica Ltd
Venture Capital 2005 By Sector

Source: Cientifica Ltd
Nano Products
Nano Products

RESISTS SPILLS

The waiter just spilled an iced latte in your lap, but you don’t mind. You’re wearing pants made with NANO-TEX™ spill-resistant fabric, so the coffee just beads up and rolls right off.

Now, this beats those conventional fabric treatments we’ve all seen before. That’s because Nano-Tex builds spill resistance into the very fibers of the fabric, and this keeps the pants comfortable, soft, and breathable—just as they should be.

With NANO-TEX Fabric, you’re looking good and feeling good. Complications roll away like water off a duck’s back, and you’re ready for whatever’s next.

WHERE TO BUY
- Apparel
- Interior
  Furnishings
- Uniforms

FAQS
- Read FAQs
  Learn more about Nano-Tex™ Resists
  Spills Fabric

DOWNLOAD
- Product Info
  Learn more about Nano-Tex™ Resists
  Spills Fabric (.pdf)

CHARACTERISTICS

SPILL RESISTANCE
allows spills to wipe off easily

DURABILITY
maximizes performance over time

COMFORT
retains natural softness for maximum comfort

BREATHABILITY
allows fabric to breathe naturally

OTHER NANO-TEX
FABRICS

COOLEST COMFORT

RESISTS STATIC

REPELS & RELEASES STAINS
Nano Products

Shanghai BEST Industry & Commerce Co, China
Nano Products

Shantou Tongsheng Co., Ltd, China
Nano Products

Hantra Corporation, Korea
Nano Products
Samsung Goes Nano

1st stage:
Electricity is passed through the electrodes to generate Ag+ ion

2nd stage:
Tap water then flow through the Ag+ Mechanism carrying the Ag+ into the Tub

3rd stage:
Ag+ ion sterilizes the clothes during the wash cycle

4th stage:
Ag+ ion is released at the last rinse cycle

5th stage:
Ag+ ion new act to prevent bacteria from clinging onto the clean clothes & its propagation on the tub

Effect lasting Up to 1 month!
Samsung Goes Nano

Silver Nano’s Sterilizing Mechanism

Silver Nano Ag+ sub-microscopic particles (1-100nm) that come into contact with bacteria or fungi can easily penetrate cells and suppress their respiration. This, in turn, adversely affects their cellular metabolism and inhibits cell growth.

1. Bacteria & Enzyme
2. Cell Wall Dissolved
3. Cell Membrane Burst
4. Bacteria Dies
The Most Crucial Product - Tools!

- Without the ability to measure and manipulate nanotech would not exist
- Tools will help nanotech into the market
AND
- Allow product manufacturers to maintain yields and quality

Gold grain boundary sample and image courtesy FEI
Characteristics of Current Nano Products

• ‘nano’ adds value by adding a nanomaterial to an existing product
• Amount and value of the ‘nano’ is nano
  – No new products visible
  – No new markets created
  – Nobody has been disrupted
  – Despite wild predictions of a ‘nano revolution’
• Why?
The Evolution of Materials

10,000 BC 1000 BC 0 1800 1900’s 2000 2010

Stone & Wood Iron Cement Steel Polymers & Composites Nano materials & Nano composites Bottom Up Design

Knowledge Based Applications

• What do nanotechnologies allow us to do that is new?
• Can we apply them to existing processes?
• Can we generate new paradigms?
• Look for the FedEx not the Webvan!
Nano Markets?

• Why have we not seen an ‘nanotech revolution?’
• Why will nanotech companies worth over $100 million close down this year?
• How far is it to the trillion dollar market?
Taking Advantage of Nanotech

• Any product or process can be nano-enhanced
• Adoption however will depend on:
  – Price competitiveness
  – Performance improvements
  – Stability, consistency and quality of supply
  – Compatibility with existing industrial processes
  – Sufficient regulatory cover-HSE
• Industry is technology agnostic
• Many existing technologies are already highly advanced
• Nanotech has many hurdles to surmount
Is the factored impact on the economy more or less than other technology?

- In many cases, nanotech IS other technology, or is a bolt-on to existing tech
- c3500 BC invention of the wheel in Mesopotamia
- 1844 Goodyear invents vulcanized rubber
- 1887 Dunlop invents pneumatic tyre
- 1904 India Rubber add carbon black for reinforcement
- 1946 Michelin invents steel radial
- >2010 Carbon nanotube incorporation…?
Total Nanotech R&D Spend (US$ million) - The Private Sector Takes Over From 2005

Source: Cientifica Ltd
Venture Capital 2005 By Sector

Source: Cientifica Ltd
Getting The Timing Right

Too Early       The Sweet Spot       Too Late

Source: Cientifica Ltd
Funding Year on Year Change

Source: Cientifica Ltd
The Pioneers Get the Arrows…

• Many ‘nano’ companies funded in 2000-2003 were;
  – Science projects rather than product development
  – Funded by VCs looking for the next wave
  – Unaware of their markets and the barriers to entry
• As a result, some of them are having to raise more money at reduced valuations, holding fire sales or closing down
An Example: Optiva

- Raised $41.5m in venture capital for flat panel display polarizers
- Attempted to break into a market 85% controlled by two Japanese companies
- Technological problems delayed the initial product
- The market found other solutions and moved on
- Assets sold for $2m to Nitto Denka
From Scattergun to Strategy

• Many economies have ‘nanotech’ funding programs but…
• There will never be a ‘nanotech industry’ so…
• Most of the funding goes on curiosity driven academic research or has no long term economic effect
Creating an Economic Effect

• Where does Japan want to be in 10 years time?
• Specify objectives and competitive threats
• How can nanotech help us?
• Focus funding where it will help meet the strategic and economic goals
Conclusion

• Nanoscience is becoming nanotechnology
• Talk is about CNTs, but real action is in medical and pharma applications
• Products we are seeing now are just the tip of the iceberg
• Now is the time to start taking a serious look at the applications of nanotechnologies
• Japan can take advantage by getting smarter