THE : FUTURE : LABORATORY
10 : 06 : 2008

Dear : Grado Zero Espace

Please find enclosed your tearsheets from Viewpoint #22, Our Synthetic Futures Issue, with our compliments. We wanted to take this opportunity to say thank you for your valued time and contribution. We couldn't achieve these results without our brilliant team of photographers, illustrators, researchers and journalists; or the designers, studios, PRs and brands that support us through news, information and visuals on their work and products.

We are already working on Viewpoint #23, which focuses on the rise of the female century, so please get in touch with your ideas and projects for inclusion in the The Eve-olution Issue. We are also now researching the next issue of our new title, THE : a quarterly for the culturally curious. If you are interested in speaking to us about recent projects you have been involved in or future ideas and work, please contact either Gwyneth Holland (gwyneth@thefuturelaboratory.com) or myself on the publications team (caroline@thefuturelaboratory.com).

If you would like any further information about Viewpoint or THE magazine, please do not hesitate to contact us, or take a look at the pages on the following websites:

www.thefuturelaboratory.com
www.view-publications.com

We look forward to collaborating with you on future projects.

Yours sincerely,

Caroline Till, Acting Design Editor

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NaturalNuclear

The new modernist mantra needs to be 'form follows function follows fabric', says Simon O'Connell. Never before has there been such a vast range of materials available, nor so many curious minds intent on bending the very fabric of the material world that we're surrounded by, and more importantly, that we depend upon for survival.

The polygonal segments of Project OR react to ultra-violet light so when in the shade the segments are translucent white and when hit by sunlight they become coloured, flooding the space with different hues of light. At night OR transforms into an enormous chandelier emitting an ambient light. Developed by architects and designers Ran Ankori, Francesco Brenta, Maya Carni, Christoph Klemmt, Laura Micalizzi and Elisa Oddone, www.orproject.com

Clockwise from top: Bone Armchair by Joris Laarman www.jorislaarman.com; Thalya chair by Patrick Jouin for Kartell, www.kartell.it; Nude cosmetics 40% of packaging is made from 50% post industrial recycled plastic with a compostable sleeve, designed by Pearlfisher, www.pearlfisher.com

Opposite page: Tent HUSKY by Ondrej Veclávik

Andrew Dent is the materials guru behind the Material ConneXion resource centre and is also the co-author of Ultra Materials: How materials innovation is changing the world. According to Dent, the drive to perfect the new wave of SuperSynthetics is underpinned by the fact that 'we're making more stuff – and we are running out of stuff with which to make it.'

In particular, Dent is talking about new types of plastic called biopolymers. Plastic as we know it has been around for almost a century, and virtually all plastics are oil-based. However, biopolymers are made from plant-based materials and, as such, should be more environmentally friendly. However, as with so many environmental issues, it's not that simple.

SYNTH STYLE

'Historically, synthetics have been seen as ugly and scratchy but technological advances have meant that synthetics can now be soft, sumptuous and above all beautiful,' says materials and innovation consultant Philippa Wagner, who worked for a decade on smart materials for Philips Design. 'The argument for synthetics being environmentally unfriendly in comparison to naturals is weak when you look at the cradle-to-cradle aspect of synthetics. They can be washed at lower temperatures and keep their colour better and therefore last longer.'

The environment is everyone's concern these days, and, echoing the Luddites of the Industrial Revolution, some environmentalism is about turning back: back to hemp, back to organic cotton, back to the spinning wheel. However, biopolymers are a certainty for our future, because oil-based plastics will soon be competing with cars and heaters for oil. Yet, like biofuels, biopolymers are not necessarily a green panacea.

Oil-based plastics are more efficient to manufacture than plant-based biopolymers – for now. As oil runs out and biopolymers are manufactured more efficiently, that will change, and so will the world around us. 'We are never going to stop requiring cotton even though it uses so much water and pesticides, so what is really innovative is that Toray of Japan has developed a fibre made from the waste of the cotton plant, essentially a synthetic fibre from the previously discarded part of the plant,' says Wagner.

GREEN BACKLASH

The new focus on synthetic materials is part backlash against the more extreme aspects of the sometimes backward-looking green movement, part consumer-driven, but mostly technology-driven. As Blaine Brownell, author of Transmaterial, notes, 'More new products have been developed in the last 20 years than in the prior history of materials science.'

One of the key fields in the brave new world of SuperSynthetics is biomimetics, the science of looking at mimicking nature. Stain-resistant paints and fabrics have been developed by examining the way in which lotus leaves emerge from the ground spotless. These paints, like the lotus leaf, have a rough, hydrophobic surface, and this texture forces water droplets to roll – not slide – away, picking up any dirt on the way. Stain-resistant paints and fabric that feature this technology can be cleaned by simply spraying with water.

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The latest plastics, biopolymers, are made from plant-based materials and, as such, should be more environmentally friendly, although their manufacture is currently less efficient than that of oil-based plastics

Synthetics can now be soft, sumptuous, and beautiful and cradle-to-cradle they are less environmentally damaging than many natural materials

More new products have been developed in the last 20 years than in the prior history of materials science

One of the key fields in SuperSynthetics is biomimetics, the science of mimicking nature, via the complexity, efficiency and durability of natural substances

Nanotechnology, the science of the unimaginably tiny, is about manipulating molecules and this technique can also be used to create new materials

Nanotechnology allows greater control over material properties, releasing innovators from the constraints of working with existing materials, and potentially using fewer chemicals in manufacturing processes

In the future smart textiles could contribute to fashion, health care, entertainment, communication and life management

More collaboration between designers and scientists is needed to realise the potential of SuperSynthetics

Material innovation has always been important to design, but it is particularly important now due to environmental problems

New ways of manipulating long-established materials are also allowing designers to experiment

The extraordinary sticking ability of the mussel is due to the excretion of byssal thread, a type of protein. Kaichang Li, associate professor at Oregon State University, noticed their exceptional adhesive qualities on a trip to the Oregon coastline; this led to his development of a water-resistant, soy-based adhesive which outperforms formaldehyde-based glues.

Scientists at the UK's University of Manchester are working on ways to regenerate damaged tendons by combining two of the most exhilarating sub-genres of SuperSynthetic science: nanotechnology and biomimetics. They are exploring the use of electrospun polycaprolactone nanofibres to repair tendons. 'All levels of tissue regeneration come with their own difficulties that need to be addressed,' says Lucy Bosworth of Manchester University's department of biomaterials in an interview published in Materials World magazine. 'The main issue with tendon regeneration is the ability to provide an environment desirable for cells that would allow them to secrete matrix (ECM) of the correct type – collagen type I – and with an orientation parallel to the direction of load application.'

SPINAL TAP

Similarly, researchers at the UK's Queen's University Belfast and University of Leeds are working to develop biological cements that mimic the properties of bone, and could be used to repair spinal injuries.

These developments look to nature, not retrogressively, but rather to understand the complexity, efficiency, and durability of natural substances. The corporations which have collaborated with the Biomimicry Guild, a global innovation consultancy, include Arup, NASA, Nike and Shell.

Furniture and product designers are similarly combining synthetic materials with biomimetic processes. The results include designer Joris Laarman's Bone Furniture range. 'Trees have the ability to add material where strength is needed,' explains Laarman. 'But bones also have the ability to take away material where it is not needed.'

The International Technical Development Centre, Adam Opel GmbH, part of General Motors Engineering Europe, created a dynamic digital tool to copy these ways of constructing, in order to optimise car parts. 'In a way it quite precisely copies the way evolution constructs. I didn't use it to create the perfect chair, but as a high-tech sculpting tool to create an elegant shape with a kind of legitimacy,' says Laarman. The limited-edition Bone Armchair is the most recent addition to the range. While previous pieces were constructed from cast aluminium or clear polurethane resin, the armchair is moulded from marble and porcelain mixed with resin.

Other examples include Ondrej Vaclavik's biomimetic tent, 'Tent HUSKY', which uses a rigid branch-like structure to add stability to the design.

NANOBOOM

Nanotechnology, the science of the unimaginably tiny, has been widely talked about, and is also widely feared. In comparison to biomimetics, little of substance has as yet come of it. To put nanotechnology in context – which, given the limitations of the human imagination, is hard, bordering on impossible – a nanometre is a billionth of a metre, about three to five atoms wide. A human hair is 100,000 nanometres wide.

This technology is about manipulating molecules. The correct definition of synthesis is the creation of a new substance by altering it at a molecular level, and nanotechnology manipulates matter on the atomic or molecular scale. One day scientists may be able to construct objects from the atom up, perhaps eventually creating new brains or hearts, but for now, we are limited to ultra-strong plastics and stain-resistant shirts from the likes of Eddie Bauer and Marks & Spencer.

One of the leading exponents of this technology is Nano-Tex, manufacturer of textiles that repel liquids, dry fast and resist wrinkles. The Nano-Tex team describe themselves as 'inventors who reach into the building blocks of our world to make changes that improve our lives every day. We believe we can make the good better. We engineer molecules to improve the properties of your favourite garments.'

SUPER-TEXTILES

Beyond apparel, the possibilities for nanotechnology are endless. 'Nanotechnology is a field of science rather than a specific technology and will have a far-reaching impact on material technology,' says Mark Brutten, Nano-Tex's senior vice president. The basic premise, he explains, is that nanotechnology allows greater control over material properties, releasing innovators from the constraints of the inherent characteristics of existing materials. 'Further, because you are dealing at the nanoscale level, the intended changes to the material at the molecular level mean that the novel properties imparted are both permanent – that is, durable – and non-invasive. For example, there is no negative impact on the desirable inherent characteristics of the material.' Brutten believes this represents an opportunity to develop fabrics that were not previously feasible.

Like biomimetics, nanotechnology has far-reaching implications for earth's environment. A recent report by the Green Technology Forum, 'Nanotechnology for Green Building', focuses on nanotechnology's many medical applications. These include anti-microbial nanocoatings which prevent the transmission of diseases. Nanotechnology will also be important to architecture.

The green potential of nanotech is immense, according to Hanne Troels Jensen, manager of Denmark's Knowledge Centre for Smart Textiles. 'If we succeed in developing nanotechnology in a desirable manner, it will be a step towards purer textiles. The use of chemicals in production will be less common than today, and the use of chemicals for cleaning garments will also be reduced.'

Jensen believes the possibilities for smart textiles based on nanotechnology are endless. 'Traditionally, we have seen intelligent textiles used for warning and protection purposes, as well as for outdoor and sports wear. In the future, we believe that we will also see smart textiles in fashion, health care, entertainment, communication and life management – for surveillance of patients, etcetera. We have not yet seen the great commercial breakthrough, but we are convinced that it is only a matter of time.'

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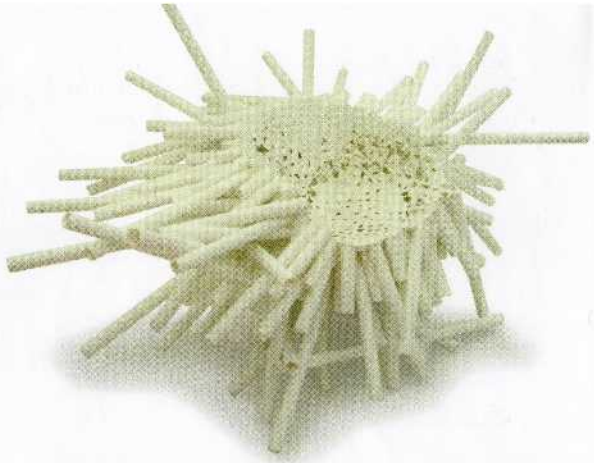
Clockwise from top: Surface Table by Terence Woodgate and John Barnard for Established & Sons, www.establishedandsons.com; MYTO Chair by Konstantin Grcic in collaboration with BASF and Plank, www.plank.it; Supernatural table by Ross Lovegrove, www.rosslovegrove.com



Brutten says that smart textiles could even potentially harness energy. 'Fabrics are being developed which can capture and store the kinetic energy of the body in order to power devices. This has the potential to power not only the multitude of hand-held devices we're all tethered to, such as laptops, phones, iPods and BlackBerries, but could also conceivably provide localised and personal temperature regulation to aid human comfort.'

BEYOND FASHION

In order to realise these dreams we need to see an increase in the collaborations between designers and scientists which material libraries such as Material ConneXion and MatériO can foster. It is in the field of product design rather than the often antediluvian world of fashion that we are seeing the most exciting engagements between designs and SuperSynthetics.

Moritz Waldemeyer, the product designer who has collaborated with the likes of Ron Arad and Hussein Chalayan on some dazzling projects, is a leading exponent of using technology to guide design. 'In my field, material innovation is driven by the electronics industry and my work benefits from faster, more intelligent chips at lower cost, allowing me to integrate more intelligence into products and reduce power consumption. Brighter LEDs, and soon organic LEDs, will allow new effects in lighting with lower power consumption and more intelligence. Organic circuits will allow new printing techniques to create large intelligent surfaces at low cost.'

Waldemeyer agrees with the scientists that material technology and environmental issues are entirely compatible. 'New materials will help face the challenges of limited resources and energy on our planet. We have to use less energy and find alternatives for classic engineering materials as these run out and become prohibitively expensive. These new alternatives will be a hybrid between natural and synthetic, or synthetics from renewable sources such as agricultural products.'

COLLABORATIVE VALUES

Ian Stallard from design duo Fredrikson Stallard says innovation is vital. 'We are interested in developments in polyurethanes and resins. We're developing materials with UK chemists and manufacturers. Our aim is for these materials to do anything we want, to be long-lasting and resilient to damage. Material innovation has always been important to design, but it's particularly important now due to environmental problems.'

Fellow design-world superstar Maarten Baas takes a more playful attitude to his use of new materials. 'I do use strange, new materials, but not because they're strange or new. I use them just because they can do what I want.'

Wagner says collaborations between art and science are vital. 'Collaboration is the only way forward in exploring new thinking and new ways of a sustainable future. Merging science, technology, art and fashion is not new thinking, but sometimes industry finds it hard.'

CROSS-DISCIPLINE

Cross-industry collaboration is essential to the new wave of synthetic products, as automotive, sports and even space technology informs new designs. Designer Konstantin Grcic, manufacturer Plank and chemical company BASF recently joined forces to produce the MYTO cantilevered chair. The BASF Ultradur® High Speed plastic, which is also used for components in high-performance cars, was injected in one piece, to create a strong but flexible cantilevered shape.

Similarly, furniture designer Terence Woodgate and Formula One car designer John Barnard recently collaborated to create the Surface Table for furniture producer Established & Sons. Using state-of-the-art autosport technology, and the rigidity of layered carbon fibre, the super-slim table three-metre table is just two millimetres thick.

CYCLICAL DESIGN

'Material innovation is hugely important only if it is underpinned with new consumer thinking, about provenance, cradle to cradle and our emotional responses to objects', says Wagner.

This concern is increasingly prevalent in the new generation of design talent. The Basel-based Laisr design studio has created a carbon-fibre chair designed to stand the test of time. Constructed from moulded carbon fibre elements connected with aluminium lugs, the chair is light-weight, strong and durable. Laisr claims the piece will easily out-live the owner.

DIGITAL CRAFT

'The increase of digital craft and using digital means to make something look and appear hand-made is alluring,' notes Wagner. 'The less homogenised something appears the more emotionally attached we become to it, and the more we want to hold onto it.'

Material innovation has always been important to design, but it's particularly important now due to environmental problems

Opposite from left: Ch.air by Laisr www.laisr.com; Meltdown by Tom Price made from melted polypropylene tubes, www.tom-price.com

Right: Power Plastic® printed solar cell by Konarka Technologies, Inc, www.konarka.com

Sebastiano Oddi has developed an innovative printing technique that reacts to liquid, revealing a temporary pattern until the cloth is washed. Temporary and permanent stains build up alongside the hidden pattern to create layered memory and meaning.

The 'Touchcrete' light, designed by Luke Bowers, is made from touch-sensitive concrete that changes colour when brushed against, while Dina Elsabahi's cushions mimic feline behaviour: sensors in the cushions trigger shape-memory alloy springs; one swings its tassels when stroked, while another purrs when held tight.

EMOTIONAL SYNTHETICS

Julien Carretero concocted a specific polyurethane resin composite to create his 'To be continued' collection. Extruded one coloured layer at a time, Carretero exploits the irregularities in production methods, to create 'unplanned' shapes. The extrusion can keep growing infinitely or slice into several different pieces.

The Melted collection by Pieke Bergmans and Peter van der Jagt works on a similar principle, manipulating existing materials into new uses and forms. Made from melted blue polystrene, the furniture is baked like bread, and while the products are mass-produced in the same way, the outcome is always different, due to the manufacturing technique.

NEW ESTABLISHEMENT

New ways of manipulating long-established materials are also allowing designers to experiment. Andrew Dent cites Philippe Starck's 'Bubble Club' chair. 'That type of plastic has been around for 40 years, but the ability to manipulate it is new. Essentially it comes from a giant version of the roto-mould, which previously would have been used to make toys, into which you put the plastic and spin it so the centrifugal force makes it stick to the sides of the mould, so you just have an outer skin.'

Meanwhile, gas-injection is being used to add new textures to plastics. Ross Lovegrove combined high-tech materials and NASA technologies to create the light yet durable construction of the gas-injected 'Supernatural' chair and table. Patrick Jouin has also used gas-injection moulding technology, to add criss-cross patterning across the surface of Kartell's Thalya chair.

TECHNICAL FASHION

Fashion, in contrast, has been slower to pick up on SuperSynthetics. The few honourable exceptions include the designers Issey Miyake and Hussein Chalayan, and companies such as Nike and The North Face which specialise in outdoor wear and sporting goods. However, the vast majority of garments are made by the same essential process that has existed for thousands of years: spin fibre into yarn, weave or knit it into cloth, then cut it into shape.

There are emotional, as well as aesthetic, practical and technical reasons why this should be so. Clothes are worn next to the skin, and, until now, most technical fibres have not had the cosseting quality that we require from our garments. But science is making progress. Many fashion designers are keen to harness the results and many niche companies are already exploiting new technologies.

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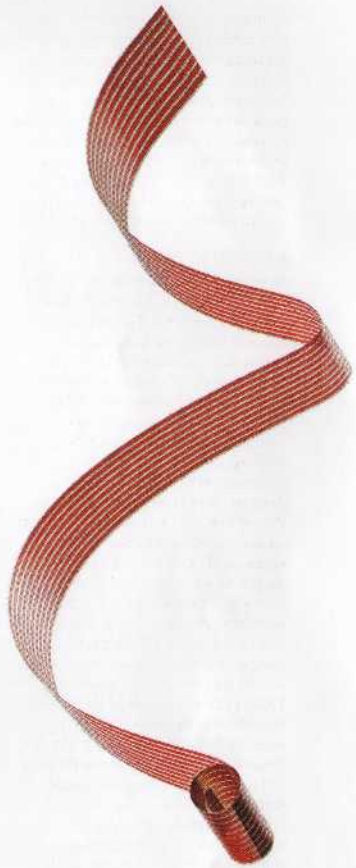
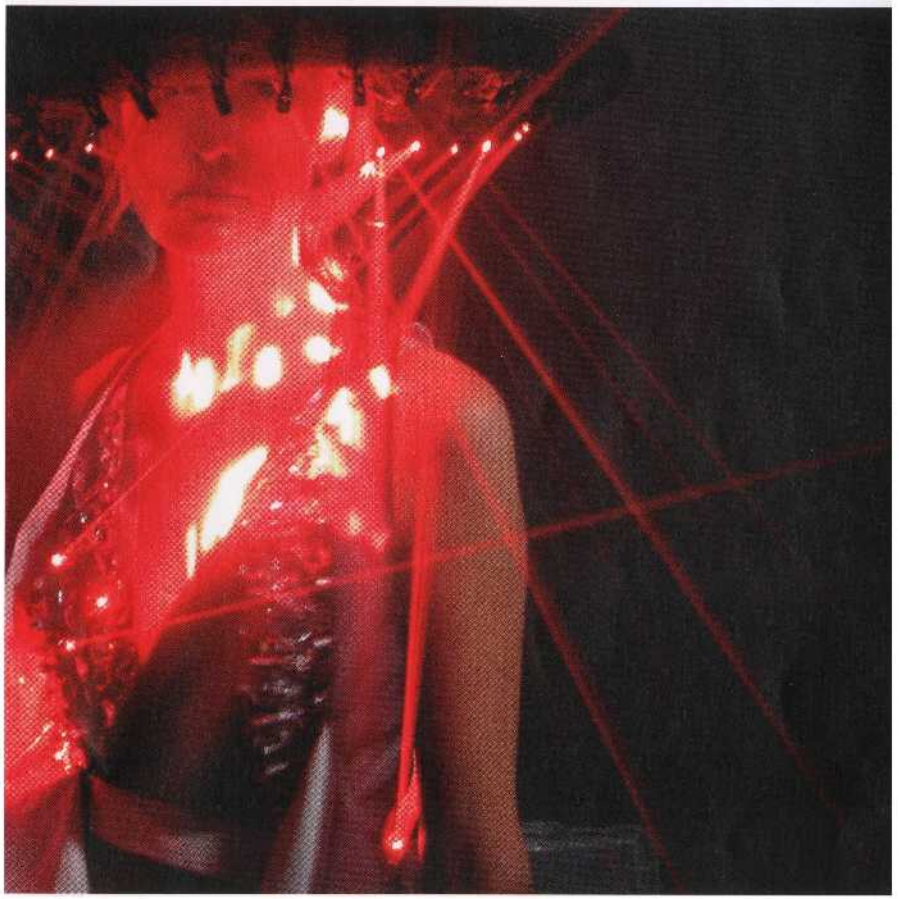


Below: Moritz Waldemeyer for Hussein Chalayan spring/summer 08



In clothing, two separate advances are occurring: smart materials and the integration of electronics into garments.

This was in evidence at last year's conference Fleshing Out: Wearable Interfaces, Smart Materials and Living Fabrics, a statement from which proclaimed: 'In laboratories across the globe, researchers at the boundaries of materials research, electronics, chemistry and biotechnology are laying the foundations of future applications. The key characteristics of the materials and clothing developed in these labs are their ability to adapt (such as fabrics that adapt their density according to the surrounding temperature), the seamless integration of technology (for example, woven-in solar panels), and the self-organising nature of the design process (such as skin that grows in the form of a leather jacket, independent of any living being).'

Industry predictions suggest that global usage of technical fabrics for apparel alone will increase over the next six years, with market volume and value set to grow by 23% and 17% respectively. This rise will be due to the increasing market penetration of more technical fabrics, such as Kevlar and Nomex, into mainstream products, either as blends or as stand-alone garments.

WEARING WELLBEING

Such innovations tend to originate in the military and medical fields and migrate initially into the sports and performance sector. 'In wearables, the most interesting work is biometric developments to monitor the body and aid wellbeing, and for the military,' says Rachel Wingfield, director of research and design group Loop.pH.

Marie O'Mahony, textile and technology consultant and co-author of Techno Textiles 2, predicts a recipe with health benefits will soon be hitting the clothes rails. 'Now, there is the mixing of different coating and finishing treatments, such vitamin C, anti-bacterial and flame retardant. Before, one would negate the other.'

FROM SPACE TO STREET

Swedish company Umbilical Design sets out to integrate space materials and technologies into commercial products. Umbilical Design's Cecilia Hertz has worked on humanising technology to improve conditions for travellers in outer space for NASA and the European Space Agency. The surface material of Umbilical Design's suit for extreme sailing originates from the tyres of NASA's Mars Rover vehicle, and can change its characteristics depending on the surrounding conditions. 'The material didn't involve any electronics, but was smart in the sense that it replaced the need for two suits for different weather conditions,' explains Hertz.

NEW FRONTIERS

Reaching the wild frontier of Super-Synthetics involves teaming up with the scientists. Any designer who wants to be first with a new material has to be in conversation with the innovators such as Nano-Tex, d30, MIT, Fibretronic, Softswitch, Eleksen and Interactive Wear.

Inventions from such companies are extolled by materials knowledge hubs including Denmark's Knowledge Centre for Smart Textiles, the Institute of Materials, Minerals and Mining in the UK, MatériO in Paris and London's Materials and Design Exchange (MADE), plus Material ConneXion with its databank of 4,000 materials and its belief that most creative solutions are found through serendipity and cross-pollination.

FIBRETRONICS

There are two approaches to material innovations. First is embedding electronics into fabric. Sportswear companies such as O'Neill Europe are pioneering this approach. O'Neill's H4 Campack is a rucksack with an integrated portable media player and external camera lens. This is the type of technology offered by Fibretronic. 'It's about making the brand look innovative in the marketplace. They want real benefits, so it's not just gimmicky,' says Fibretronic's technical director Dianne Jones. Also in this vein is Interactive Wear's solar technology, which can supply the power for cell phones and has been integrated into jackets by Italian manufacturer Ermenegildo Zegna.

COAT CONROL

Secondly, there are treatments or coatings for fabrics. These might repel dirt, control temperature, or wick away sweat. Yeohlee Teng, for example, has incorporated spill-resistant technology into her silk and linen garments.

However, Hanne Troels Jensen, head of the Knowledge Centre for Smart Textiles, is not entirely convinced. 'It's difficult to combine electronics and textiles because it makes washing the item hard, and we aren't seeing the great volume that was predicted.' Wingfield echoes this. 'There are some great couture catwalk pieces, like Hussein's experiments, but it's electronics, and I'm trying to move away from electronics because they're dated.' She sees the future in 'materials that are chemically enhanced. That could be nanotechnology, or polymers responding to heat and light and changing their shape.'

This view is echoed by O'Mahony. 'Now we're seeing synthetics which mimic natural fibre, such as artificial leathers and suedes that are breathable, flame retardant, and only the sniff test tells the difference.'

INNOVATION LINKS

The difficulties of linking fashion into materials innovation are highlighted by Anne Marie Commandeur, founder and creative director of Studio Commandeur, a multidisciplinary agency that attempts to act as a bridge between fashion companies and material innovators. 'The interesting thing is that where industrial designers such as Marc Newson are hired to work on fashion and apparel projects the link is established. They work from bottom up: innovation in material and manufacturing until you get the finished product.'

Commandeur also cites a lack of emotion in many high-tech developments, and warns against technical innovation for the sake of it. She is passionate about the damage that the fashion industry is doing to the environment. 'The need for change is evident. Why is fast fashion not produced in fabrics that are recyclable or biodegradable? Why do we use non-recyclable materials for garments that will not be used for more than one or two seasons?'

As with all environmental issues, there are very few simple truths and plenty of inconvenient ones. But when it comes to materials it seems that synthetics are the clear winners. 'Synthetics wear better, keep their colour better, and therefore keep their inherent beauty for longer,' says Wagner. Game, set and match to the SuperSynthetics.

Left: Oricalco shape memory shirt by Grado Zero Espace can be programmed so the sleeves shorten immediately as the room temperature increases

VIEWPOINTVIEW

Boom or recession, ostentation or austerity, nostalgic or contemporary: whatever the mood, economic or designwise, the textile and fibre industry has continued to innovate in high-tech materials.

The list is long: new-generation polyesters and polyamides, hyper-fine but super-strong yarns, biopolymers, biomimetics and, above all, nanotechnology – a science that operates in a world below 100nm. It is a veritable brave new world, but are enough people interested?

When it comes to apparel textiles and associated areas, the answer, sadly, is no. Why? However much we innovate, it will only work when underpinned by new consumer thinking. At the moment, attitudes range from nostalgic to verging on the Luddite. We are bogged down in the concept of 'organic' and the notion that only that which is grown in a totally natural way or produced from natural materials can be good.

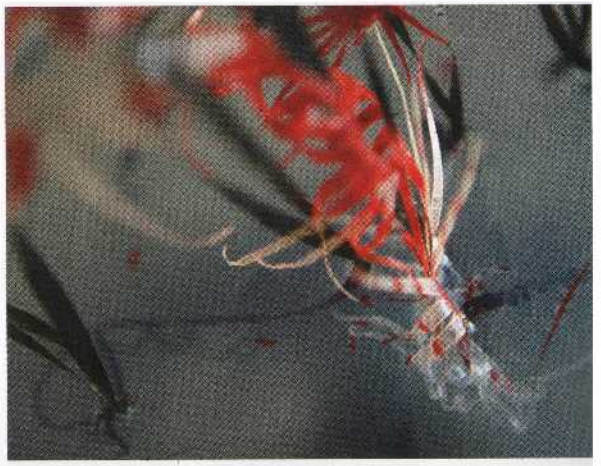
As far as textiles goes, the bad image of synthetics stretches back to the first oil crisis of the mid70s, to a world of cheaply produced drip-dry shirts, transfer prints, polyester, double jersey and acrylic sweaters: a world of static and harsh fabrics. It was also the time of giant corporations – ICI Fibres, Courtaulds, Monsanto, Montefibre, DuPont – who finally killed each other off by over-producing in a weakening market.

Today, we are living in a completely different world of smaller, specialised manufacturers. These are making products, not necessarily based on petrochemicals, that will help us all face the challenges of sustainability, limited resources and climate change. But it seems nigh on impossible to forget the past.

At the moment, smart textiles are having difficulty penetrating beyond engineering, military activities and high-performance sportswear. How many people understand the cradle-to-cradle properties of synthetic fibres, which are sustainable, last longer and are easier to care for?

It's all a question of public relations. Manufacturers would even like to erase the word synthetic from 'textile speak' and use terms such as 'new fibres'. The problem is that these new, high-tech companies simply do not have the money to run marketing and advertising campaigns to broadcast the truth about SuperSynthetics.

But it's not all bad news. More creators are talking to scientists; in the design field, more 'new materials' are being sought to create totally innovative products. Even in the prehistoric world of fashion, more consumers are realising the perils of 'value' retailing and are looking for valid alternatives. And those have to include 'intelligent textiles'.



From top: 'To be continued' collection by Julien Carretero, www.juliencarretero.com; Detail from 'Wonderland' collaborative project between Helen Storey and Tony Ryan to develop dissolvable dresses, www.wonderland-sheffield.co.uk