

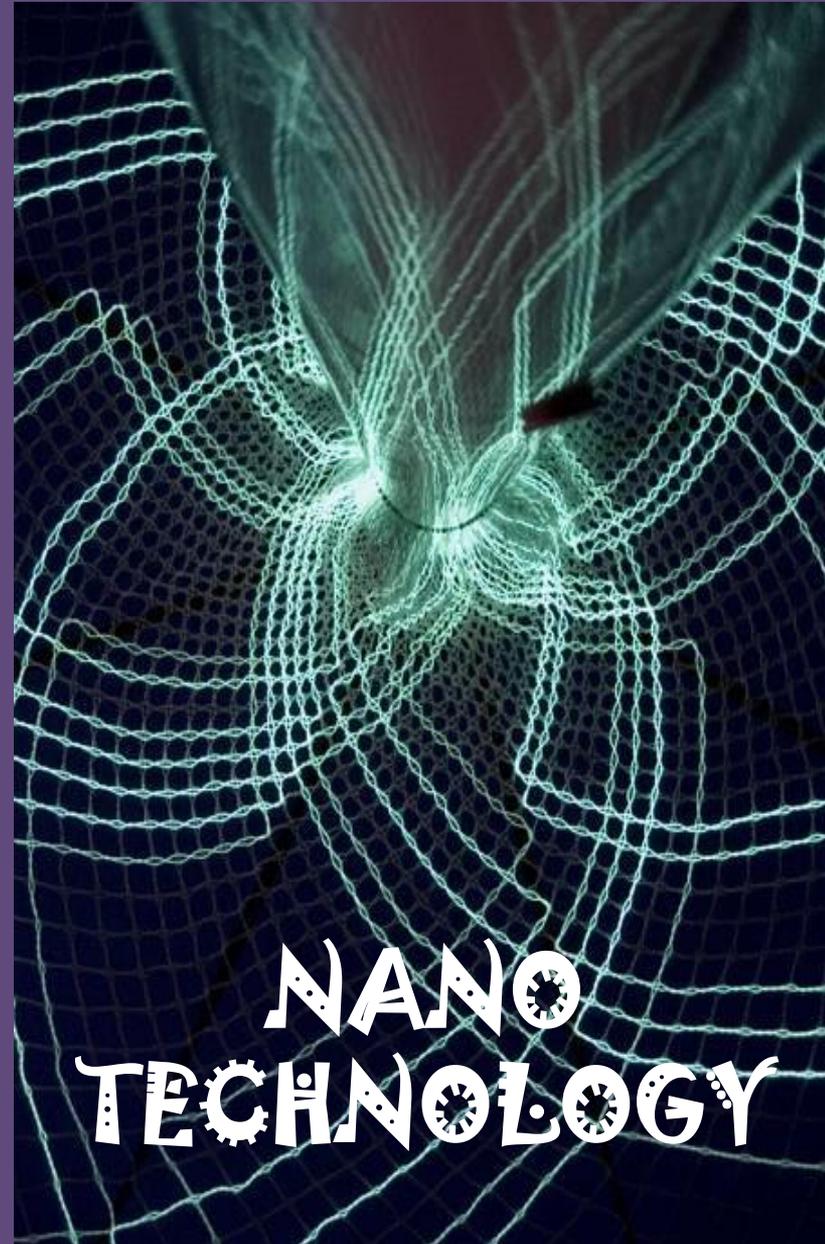
...NEW TECHNOLOGY...NEW TECHNOLOGY...

Smart fibres and fabrics are those that respond to external stimuli:

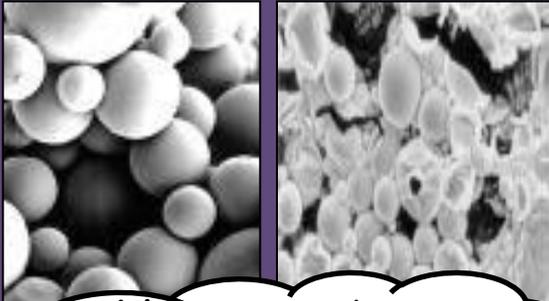
- Micro-encapsulation
- Thermochromic properties
- Photochromic properties and UV sensitive fabrics
- Biomimetics

Interactive textiles function as electronic devices and sensors:

- Circuits integrated into fabrics
- Wearable electronics
- Wearable electronics as part of the fabric itself

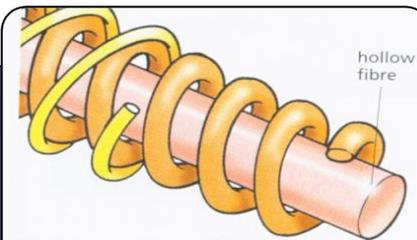


Micro-encapsulation... Micro-encapsulation



How are the particles added to fabrics?

- ❖ Particles can be added to the fibres in the **weaving** process.
- ❖ Particles can be added to **dyes** that colour the garment.
- ❖ They can be **printed** on as a clear coating.



Micro-encapsulation within a fibre

Micro-encapsulation is when very small aromatic or medicinal particles are inserted or 'encapsulated' into fibres or fabrics.

How does it work?

During wear or use friction caused by touch ruptures the particles releasing the contents.

Uses:

Medicinal
Bed linen
Nightwear
Sportswear
Children's wear



Odour repellent could be encapsulated in to the lining of trainers to prevent them from smelling!



Fragrant fabrics

Perfume is released when the fabric is rubbed. An example would be bed linen and nightwear releasing fragrances that soothe like aromatherapy oils.

Cosmetic oils & vitamins

Dry skin could be helped by the slow release of moisture when encapsulated in to tights. Mosquito repellents could be encapsulated in to clothing fabrics.

...Thermochromic ...Thermochromic...

Thermochromic dyes change in response to changes in temperature.

How does this work?

Fabrics are dyed using a base colour for example blue. A top shade is dyed over it for example red. The finished colour is purple. The purple colour will react to heat and allow the blue to show through.

Possible uses:

- ❖ Plastic spoons change colour when heated; could be used to test whether baby food is too hot.
- ❖ Kettles can change colour with hot water.
- ❖ Bandages could change colour with heat indicating the wound is inflamed.



Sometimes the thermochromic dyes change from coloured to colourless when heated. Examples include: kettles, mugs, baby spoons and fabrics.

A recent development shows how the tightness of the weave in fabric can also change along with the colour if thermochromic dyes have been applied. This would allow the wearer to cool down or warm up automatically according to the temperature.



..UV Sensitive...UV Sensitive...UV Sensitive..

UV sensitive fabrics can be made using UV sensitive inks which are known as **photochromic inks**. They change colour when taken outside into the sunlight and exposed to ultra-violet light (UV light).



We need energy from the sun to sustain life on earth. Some forms of sun energy are harmful. Ultra-violet rays can cause sunburn and skin cancer. The most harmful ones can burn the skin and over exposure can lead to skin cancer. Sunscreen protection and clothing can protect against these rays. The UV sensitive dyes can make you aware when you are exposed to UV rays.

How can this technology be used?

- ❖ Photochromic inks were first used on clothing in the 1990's.
- ❖ They help make people aware of exposure to the sun's harmful UV rays.

The dyes can be used in:

- ❖ Security products – checking bank notes are genuine
- ❖ Sunglasses – which darken in the sun.
- ❖ Novelty products such as nail varnish.
- ❖ Rave-ware – where clubs use UV light for dancing

SPEEDO are just one company who have developed a range of protection clothing that provides covered skin with 98% protection against the sun's rays.

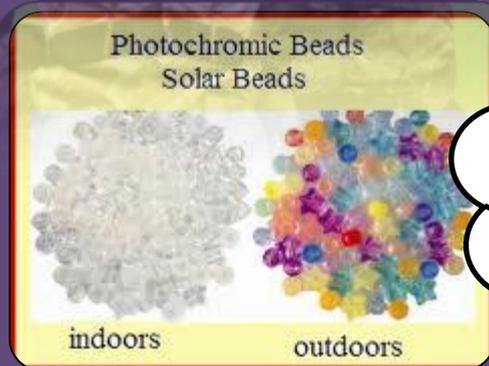
Photochromic ... Photochromic ... Photochromic

Photochromic dyes change in response to changes in light.

Uses

- ❖ Novelty T shirts and clothing
- ❖ Military clothing

One recent development includes looking at using photochromic dyes for military uniforms which will change colour according to the surroundings. This will avoid the need to change uniforms or use camouflage nets.



The novelty T shirt and bag shown opposite have been printed with photochromic inks. They respond to changes in **light**.



The logo on the T shirt shown opposite has been embroidered using thread that has been dyed using photochromic dyes. The dye responds to changes in **light**.



..Biomimetics...Biomimetics...Biomimetics..

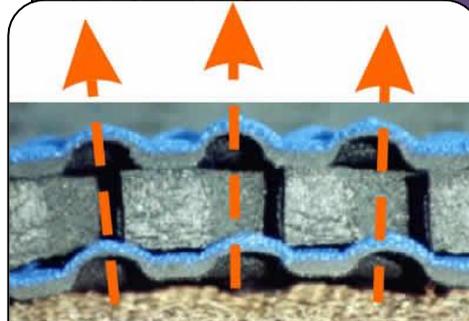
This literal meaning of this term is **imitating a living bio system**. It describes the science of understanding how nature responds to external stimuli. For example:

- ❖ A pine cone opens and closes in response to changes in air pressure. How?
- ❖ How do the feathers on penguins keep them warm for so long in sub zero temperatures?

Stomatex

Stomatex mimics nature – it keep the wearer dry and comfortable during exercise.

Excess body heat and perspiration collect in the dome shaped chambers before being pumped out through tiny pores. This keeps the body cooler. It also allows cooler air to enter. This varies according to physical exertion.



Perspiration & Excess Heat is pumped away from the body

Uses include: wound dressings, support bandages, wetsuits.



Fastskin

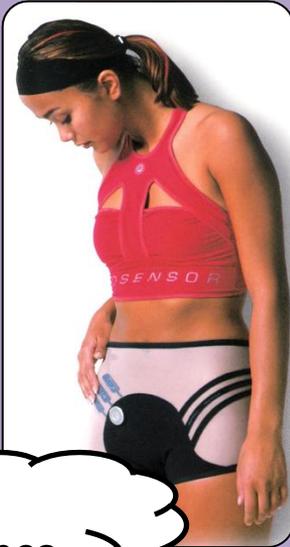
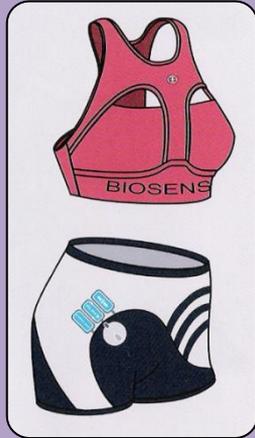
Fast skin is a development by Speedo which replicates the textured surface of shark skin and was developed as a response to the need for speed in swimming competitions. It reduces the drag in the water and allows greater movement and flexibility.



Susie O'Neill in a Fastskin suit



.. Wearable electronics... Wearable electronics..



Perfect Performance

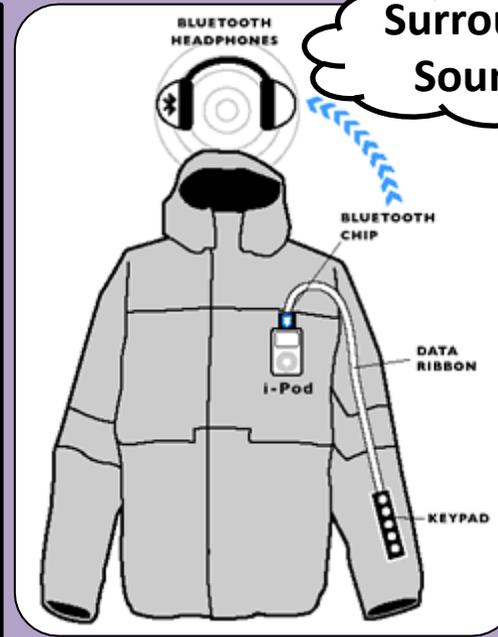
Biometric sensors can be integrated into clothing to monitor pulse, blood pressure, respiration and other vital indicators. This helps the wearer manage their fitness programmes and communicate wirelessly to other devices. This appeals to athletes and people who are recovering from illness.

Bluetooth Technology!

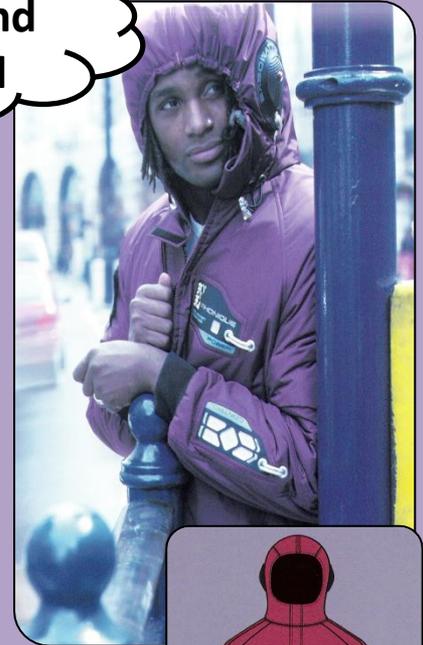
Wearable electronics – intelligent textiles at work and play.

The idea of wearing computers as an extension of your body was first seen in films like Robocop and Terminator.

However it is only recently that fabrics have become sophisticated enough to make this a reality.



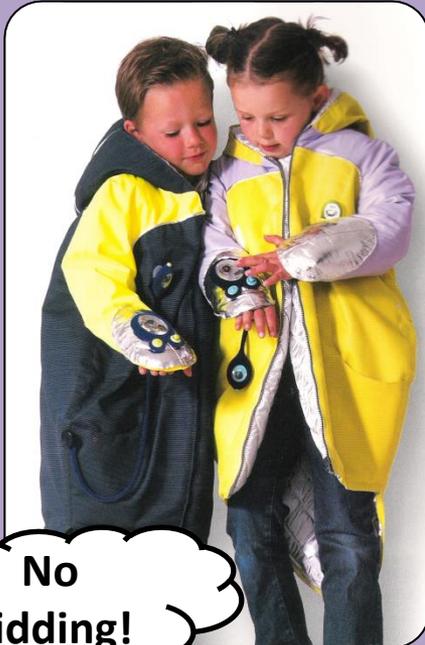
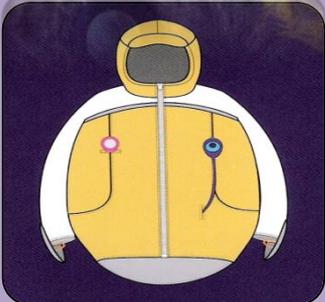
Surround Sound



The Audio jacket will appeal to young people. It provides an entertainment system fully integrated into the jacket itself. A smart pocket holds the audio unit, which in turn is connected to speakers which have been integrated into the hood. A control panel on the sleeve operates the device.



.. Wearable electronics.. Wearable electronics..

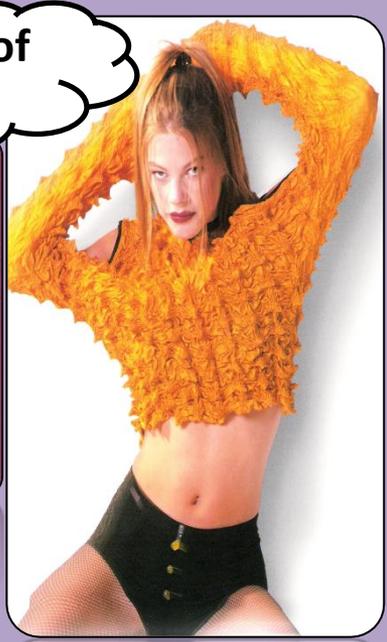
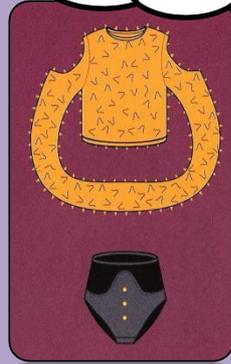


No Kidding!

GPS tracking systems integrated into kid's clothing allows parents to monitor their children without them knowing. It uses fabric antennas, radio tagging and miniature remote cameras. For the kids - fun clothing to play outdoors in!

There is no need to carry mobile phones and other devices when clubbing as they are integrated into clothing such as the outfit shown here. It also allows the wearer to interact with the surroundings – as the fabric stretches and relaxes, sensing body movement, it causes the audio light settings in the club to change too.

Queen of clubs



Techno Surfer



This outfit has built in electronic ski passes, radio links, satellite positioning, warning displays, temperature sensors and heating materials, basically everything the adventurous skier could need to ensure safety at all times.