NANOTECHNOLOGY

IMPACT OF NANOTECHNOLOGY IN THE MARKET PLACE

UK INDUSTRY VIEW

TECHNOLOGY WAVES

Cassein nanoparticles

Glenfiddich
SINGLE MALT
SCOTCH WHISKY
12
BASIL
HAYDEN'S
Kentucky Straight
Bourbon Whiskey
THE
FAMOUS
GROUSE
FINEST SCOTCH WHISKY
PRODUCT OF SCOTLAND

parlux 3200
parlux 3200
parlux 3200
parlux 3200

COMMERCIAL PRODUCTS USING NANOTECHNOLOGY

Source: Project on Emerging Technologies, Woodrow Wilson International Center for Scholars

The Project on Emerging Nanotechnologies

BY COUNTRY

NANOTECHNOLOGY FUNDING IN 2001

Number of products 2009
Number of Products
600
500
400
300
200
100
0
540
120
63
51
43
41
28
24
17
16
15
USA
Korea
Germany
China
UK
Japan
Taiwan
Singapore
France
Canada
Australia

Funding in 2001
US $ millions
800
700
600
500
400
300
200
100
0
696
600
110
80
50
50
36
35
25
20
13
USA
Japan
Korea
Germany
China
UK
Taiwan
Singapore
France
Australia
Canada

SoleFresh™
Nano-silver Socks

LEOREX

Nanotechnology types

DIMENSIONS	EXAMPLES	BENEFITS
1-D Thin films	Clays Surface coatings	Barrier properties Lighter weight Reinforcement Durable surfaces
2-D Nano tubes	Carbon nanotubes Nanofibres	Mechanical reinforcement Weight saving
3-D Nanoparticles	SiO_2 TiO_2 ZnO CeO_2 fullerenes etc.	Reinforcement Scratch resistance Antimicrobial UV resistance Flame retardancy

CLAYS

Good dispersion is crucial

ITF APPROV
DAVIS C
OFFICIAL BA

e.g. oxygen
clay platelets
1nm
1µm

Food Packaging

increased shelf-life

meat

drinks

JRT 391

SURFACE COATINGS

NANOTECHNOLOGY COATINGS

- Anti-corrosive
- Aesthetic
- Anti-scratch
- Heat repulsion / transfer
- Insulation
- Anti-microbial
- Barrier coatings
- Self-healing
- Self-cleaning
- Anti-reflective
- Increased strength
- Anti-fingerprint
- Anti-static
- Anti-UV
- Superhydrophobic
- Anti-pollution

Indestructible

specialist coatings manufacture

High Performance Surface Coatings Division

Turbine
Aero Engine

Aero Ancillaries

Airframe
& Aerospace

Defense
Equipment

Dry Film Lubrication
Lubricants and Lube

Magnesium Sealing
and Finishing

Heat and
Thermal Barrier Coatings

R & D
+ Environmental Issues

Firth of Forth Railway Bridge

NANO-CARE

The Next Generation of Wrinkle-Resistant
Eddie Bauer® Khakis with Nano-Tex®
Now with stain release in soft, breathable cotton.

Glass cleaner with Nano-Protect®
from Henkel KGaA

Högl Gore-Tex ankle boots

Windguard

Coldguard

Security

NEW Men's Nightfall Jacket £175

A necessary companion for mountaineering expeditions when keeping warm is critical. The perfect friend for every other time when it's a luxury. The face fabric: This has been chosen for everyone who has washed a favourite down jacket only to end up holding a mound of lumpy porridge. Using the latest nanotechnology the fabric actually sheds dirt, it's highly stain resistant and designed to be wiped clean. At last, a practical version of the classic down jacket. The filling: We only use white goose down for the Nightfall. This is the smallest, fluffiest down and also the warmest. It means leaving 95% of down for other brands who may care more what it looks like, than how it performs. This filling is so light, warm and packable you may even want to reconsider flying south for the winter!

Weight 480g, Packed Size 2000ml

Fabric: Schoeller™ Nanosphere® 100% polyamide outer, 100% polyamide lining, white goose down filling

Shown in Royal Blue, also available in Black ● Sizes S-XL, Code 02458

Nano-based lacquers are now on the market.

WENKO
NANO
Plus
NANO
STONE
CLEANER
8218
500 ml
e

Sheffield Hallam University

MATERIALS AND ENGINEERING
RESEARCH INSTITUTE

NANO-COATED BOWLING BALLS

KR 04 JUL
Mercedes-Benz

30

Jubilee Church, Rome

(Dio Padre Misericordioso)

THE NANOBREEZE ROOM AIR PURIFIER

NanoBreeze Room Air Purifier

Decomposes allergens, odours, germs, gases, fumes and more

(Nano TiO_2 as oxidant)

TEIJIN FIBERS LIMITED

Insect-repellent clothing

Nano-adhesion technology enables Earth Chemical Co's SCORON® to stay fixed on the fibre

Without SCORON® **With SCORON®**

TEIJIN FIBERS LIMITED

high-strength polyester nanofibre *Nanofront*

The new golf gloves have:

- **slip-resistance**
- **soft features**
- **high absorbency and diffusion**

APPLIED NANODETECTORS

Dr. V. Higgs with Dr. Cuenat at NPL

ACCU-CHEK
Aviva Nano
NEW
Half the steps to test
Proven least painful
No lancet handling
Roche

$6H_2O + 6CO_2 \rightarrow C_6H_{12}O_6 + 6O_2$

Bromborough
Airport
Eastham
M53
Parkgate
Childer Thornton
Willaston
Neston
Ellesmere Port
Greenfield
Little Sutton
Little Neston
Ness
Whelston
Bagillt
Great Sutton
Whitby
Elton
Hapsford
Burton
Ledsham
M53
Stoke
A55
A550
A5117
M56
Flint
Dunham-on-the-Hill
Pentre Halkyn
Oakenholt
Shotwick Park
Lea-by-Backford
Halkyn
A548
Saughall
A41
Barrow
Quay
Upton
Garden City
Sealand
Shotton
Guilden Sutton
Great Barrow
Rhosesmor
Northop
Blacon
Bache
A56
Hoole
Vicars Cross
Tarvin Rd
A51
Rhydymwyn
Chester
Great Boughton
Christleton
Hawarden
Hockenhu
A494
Saltney
Huntington
Cotton Abbotts
Gwernaffield
Mold
Mynydd Isa
Buckley
Broughton
Claverton
A55
Waverton
A41
Gwernymynydd
Penyffordd
Hatton
Maeshafn
Higher Kinnerton
England
Wales
Eaton
Golborne David
Llanferres
Nercwys
Leeswood
Buerton
Golborn Bellow

oxford advanced surfaces group plc

Onto® Technology

Wet Process
[Spray, dip, spin, roll-to-roll]

ANTI-REFLECTIVE SURFACES

Reduced reflection, improved transmission

BSME 615

Nanotecture

Microbatteries

- Extremely thin
- High power
- Rapidly rechargeable

CARBON NANOTUBES

CARBON NANOTUBES
THOMAS SWAN
PERFORMANCE & SPECIALITY CHEMICALS
50-100 x STRONGER THAN STEEL
1/6th THE WEIGHT

10^{-12} kg of CARBON NANOTUBES in one slice of TOAST

NanoTECH

STEALTH

PolyCond

82% weight reduction compared to a brass pin.

One fifth the cost of the brass pin, and the finished 3-pin plug is 40% cheaper.

BASF
The Chemical Company

BOSCH

BAYER CARBON NANOTUBES IN VELOZZI SOLO CAR

The SOLO crossover alternative energy vehicle from California-based Velozzi has carbon nanotubes for body panels, and achieves 100 miles per gallon.

- Construction
- Wind turbine blades
- Electrically conducting parts
- Electrodes for redox-flow batteries

Dr Nicole Grobert

NANOPARTICLES

6.3 million tonnes carbon black nanoparticles per annum

Normal room

15,000 per cm³

Forest

50,000 per cm³

Urban street

100,000 per cm³

LIVING WITH NANOPARTICLES

2008 Net Sales: € 17.5 billion

Operating Profit: € 2.67 billion (15.2%)

R&D expenditure: € 581 million (3.3%)

PARTICLE SIZE DISTRIBUTION

The Miller – from an engraving of the sixteenth century by J Amman

NANOSIGHT LM20

- Fast and easy and to use
- Portable and robust
- Compact footprint
- No disposables
- No calibration

smith&nephew

Acticoat SILCRYST

Unique patented

Nanocrystalline silver technology

NEW
CURAD®
silver
Natural Antibacterial
SILVER IN THE PAD
20 Assorted Bandages
SEALED FOR YOUR PROTECTION
PRESS TO OPEN
INSERT TO CLOSE
CURAD®
silver
* Curad Silver bandage is indicated for first aid to help minor cuts, scrapes, abrasions, lacerations, and scalds. Curad Silver bandage is an adhesive bandage with silver added for an antibacterial effect.
HOW IT WORKS
STRONG HOLD
ABSORBS FLUIDS
KEEPS OUT WATER AND DIRT
GENTLE TO THE SKIN
SILVER IN THE PAD
silver
Natural Antibacterial
CURAD. WE HELP HEAL.
Visit us at www.curaduse.com or call 1-800-227-4703

FresherLonger™

Miracle Food Storage

SHARPER IMAGE® (USA)

FresherLonger **containers are infused with silver nanoparticles**

(24 hour growth of bacteria was reduced by over 98% inside FresherLonger containers, compared with conventional ones)

STORAGE AFTER 15 DAYS

Non-silver container

FresherLonger™

£45
exclusive to MARKS & SPENCER
MARKS & SPENCER
+sleepsafe
pyjama
SILVER TECHNOLOGY CLINICALLY PROVEN
TO REDUCE THE RISK OF MRSA
EXCLUSIVE TO M&S
Travel Unlimited
LIGHTWEIGHT PACKABLE
X-STATIC®
BASE LAYER GARMENT
X-STATIC® BASE LAYER
Rohan

Koichi Wakata
Japanese astronaut

Dummy/Pacifier

Donny the Dog

Benny the Bear

Sukoyaka baby milk carton

Wet wipes

Baby carrriage

APPENDIX 1: EXAMPLES OF NANOSILVER PRODUCTS READILY AVAILABLE IN SHOPS AND FROM MAJOR ONLINE RETAILERS

UNITED STATES

Note: all products were viewed on the 1st of May 2009

PRODUCT TYPE	NANO SILVER CLAIM	PRODUCT & MANUFACTURER	PURCHA
Hair Styling	"The advanced technologies of ionic steam infuses hair with healthy moisture, tourmaline coating provides radiant shine, nano silver particles for clean, healthy-looking hair, ceramic provides uniform heat-no hot spots."	Conair Infiniti Nano Silver 1 1/2" Straightener	
Hair Styling	"Nano-Silver technology has anti properties."		
Hair Styling	"... clean, shi with less infrag		

AUSTRALIA

PRODUCT TYPE	NANO SILVER CLAIM	PRODUCT & MANUFACTURER	PURCHASED OR VIEWED AT
Socks	"Silver fabric eliminates bacteria and odour. ... keeping you cool in summer and warm in winter. ... silvertech is safe and natural and will last for the life of the product"	Outdoor expedition silver tech hiking socks	Raya Tent City
			Raya Tent City
Underwear	"Silver fabric is moisture repellant and dries quickly, antimicrobial"	Wild workwear thermal bottom/top	
Hair Styling	"Clean beautiful shine. Nanosilver technology"	Remington 'Estudio hot rollers	Pulse Chemist
Band-aids	"Kills harmful germs for optimal healing. Silver ions are continually released..."	Elastoplast	Mattress Resources Australia http://www.mattressresources.com.au/index.php?option=com_content&task=viewlist=3&Itemid=127
Mattress fabric	"Anti static - reduces electrostatic discharges. Thermodynamic- regulates temperature - Cool in summer, warm in winter. Anti microbial- inhibits growth of fungi and bacteria. Hypo allergenic - reduces allergies ...Natural"	Interlude mattress fabric	http://www.softmats.com.au/Technical/Spec.aspx
Children's playmats	"Nano-silver is: Highly effective, Fast acting, Non Poisonous, Non toxic, Non allergic"	Bubba mat (LG Chem)	http://www.kleruz.com.au/index_files/page0002.htm
Refrigerator	"Nano Silver ions ... are blasted around the chamber by an inbuilt fan."	Kleruz Sanitizer	http://www.amazon.com/Handler-Thelidy/B000NUI6V6/ref=sr_1_16?ie=UTF8&s=shoes&qid=1241468897&sr=8-16
Footwear sanitizer	"Constructed with nano silvers that inhibit the growth of bacteria, mold, fungi and more, for the life of the product"	The Handler open doors, flush toilets and more	http://www.beaubelleaustralia.com.au/beaubelle_products.php?cat_id=&subcat=30
Face spray	"With superior antibacterial benefits to keep your skin germ-free, deionized water maintains optimal hydration without interfering with the activity of nano-silver."	Beaubelle Face spray	Northcote Plaza Healthfood shop
Colloidal silver	"The natural antimicrobial. Safe for human consumption"	Fulhealth Industries Silver colloid	Northcote Plaza Healthfood shop
Colloidal silver	"Quality , reliability, trust"	Silvex Solutions Colloidal silver	Northcote Plaza Healthfood shop
Colloidal silver	"Non allergenic"	Natures Treasures Colloidal Silver (Australian Health Research	

40 Nano and Biocidal Silver

Turtle WAX
EXTREME
NANO-TECH
FORMULA
WASH & WAX
- Enhanced cleaning
- Shine & protection
- Rapid drying formula

Turtle Wax® Extreme Nano-Tech offers benefits beyond traditional car care. Nano sized particles work at a molecular level, cleaning deeper for ultimate cleaning performance and bonding tighter for a smoother more glossy finish.
Surface
Surface
STANDARD
NANO-TECH

Fuel Additives

CERIUM OXIDE NANOPARTICLES

Oxonica

- **15% improved fuel efficiency**
- **Reduced emissions**

NANOPARTICLES IN INKJET PRINTING

A UK manufacturer has developed nanoporous aluminium hydroxide particles (top image) for coating inkjet paper, which gives the benefit of 'instant' drying for high quality applications such as photographic printing (Image: Ilford)

BLANX

What are Nano-crystals?

Nano-crystals are tiny particles measuring 10 - 100 nanometres - that is 10 to 100 billionths of a metre, or around one thousandth of the width of a human hair. ('Nano' simply means 'a billionth', or 10 to the power -9.)

BlanX BioRepair toothpastes contain about 15% NANOREPAIR™ nano-crystals of a substance called carbonated apatite activated by zinc ions - this is the same substance that forms the main component of human teeth.

Made in Italy **100 ml ℮/3.4 fl. oz.** 12 M

INGREDIENTS

Aqua (Deionized Water), Sorbitol, Hydrated Silica, Carbonate Hydroxyapatite*, Tetrapotassium Pyrophosphate, Sodium Lauryl Sulfate, Cellulose Gum, Silica, Zinc Carbonate Hydroxyapatite*, Cetraria Islandica (Cetraria Islandica Extract), Glycerin, Mentha Piperita, Titanium Dioxide, Citric Acid, Sodium Saccharin, Phenoxyethanol, Benzyl Alcohol, Methylparaben, Propylparaben, Ethylparaben, Butylparaben, Anethole, Menthol, Eugenol.

*NanoRepair™

Guaber
www.guaber.com

Guaber UK Ltd 0845 4900176
Harmill Industrial Estate,
Leighton Buzzard, Beds LU7 4FF
www.blanx.info

Nanofluids

dispersia ltd

UNIVERSITY OF LEEDS

eminate

innovative solutions in micro and nanotechnology

Daily Mail

Saturday 31st January 2009

Salty soups can increase cancer risk, says expert

Daily Mail Reporter

PEOPLE who regularly have soup with a high salt content could be increasing their risk of stomach cancer, according to an expert.

Soups are one of the 'worst culprits' for hidden salt, she said, and a single serving of some leading brands contains half the recommended daily maximum intake.

Dr Rachel Thompson, science programme manager for the World Cancer Research Fund (WCRF) recommended making low-salt versions at home.

She also suggested reducing intake of salt-preserved foods, such as ham and sausages, as well as pizza, some ready meals and breakfast cereals.

Salt is known to increase blood pressure and the risk of stroke and heart disease, but scientists also believe it is a cause of stomach cancer.

The recommended intake of salt for adults is no more than 6g a day although the current average consumption is 8.6g daily. Dr Thompson said: 'Fresh vegetable-based soups tend to have less salt than tinned cream-based soups which include bacon or ham, but even some of the healthier brands of vegetable soups still contain over a third of our recommended daily intake.

'This should be no more than 6g but we actually need far less.

'It is commonly known that salt increases risk of high blood pressure, but people are less aware that it also probably increases risk of stomach cancer. 'Even taking small steps to reduce your salt intake, such as always checking labels or making your own soup from scratch, is something positive you can do to help reduce your risk of cancer.'

Heinz Classic Vegetable: Has 33pc of daily salt per serving

According to the WCRF, the salt levels in Batchelors Soupfulls, for example, vary from 1.9g to 3g per single serving, which is 32 per cent to 50 per cent of the recommended intake, while Heinz Classic Vegetable soup contains 2g of salt per serving (33 per cent).

A Batchelors spokesman said the company was committed to providing healthy, nutritious foods and was reformulating its Soupfulls brand to meet the 2010 Food Standards Agency target for levels of sodium.

Heinz said it was working to bring its best-selling soups within the FSA criteria.

A spokesman for the Salt Association, which represents the industry, said a report by leading toxicological experts had found no grounds for believing that a reduction in the average daily salt intake in the Western diet would have any effect on the risk of developing any form of cancer.

PURE
POISON
Dior
EAU DE PARFUM VAPORISATEUR

COLOUR WITHOUT DYES

Solid state lighting

Displays

NANOCO GROUP PLC

Solar

Biological

IOTA NANO SOLUTIONS

DELIVERY AND FORMULATION OF POORLY SOLUBLE INGREDIENTS

ROAR Particles Ltd

Dusting powders to improve definition and profile of latent fingerprints

Existing Powders/Chemicals

1. Can be used within existing Health & Safety Legislation
2. Can define a fingerprint to legal requirements

ROAR Particles Ltd Powders/Chemicals

More in PRODUCTS + SERVICES

1. Can be used within existing Health & Safety Legislation
2. Can define a fingerprint to legal requirements
3. Can give greater definition to fingerprints over existing powders (+20%)
4. Can be used to identify chemicals in latent fingerprints (i.e. cocaine, nicotine, explosives etc)
5. Can be used to identify both Endogenous and Exogenous metabolites in the latent fingerprints i.e. drugs and various biomakers
6. Can be used to harvest skin cells from latent fingerprints to profile DNA characteristics

EMULSIONS

oil
water
emulsifier
Duke's
MAYONNAISE

nanonaise
nanonaise
MINDER VET

water
water
oil
emulsifier

FUTURE PRODUCTS

TOP TEN WAYS NANOTECHNOLOGY WILL IMPACT LIFE

Healthcare

1. Diagnosing disease
2. Treatment of cancer and other disease

Energy

3. Widespread adoption of solar energy
4. New batteries and other forms of n
5. Blending electronics and paper-based
6. Lighter, stronger, and more conductive materials

Environment

7. Clean water
8. Low emission automobiles
9. Responding to terrorism and environ
10. Increased monitoring of consumer products

Source:Nanotechnology Law & Business, Vol.4, Issue 3.

Professor Peter Dobson
Nanotechnology Investment Priorities

- Nanomedicine
  - Improved medical imaging
  - Improved drug delivery
  - Improved medical diagnostics via point-of-care testing
- Solar energy generation
  - along with better ways to store energy
- New methods to clean up water and soil

REALLY NANO ?

http://www.nanotech.com.hk/en/first.html

NANO
BREAST SERUM
Nano Technology Product
INSTANT BREAST FIRMNESS
Enriched Nanosomes
INSTANT FIRMN
Herbal Instant Solution
For Loose
& Saggy Breast
BY NANO TECHNOLOGY

Copyright 2003 Apple Computer Inc. www.apple.com/ipod/nano/

Logitech
VX Nano Cordless Laser
Mouse for Notebooks
Logitech
Quick start guide

TATA NANO

TATA NANO

cientifica

Consumer Pressure Groups are increasingly anti technology.

While some of their concerns are legitimate, many are not.

For policy makers who are not scientific experts (and few are) speculative concerns are given equal weighting with scientific results.

White Paper on 'How to make money from Emerging Technologies', December 2010

THANK YOU