

## **Another Side of Fashion: The Fashion of Smart Materials**

Report  
on  
conference/workshop event, Dana Center, London, Sept. 18-19, 2008

DANA CENTER  
(South Kensington, one block off V & A and Science Museum)  
<http://www.danacentre.org.uk/>

Invitation mailed out to a select group:  
From: Materials KTN. News [<mailto:materialsktn.news@iom3.org>]

### Mailout Description of Event

#### **Subject: Another Side of Fashion - The Fashion for Smart Materials 18/19th September 2008**

SMART.mat is co-organising a debate, exhibition, and one-day workshop for specialists at the Dana Centre, London on Friday 19th September. The aim of the workshop is to inform the research agenda for smart materials by producing a set of research priorities and a roadmap for this hybrid area of smart materials and digital technologies for fashion.

Speakers on the day will include: Arrow Science Consulting, NPL, Cambridge Display Technologies, Couture Clubbing, Brunel University, Cute Circuit, Frost and Sullivan and Nokia.

We are particularly looking for delegates from academia and industry to fill the remaining places at the workshop and would value your input into this discussion. If you would like to attend the workshop for specialists on Friday 19th September, please email Odette Valentine [Odette.valentine@npl.co.uk](mailto:Odette.valentine@npl.co.uk)  
Attached is a flyer for the event for your information.

Jackie Butterfield  
Operations Director, SMART.mat

INSTITUTE MEMBERS - you can now update your contact details online and set up your personal interests profile by visiting the new members' area at: <http://wam.iom3.org/wam/login.htm> Institute of Materials, Minerals and Mining. <http://www.iom3.org>

2.

A clearer description is on the attached flyer, which also lists the movers and shakers of the event who set up the Thursday exhibit, with many items displayed on tables, DVD

screen, posters, etc in two small rooms, of the kind we also seen at Future Wearables in Newport – clothes, interactive sports jackets, hats, LED and electroluminescent pieces, gloves, socks, sportswear, dresses to project on, thermochromic designs for sportclothes, e-broidery, Scentsory design products. a video about a movement piece (with the dress to project on), 2 new books (Suzanne Lee's *Fashioning the Future* & Sabine Seymour, *Fashionable Technology: The Integrations of Design, Fashion, Science and Technology*, Wien: Springer, 2008).

Furthermore prints, all kinds of info on gadgets, one jacket that allows you to plug your iPod in to control music on the outside sleeve; a T-shirt with a klunky sensor that picks up sound and respond to it by showing the frequencies in color on a flexible display across the chest.

The second room had the dresses (high tech/mostly with LED) by Couture Clubbing, the two women designers (who graduated from Central Saint Martins Theatre/Stage Design MA & went into fashion and entertainment/club culture, they gave me their catalogue of the Paradise Lost collection which appears inspired by Milton's epic poem).

There was the electroluminescent bed, and back drop curtain that changed light/color subtly every 10 seconds...and the company that produces it is Luminites, and there was also a company called Scentsory Design featured on the posters- announcing their new lab in Cambridge.

I have written down notes on all these: here are some of the names of the labels and what they purport:

Poster with Track Athlete

Thermochromic Liquid Crystal Technology in interactive sportswear. The Research project is: MotionResponse™ Sportwear, ongoing research by Kerri Wallace [www.kerriwallace.com](http://www.kerriwallace.com)

Poster Text:

*Interactive Sportwear:*

*Motion Response Sportswear challenges the potential for wearable display technologies in performance sportswear. Kerri explores how sport can be visually enhanced by using printed techniques and applications of smart technology whilst creating a platform where statistics act versus design and aesthetic. By using temperature specific thermochromic and liquid crystal printing inks that react to body heat, Kerri investigates a direct visual relationship between the mechanical and biological human body. Fascinated by how the body behaves whilst in motion and its biological activity, such as increased heart rate, temperature changes and movement, Kerri is developing interactive printed textiles inspired by metamorphosis, mutation and biomimetics.*

Other posters:

Illum (futures)

Cycling Jacket with a Twist

By PDD & Goose

(a dark parka like sweater with light electrodes/LED (red and white) in two areas, the battery and electronics are at the bottom/back of the jacket rim.

[www.pdd.co.uk](http://www.pdd.co.uk)

Scentsory Design & Technology Ltd is a new fashion spin out from Central Saint Martins Innovation Centre and is developing sensory products. Sensory Design & Technology Ltd's aim is to launch a Science Fashion Lab ®, the first its kind, in Cambridge in 2009. The first product released is : eScent.

Jenny Tillotson, CEO, Founder of SDT Ltd, St John's Innovation Centre, Cowley Rd Cambridge. [www.smartsecondskin.com](http://www.smartsecondskin.com)

Senior Research Fellow [j.tillotson@csm.arts.ac.uk](mailto:j.tillotson@csm.arts.ac.uk)

The Innovation Centre School of Fashion and Textile Design Central Saint Martins College of Art and Design University of the Arts London Southampton Row London, WC1B 4AP [www.csm.arts.ac.uk](http://www.csm.arts.ac.uk)

Camouflage Ski Jacket with device to connect your own iPod.

By Surfanik

From Ski sports fashion to mass market high street fashion.

[www.surfanik.com](http://www.surfanik.com)

Sleeve has integrated operator surface (the play and stop and fastforward buttons) and the touch sensors are linked via transductive small band (inside the lining of the jacket) that emerges inside left inside side pocket where personal iPod can be connected to a dongle that is hooked into the band which is made of quantum tunnelling composite (electrons that do not move but transmit via tunnelling effect, like on two sides of a divide in a swimming pool where motion of water on one side can effect the motion on other side). It seems much sturdier than we conductive fibres we have seen before.

Glove

[www.reusch.com](http://www.reusch.com)

in black and orange, looks like an accessory for skiing or for bikers

wrist bands

shoes (comfortable, for winter time): Touch Memory Foam with piezo microcontrollers

a box of smart putty.

Lumintes: electroluminescent Fiber Optic Bridal Dresses

Small sheets of intricate small design prints layered on top of white A 4 sheets (leaving room for comments by the visitors) are lying on the table (see sample), created by Sara Roberston ([sr93@hw.ac.uk](mailto:sr93@hw.ac.uk)) from Heriot Watt University, the demonstrator uses a hair dryer to blow hot air on it, it changes and leaves imprint on sheet if applied (electrically conductive patterns). Their description refers to them as Satin Cotton 3layer screen print, Liquid Crysta; activated at 35C, laser etched shadow pattern.

#### Piezoelectric Materials

Producing voltage when stretched or compressed

#### Shape Memory / Pattern and Form

Laura Perryman (RC) [lauraperryman@hotmail.com](mailto:lauraperryman@hotmail.com)

#### E-broidery Dress: Re-wiring your wardrobe

Light spectrum reflection embroidery

The dress reflects different wave-lengths of lights and reflects various colors which will enliven your wardrobe from the most luxurious to the mundane

#### The white dress n (on mannequin) and the projected/movement on film (DVD)

Jessica Beyers & Emma Gibson

[abfabjess@aol.com](mailto:abfabjess@aol.com)

[gibsonemma@gmail.com](mailto:gibsonemma@gmail.com)

Layered wardrobe Display jacket (two parts) sleeves / shoulder parts lengthen and can be held out in tent-like fashion, on the DVD one sees the wearer moving around her axis, dance like, while film is projected onto the garment surface. The projected imaged are created from location mapping (google earth etc) and display moving landscapes

#### Nilufer Kocabas: architecture / Fashion for Smart Materials

NTU: Philip Breedon

Leading Technical Textiles Research in the pioneering Technical Textiles Project at Nottingham Trent

Stretch sensor with output/display device (LED) (integration of sensors)

#### Shape memory materials

The power of smart suits: NPL (National Physical Laboratory)

Peacock / Wolf KitFriend / Design Management and Creative Leadership

Animated Surface Design

Customisable Peer to Peer and downloadable surface designs

Changeable surface designs

Light & Motion Licht Technik (Austria)

Downstairs in the foyer gallery the participants (circa 45) gather for the opening night debate, there are 4 video screens, two on either side, and initially a film was shown by Scentsory Design. It showed the ethereal garments with e-scent and how they enhance quality of life, contribute to happiness and stress release. Strong visual themes were shown, and introduced by voice over describing what scentsory design will do for you, de-stress stress, relax you, heighten your lifestyle experience. It is “emotion fashion,” and can create a spiritual mood. It also uses fragrance as a communicative tool and for balancing the nervous system. (Visualization by Mikael Persson).

Couture Clubbing - Paradise Lost 2008 collection  
[www.coutureclubbing.com](http://www.coutureclubbing.com) Torrence Street Studio 2C, London ECN 1NQ  
 shown by the designers: Amy Winters & Kseniya Zagorodnyuk\

Their garments were hanging on display on mannequins in same room as the electroluminescent bedspread, backdrop, pillow, and red heart lying on bed. Featuring light emitting materials by Luminites. [www.luminites.co.uk](http://www.luminites.co.uk)

#### Thursday evening

The moderated debates, on Thursday night, paired materials and research scientists in brief statements (they all spoke for very short time and showed Power Point and films, the most interesting was Tapani Ryhänen from Nokia Research Lab in Cambridge, who lectured on the “new paradigm of touch” and their haptics research, turning mobile phones into sexy accessories that interact with other accessories or your clothes (with Nokia at Cambridge, and other tech firms there, emerging as a new high tech hot bed in the UK) against designers, but here only the two, Amy Winters and Kseniya Zagorodnyuk, from Couture Clubbing showed their collection, models came and went. The light was turned off a few times so that the electrotexiles could be admired, even though their lights were difficult to see. The presentations were moderated & commented by Rody Cellan Jones (BBC technology correspondent). Then we all broke up into debating groups, and re-emerged at end for general idea exchange. We were asked to spend some time in the groups discussing and formulating one statement that sums up our discussion, and one question. In my group, we were asked to comment on what we would like to see, and what we expect from new materials. Some mentioned clothes can affect the environment or change color, or be affected through smart environment [mobile communications systems]. I suggested instead that one could also be concerned about the breakdowns of civil liberties and privacy and all-around surveillance cameras and therefore hope for clothes that make you invisible or cloak your identity rather than allowing yourself to be profiled or become a walking advertisement (logos and brand names on your stuff, colors changing to make you obvious, etc). Who is in control of changeable clothes?

We addressed the question of powering the electro-textiles, and the need for battery. I asked why there are no solar dresses that can regenerate, and also wondered why such stress on singularities, standing out, why not also look at de-expressiveness and evasiveness? This was greeted with agreement, and the notion of camouflage was brought up, but seen in connection with the military. I then suggested one needs to discuss more rigorously the ‘content’ of wearables. Others commented on sustainability, which was a recurring theme, and energy conservation, and designers mentioned the general discrepancy between push for functionality (sports sector, safety sector, medial health sector) versus aesthetic choices and the need, in the future, to provide more and more personalized, individual styles and bespoke clothes. Some seemed to address the social aspects of smart materials, mentioning that fashion is an important or imperative “designer” of social behaviors, and speaking about engineering or technology, the term “social algorithm” came up in our debate, a term I find extremely interesting. We then talked about increasing the awareness of contexts (for communication devices), and asked whether fashion designers take into consideration the social behaviors and the need that people might have for “adaptive” clothes. Other wanted to see clothes that clean themselves, or, as I suggested, might be ‘self-enhancing’ (in the techno spirit of up-gradable). Several designers present in this group proposed that it would be invaluable if designers had more access to materials that are being tested in labs, they would like to see more “tool kits” so they can experiment. This was corroborated later by scientist Raymond Oliver who admitted that, within the history of engineering and invention as well, materials and their functions need testing and prototyping, one gets it wrong 9 times before one gets it right 1 time, and it can take 20 or 30 years until a product (or a material, and he referred to Polyester, synthetic materials, the zip, instant coffee, etc) become popular, and some of these products have meanwhile fallen out of favor and one sees the return of wools, cottons, etc.

The presenters of the short science research statements were all invited back to the Friday workshop and I list their names and lectures below.

\* \* \*

### Friday Workshop

9:30 – 12:30

Welcome by Sharon Baurley, Central Saint Martins College of Art and Design,  
University of the Arts London

Market overview and forecasts for smart materials  
Ankit A Shukla, Frost & Sullivan

Fashion and wellbeing futures – inspired by emerging materials  
Raymond Oliver, Arrow Science, Cambridge

Polymer OLEDs for fashion: opportunities and challenges  
Jonathon Halls, Cambridge Display Technologies

Piezo Technology for smart design & fashion  
Markys Cain, National Physical Laboratory

Changing the “Dimension’: new opportunities with smart textiles  
Tony Anson, School of Medical Engineering, Brunel University

Fashion aesthetics & technology  
Amy Winters & Kseniya Zagorodnyuk, Couture Clubbing

The Morph Concept: the mouldable phone, materials technology and the aesthetic  
dimension  
Tapani Ryhänen, Nokia Research Centre,, Cambridge, UK

Afternoon 13:10 – 16:30

Workshop Activity I

Workshop Activity II

Plenary Discussion

Workshop Activity III

Plenary Discussion and Summing Up

(Tom Inns, Facilitator, Professor of Design, University of Dundee)

The Friday workshop started with longer and more detailed market prediction, science and materials science and convergence topics lectures.

Then we broke up in the work groups (Activity I and II) to exchange ideas about what we considered important issues in the materials/fashion/design convergences. These ideas were to be written down as a series of 10 statements, and the papers handed out for these idea-visions were then pasted on the wall for everyone to see. The wall became a bulletin board of these unfolding visions and concerns. A discussion of these ideas followed.

The facilitator had also created a matrix (outlines) on the floor which had at the bottom line a time line from 2008 – 2020. Each table of the five groups (of five to seven members each) had specially design paper sheets for each individual to write on and define recommendations or research plans, small cards for short term projects, larger cards for long term and large scale projects. Then the paper cards were folded up into small boxes or houses, and we were asked to place them inside the floor matrix and the timeline. We all jointly erected a topology of future research- how we see the interdisciplinary field moving, what kinds of projects we like to see, what kind of materials people imagine wanting to work with. On the floor we could perceive the “skyline” of these projects. Most projects cluttered the present/near future, 2008- 2013.

Someone had put a future project down in an empty space around 2018 (a project where the clothes choose the people), and many interesting observations were discussed. I went from table to table and overheard different group chats.

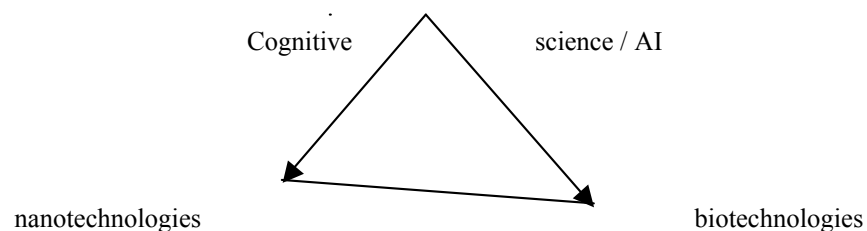
The facilitation of the exchange was excellent, the level of conversation high, and Sharon Baurley (University of the Arts) and Jeremy Davenport (University of London) will now analyse the outcomes and the project proposals; results will be made available on a website to us, and also will be shared with policy makers and funders.

The discussion at my table revolved around:

Fashion and digital communications, fashion and aesthetics. Where do we want to be? Some answers included the desire for distributed displays (not just on the single wearer), care for body scale and environmental scale, garments functioning as community (like the Mexican wave in a stadium), and a desire for “meta-materials” (invisible fabric), and concern for power, re-generative fabrics, fabrics that are reactive to the environment (mood), and intelligent built space. I brought up the idea of clothes that are sonic or express music, not just color and shape, and we had a little discussion on composition and on affecting others and how fashion can do that. Someone suggested embedding, i.e. embedding of smaller intelligent modules into the clothes, making them less visible and klunky. Aurelie Brun, who comes from the engineering end and works for the TWI, spoke persuasively of new materials which can fuse natural/organic fabric with newly constructed textiles of help to medical users, fabrics linked to the vascular system, and we briefly addressed the need for fashion to be more aware of medical research and neurophysiology. Baudika and Di Mainstone were mentioned, I don’t know who they are. But the discussion about the cross-disciplinary research certainly was something that echoes throughout all the morning lectures when the speakers addressed the work in their labs, their “design” departments (e.g. Nokia), and their deployment of prototyping in conjunction with user testing and user experience architects who advise design processes (drawing also on cognitive science and AI, apart from drawing on perceived market needs or market niches and to-be-developed markets).

One could try to summarize some of lectures on materials sciences, on the reports from Polymer OLEDs, metallurgy, piezo technologies, smart fabrics using chemo, electro and photoactive materials, etc etc. There are many notes I have and they would require careful sorting. I want to single out one area that was brought up in the lectures, which I found particularly insightful and related to our interests in sensorial design:

*The Morph Concept: the mouldable phone, materials technology and the aesthetic dimension* (Tapani Ryhänen, Nokia Research Centre) spelled out the following propositions:





The new “haptics” or touch paradigm now governs the research at Nokia and for the design of their mobile communications devices, and the company is looking at new concepts and at new designs pushing the convergences of the three areas shown in the triangle diagram above.

Before continuing with Ryhänen’s lecture, one could point out that the two young fashion designers from Couture Clubbing had implied something similar, to the extent that they claimed the gap between science (function oriented) and aesthetics (fashion looking for personal expression, lifestyle and identity issues) must be narrowed, especially when there are recurring trends (retro-styles, haute-couture re-sampling of older concepts) to emphasize older materials like cotton or silk which have always been associated with luxury and the sensual, rather than seeing the sensual or erotic side of new materials. The problem, Amy Winters suggested, might be that new technologies./computing so far in fashion have only yielded what many perceive as gimmicks rather than addressing key concepts like mobility or transformability and making these personalized, addressing customer needs and personal desires. Often what is displayed in techno fashion are single t-shirts (like the sonar one in the show) that are either functional and very poorly designed (aesthetically) or over-conceptualized. Couture Clubbing proposes a hybrid design, mixing innovative fabrics with traditional luxury materials, and their “market” (niche) has been the fashion entertainment (club scene) world, where they launched their integrated LED garments (technology provided by MARL), but also experimenting with lenticular printings and fibre aesthetics, and Luminex.

Ryhänen stressed the mobile opportunities the NOKIA company clearly expects (3 billion subscribers by 2010, 1 billion wireless broadband users), with more and more integration of mobile communication in the global world, fusing the digital with the physical world, providing digital mobile services and telephony (with audio visual downloadables and information exchange at all times). This implies more interconnection at all levels between the digital and physical worlds and Nokia explores the paradigm they call “Haptics concept” - linking gestures, vibrotactile feedback, and displays technologies, thus directing design attention to reactive surfaces which have the following main features: flexibility (elasticity), transparency, and transformability.

The touch paradigm means that touching your devices gives you a feeling that you have touched something real. (vibratory surfaces becoming more important now). And when one designs a device such as a mobile phone, one needs to look at how to distribute many (ever increasing numbers) functionalities into our wearables, into the environment, and what we carry along (thus invoking the concepts of modularity and what NOKIA calls the “morph” concept).

Ryhänen mentioned the surprising commission by MoMA (New York) to have Nokia create an exhibition on nanotechnologies, presenting these ideas mentioned above on *flexibility, transparency, and transformability*. Flexibility implies *conformability*, and *stretchability* (their head of research in Cambridge, Prof. Locousse [?] works on this), and the company works on developing stretchable devices that embed active electronics

(sensors, actuators, circuitry). These devices need to have an ordered nanoscale internal structure to control elasticity, and Nokia is looking to develop smart surface materials (such as self-cleaning surfaces that have hydrophobic behavior), with flexible and transparent character, tactile sensing arrays, extremely controllable color changes, and also include energy harvesting. One new material they develop has carbon nanotube network based transistors (CNTN) and circuitry, also nanowireband with piezo technology, that can meet environmental challenges (or future environmental challenges that have to do with the life cycle of a program), thus they look into re-cycling that might be necessary when new materials are introduced into the world. We need to have concern for more sustainable electronic materials.

Nokia assumes that we shall live in ambient /assisted living environments (smart spaces), and thus wants to advance the concepts of inter-operability. This implies moving beyond specialized protocols towards activating greater conformability.

Raymond Oliver (Arrow Science Consulting) had also spoken about the range of materials that science is developing, including (in a makro sense), related to nano-materials:

The materials created will be soft, flexible, smart, and wet systems.

Materials evolution includes:

- electroactive polymers
- photoactive polymers
- bioresponsive hydrogels
- electroluminescent fibres
- phototonic fibres, films
- biomimetic materials
- meta materials

shape changing materials

adaptable materials

energy exchanging materials

material exchanging materials

Oliver's main visual references (to design and materials evolution) focussed on dots, lines and surfaces, these are the main constituents.

Techniques: printing, spinning, extruding

(as applied to/with inks, jets, thread/yarns, webs/extrudates, in 3D printing, fibres, films, etc, coating over small areas, knitting/weaving/sewing medium areas, and coating of large areas. Oliver pleaded for more effective interaction between innovative materials

science and engineering and creative product design. He was well in favor of science providing “tool kits” for creative designers to experiment with.

### Network

In terms of networking, the event was a good opportunity to meet artists and researchers from a number of fields; some I had seen before on other occasions (such as Future Wearables in Newport), and many others of course I did not know. There were many fliers and business cards displayed in the exhibition, and the names of scientists and their companies, labs, and websites are available (separate contact sheet).

Sharon Baurley seemed to have been one of the key organisers. Prof. Sandy Black (LCF) was the other force at the event, and the organisation seemed to have been shared between several organizations. I spoke to Sandy Black about a new science lab she seems to want to create at her university, and she mentioned that she supervises a group of 7 or 8 PhDs. Also, at Cambridge a new “Science Fashion Lab” is about to be founded by Jenny Tollotson.

Grants for start up companies can be submitted still (up to 50.000) until October. Technology Strategy Board Contact: Sian Brereton, who mentioned this to the participants. I asked whether a performance group or a lab qualify as a company, and she said probably yes, as long as the group considers itself part of the creative industry.

Jane McCann was there, the editor for the Woodhead Publishing project on “Wearables,” and she had just returned from China with her daughters where she had witnessed the 100 meter sprint live, and Usain Bolt winning it. She lives up north in Derby, and another contact, Anne Martyn, from the Institute of Materials, Minerals & Mining, who is Education Coordinator / Materials (Danum House, South Parade, Doncaster, DN1 2DY) kindly offered to come into our schools, if we wanted, to talk to our students and refer them to materials science research.

Sarah Kettley from NTU was in my group at the table, amongst some designers I did not know (from London), and Aurelie Brun (The Welding Institute). Sarah Kettley is involved in intelligent textiles research and Phil Breedon’s group at NTU.

In terms of PhD research, Sandy was offering advice, and also announced that she is editor of new *Fashion Practice* journal to begin publication next year, it is a parallel publication to *Fashion Theory* (same format) and signifies a concerted effort to put out more research writing in the field. She invited participants to send her a new piece of writing, and she offered to counsel for PhD research that is happening under her guidance at her institution.

Finally, a very interesting meeting took place when I ran into one of the resident curators of Dana Center and Science Museum, Dr Susan Mossmann, who seemed very interested in new research projects and interdisciplinary undertakings, mentioning the programmers of the exhibition/performance events at the Dana Center and referring to the fact that they

prepare a very lively series of programming all year round. I tried to see whether this conference meeting event was on the website but could not find it, it must have been exclusive to the smart.mat membership, it seemed well funded and provided for.

There were folders with the magazines and literature handed out to the participants, as well as fliers from the various poster presenters. It was not possible here to go more deeply into critical viewpoints or a contextualization of the discussion. Rather, the report offers a synopsis of the key issues: the tenor of the event was informative, it was about networking and knowledge transfer, and to raise suggestions from the experts present as to what kind of research activities the fashion/design and materials community would like to see, and what kind of ventures it would like to see supported, and in what manner.

Johannes Birringer 09/21/2008