



# *Flexible Substrate*

*Veritas et Visus*

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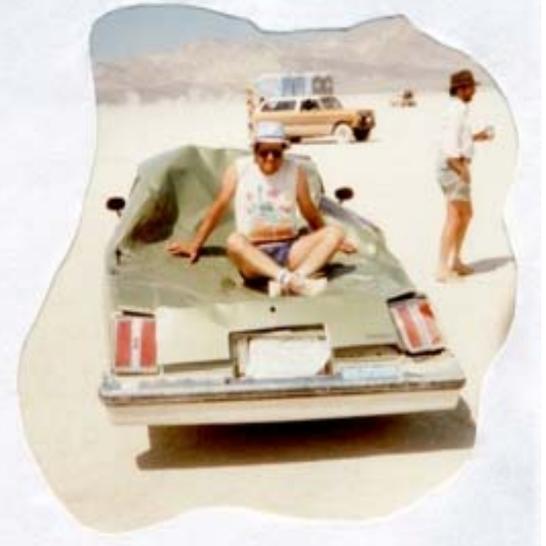
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## *Fashion wear in its best light*

*by Louis M. Brill*

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In the world of flexible displays, much promise has emerged with the convergence of fashion wear with built-in lighting giving new purpose to making illuminated clothes a splash in the fashion world. Glowing gowns, light up shirts and blouses, pants that blink on and off, are all part of the realization of clothing that glows or changes from opaque to transparency levels when charged with electricity. Although this is not yet a fashion runway trend nor has Levi's or The Gap decided to release a line of light-up shirts, illuminated fashion wear is making its presence known as a form of party decor. As one person put it, "No matter how I look at illuminated clothing, it has a magical power. Why else would people use it for special occasions like weddings, or with musicians to create a special effect on stage or to wear and have some fun at a party."



This interest in illuminated fashion wear is being driven mostly by several independent but overlapping markets, one being the Do It Yourself (DIY) community which has taken the initiative to design light up clothing for themselves. On a slightly bigger scale, there are several companies on a research and development level experimenting with new illumination materials (many covered here in other issues of Flexible Substrates) and finally boutique novelty lighting companies that create their own custom illuminated clothing for resale.

There is a definite market interest in illuminated clothing, perhaps best defined as where "the tail is wagging the dog." Fashion designer Katherine Becvar sees illuminated fashion wear as market not yet fully in play, but one that is still defining itself in terms of what people want, what price points best work for consumer interest, and how best to sell it.

Illuminated clothing is a niche fashion, mostly worn at holiday parties, special events, music concerts, dance clubs and festival events. Almost all illuminated fashion wear comes from boutique costume or clothing design companies, although Philips Electronics of the Netherlands, a significant multinational company has developed an LED fabric-based product known as Lumalive. And as well, Luminex (Proto, Italy) and Lumigram (Gif-sur-Yvette, France) have both developed a fiber optic fabric for illuminated garments. This overview however, will focus more on boutique design companies.

- **Illuminated Clothing:** Katherine Becvar of Blue Moon Designs (Oakland, CA) is such an entrepreneur who comes from a costume design background. Since 2002, Becvar has designed illuminated costumes, clothes and fashion accessories for party, dance, and theatrical events. Putting lighting on clothing is more than just sewing a few LED blinkies on a shirt. "Our design effort is about style in creating something illuminated for people to wear." says Becvar "One of my design concerns is how the lighting will enhance the wearer's appearance, and how well it integrates with the fabric in terms of flexibility and style." As to what kind of lighting to use, Becvar notes, "it's not so much any particular lighting technique as long as its workable with fabric, has an appealing illuminated look, and is easy to operate and care for (put it on, turn it on, and forget about it)."

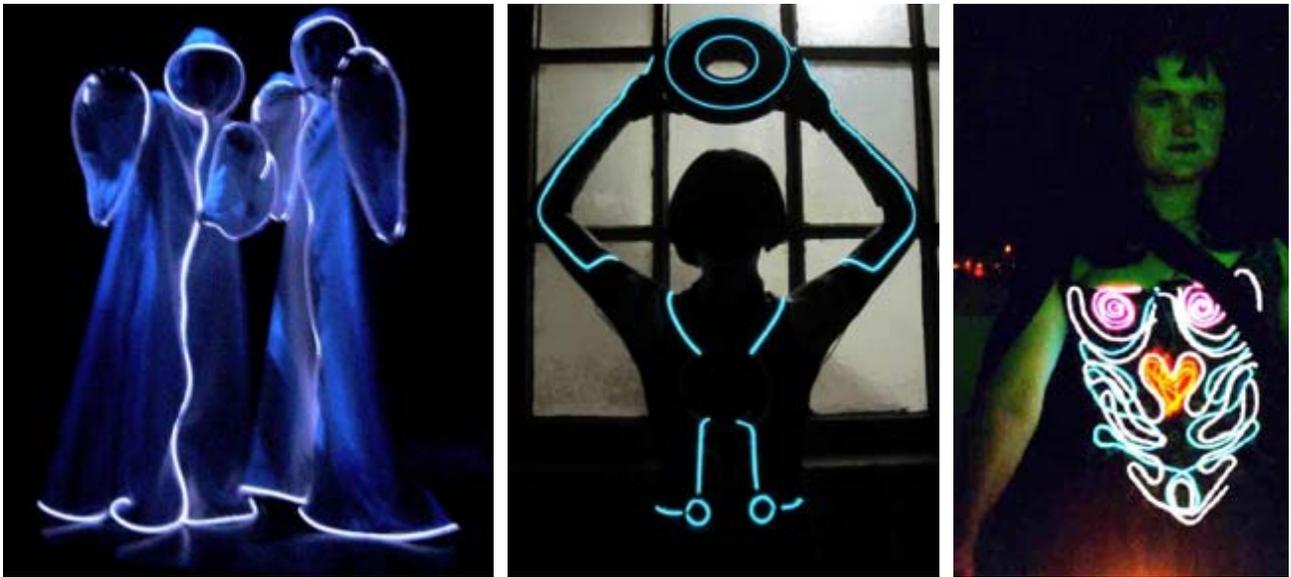
Which lighting formats to be used? Anything that can be attached to clothing and is battery operated including LEDs, Lightwire (electro-luminescent wire, Christmas tree lights (small grain-of-wheat lights

are best), fiber optics, and even Black Light under the right conditions. Which lighting effect works best? They all do, it's all a matter of choice and what visual impression you're trying to create. Perhaps the most popular of these varied lighting effects are LEDs and Lightwire, each lending itself as a very functional illumination for illuminated clothing. Each is flexible to fit on clothing, comes in many colors, is portable and will certainly get its wearer noticed. <http://blue-moon-designs.com>



*Fashion outfits created by Blue Moon Design, LED accessories include on the left, both a light-up belt and a blouse; on the right, LEDs seen in their best light adorning a Tech Tribal dance costume. Photos by Blue Moon Design*

- **Bringing Out the Inner Glow:** Light 'N Wire Productions, (San Francisco, CA) of which the author is a co-founder, is a company that sells Lightwire (electro-luminescent wire or EL-wire) as a novelty design effect. A good percentage of Lightwire business comes from the “costume crowd” who definitely see illuminated costumes as a new kind of fashion statement.



*Christmas Ghosts created for A Christmas Carol, produced by Center REPeritory Company Photo by Melissa Anne Paterson; In the spirit of TRON, a duplicate of one of the movie's costumes was created by fashion designer Elizabeth Lass with Lightwire. Photo by Carly Queen; Illuminated corsets bring out that inner glow for night wear.*

Much of the interest in Lightwire illuminated costumes is of the DIY kind (Do It Yourself), where there is a serious enthusiasm to combine mobile lighting and costumes into a single 'flashy look.' As to which costumes get lit, anything is possible from a top hat and tails to some kind of TRON-like cyber look.

People attracted to Lightwire have two basic approaches, first many Lightwire users will take pre-existing costumes or special clothing and add Lightwire to it by following the look of the existing costume and filling it with a glowing or blinking trim. In other cases, people will design clothing from scratch and incorporate Lightwire as an integral part of a garment. <http://www.lighnwire.com>

- **LED Animatronic Fashions:** Erogear LLC.(San Francisco, CA) founded by Anders Nelson, and whose efforts in exploring illuminated fashion wear began in 2005, sees LED displays as a definite clothing decor item. His company has invented a micro-processor-based LED matrix (at a ¼ " pitch) whose form of a flexible LED panel can easily be attached to garments. The Erogear LED video matrix currently displays full grey scale video images at 60 fps and produces a low-res video image that streams across its display face. An interesting benefit of the Erogear matrix is that it is programmable and the wearer can easily upgrade its fabric-embedded microprocessor with new video, graphic images or text message files depending on the holiday or event theme.

Once the LED matrix form is defined (portrait or landscape shape) and attached to the garment (hat, jacket or vest), any number of visual applications are possible from animations of graphic imagery to continuous scrolling text messages. Nelson sees one immediate use of his LED matrix as a specialty display from for the conference promotion and special events market as wearers of Erogear vests could walk around as mobile sign boards amidst trade shows. Used with abstract constantly shifting video images, Erogear displays would easily be well received within the party set. <http://www.erogear.com>

*Marco Tempast, a new age magician not only wore a Erogear garment, but incorporated it within his magic performance where his illuminated jacket interacts with a light sphere as the light jumps from his hands to the front of the jacket, runs up his sleeves and escapes the jacket and is fetched again by Marco.*

*An Erogear garment with an LED matrix attached to a vest. This display can present either video or graphic imagery or text messages based on the user's marketing needs.*



- **Transparent Fashionwear:** On another end of the fashion spectrum is a revolutionary concept being developed by Daan Roosegaarde (Rotterdam), an artist who operates Studio Roosegaarde, a design firm that experiments with interactive technologies that connect with and engage people within the social sphere. Roosegaarde has come up with a new technology application for clothing that completely negates its most basic function of covering the human body; here his designer clothing transforms from translucent to transparent at the whim of its wearer.

The fashion-form Roosegaarde has created is known as INTIMACY. "We know how much fashion rules our life and our culture, and we all define who we are by how and what kinds of clothing we wear. What we did at my studio was to make a series of dresses that could become transparent based on how the wearer of the dress lessens the dress's opaque look."

INTIMACY is more than lighting up clothing, as Roosegaarde says, “it's a new way of expressing yourself. Essentially it redefines the wear's social behavior, which is easily summed up: if you wear it – accept the consequences.” (excerpt from detailed article, below). <http://www.studio Roosegaarde.net/>

*Intimacy by Studio Roosegaarde is a fashion project about the relationship between intimacy and social behavior as the wearer determines the level of transparency creating a 'sensual play of disclosure.' Intimacy is about a new dimensional use of fashion through the use of smart e-foils which become transparent based on personal interactions.*



Clothing as a basic platform for illuminated fashion wear is constantly evolving - it's certainly a market niche whose time has come - the big challenge is taking available lighting technologies and transforming them into fashion wearables at the right price point. Given enough market demand, illuminated clothing might more readily be seen at night where the 'in crowd' may soon become the glow crowd.

## *Now You See It – Now You Don't*

*by Louis M. Brill*

They say that "clothing makes the person," and often, people's first impression of meeting a new person is fashion-based on how they dress. Imagine a set of garments that has a "naughty" element of variable transparency, allowing the wearer of such garments to show off or hide parts of their body at their discretion. Puts a whole new spin on *The Emperor's New Clothing...*

Such garments exist and come from the well spring of Studio Roosegaarde (Rotterdam, Holland), a company that is a design firm that does research and makes products or art works that interact with the public. “Here we specialize in social technology, to make things that are 'alive' and engage people,” says founder Daan Roosegaarde. The overall project was in collaboration between Studio Roosegaarde and V2\_Lab (the Netherlands).

**Sensual Disclosure:** “One great example of this is our INTIMACY project which was applied to something that everyone has contact with, which is fashion. We already know how much fashion rules our life and our culture. We define who we are by how and what kinds of clothing we wear. With INTIMACY, Studio Roosegaarde turned the conventional notions of fashion inside-out or more specifically - invisible. What we did was to make a set of dresses,” said Roosegaarde, “using materials that could become more or less transparent, based on how intimate you could become with the dress.”

“The creation of transparent fashion-based materials comes from our own research into interactive technologies and smart e-foils which have varied degrees of transparency based on the wearer's personal interactions and how "clear" they want their garment to be.” To make INTIMACY work on a fashion level, said Roosegaarde, “we used a 1/2mm thick flexible liquid crystal film material which comes in a clear or opaque (black) form. Thus we can make the clear transform into levels of opaque and in reverse, take our black material and give it various degrees of transparency, both effects working their magic when charged with electricity.”

**Black and white and everything in sight:** Thus far, two dresses have been created, fashion designer Maartje Dijktra designed the first prototype dress known as Intimacy White. This garment is made from segments of white e-foil, and is formed by a series of wide overlapping strips that carefully cover the body, but are strategically placed for a maximum reveal at the wearer's choice of time.

The second dress was designed by Anouk Wipprecht and is called Intimacy Black. This e-foil transforms from black to transparent and is composed of a series of vertical stripes that create a covered, but exposed view of the wearer's body.

**An emotional meter of intimacy:** The material exists in a flexible format allowing it to be easily formed into garments. Its transparency is based on a similar process to how electronic ink works. Not only were we challenged by making the material with a variable transparency, but also “how to control it in relation to the people around you and what would define that control. Our solution was to establish that control with a sensor,” said Roosegaarde, “that could be based on varying types of triggers, including voice recognition, touch or motion proximity (the closer you get to the garment, the more it changes).”

Within the fashion world, INTIMACY offers new notions about clothing and how it functions in wearing these special garments and how you want to present yourself to the outside world. Obviously depending on its design and what parts of the body it covers, calls for a wearer who has a strong confidence about themselves and also feels comfortable about how and when they would reveal themselves.

As for the continuation of INTIMACY, Roosegaarde plans for at least a dozen more similar garments to be made which in turn will all be destined for a series of enlightened experiences for both the wearers and the viewers of these dresses. “Wearing INTIMACY-based garments” said Roosegaarde, “leaves that person with a certain visceral power of when to show off, and how much do you show? The biggest challenge and possible conundrum - who do you show off to.” <http://www.studioroosegaarde.net/>



*Intimacy Black: designed by Anouk Wipprecht, the upgraded e-foil transforms from black to transparent, just the thing for that special 22nd century party you might be attending. Photo by Robert Lunak*

*Intimacy White: created by fashion designer Maartje Dijktra which becomes transparent at user discretion. Wearing these dresses calls for a woman who feels comfortable about how and when they would reveal themselves.*

Photo by Lotte Stekelenburg

*Wearing INTIMACY-based garments leaves that person with a certain visceral power of when to show off, and the challenge of how much do you show. Photo by Studio Roosegaarde*