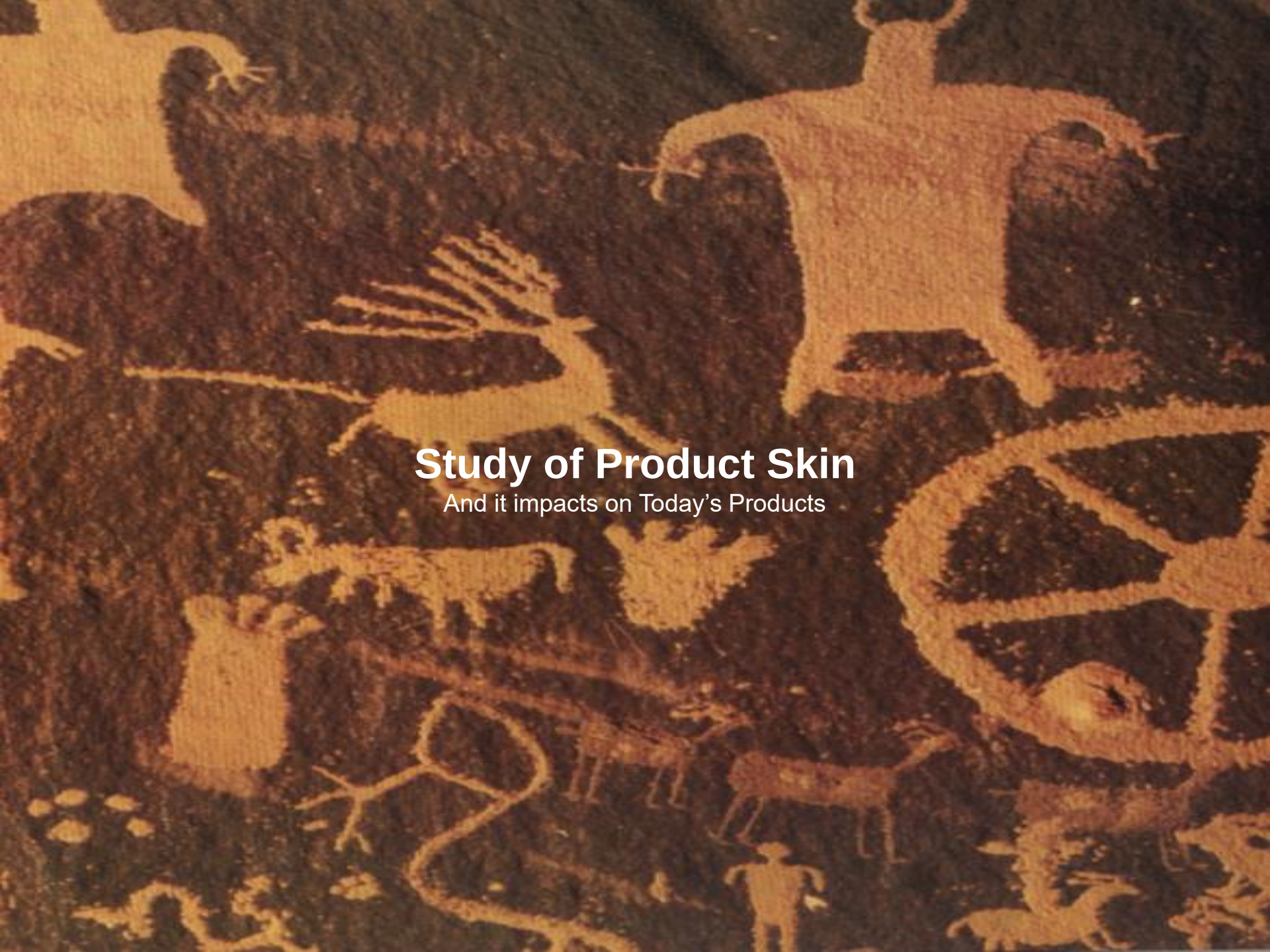




Study of Product Skin

And it impacts on Today's Products



*Take away the
sensations of softness
moisture and color
....you take away the
orange*

*Since it is not a being
distant from these
sensations an orange I
say is nothing but
congeries of sensible
impressions or ideas
perceives by various
ideas; which are united
into one thing.*

George Berkeley 1713

Skins of nature tell us the **health** of the life form



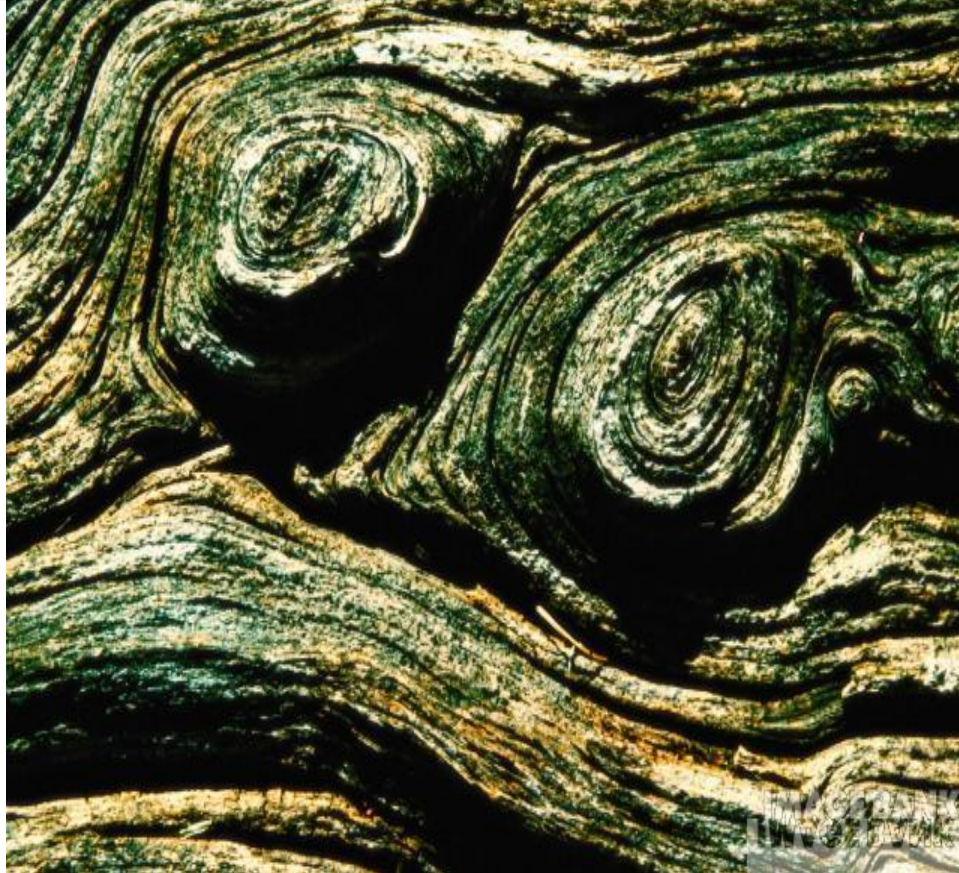
Skins in nature show us the **age**

Thorny
Pineapple



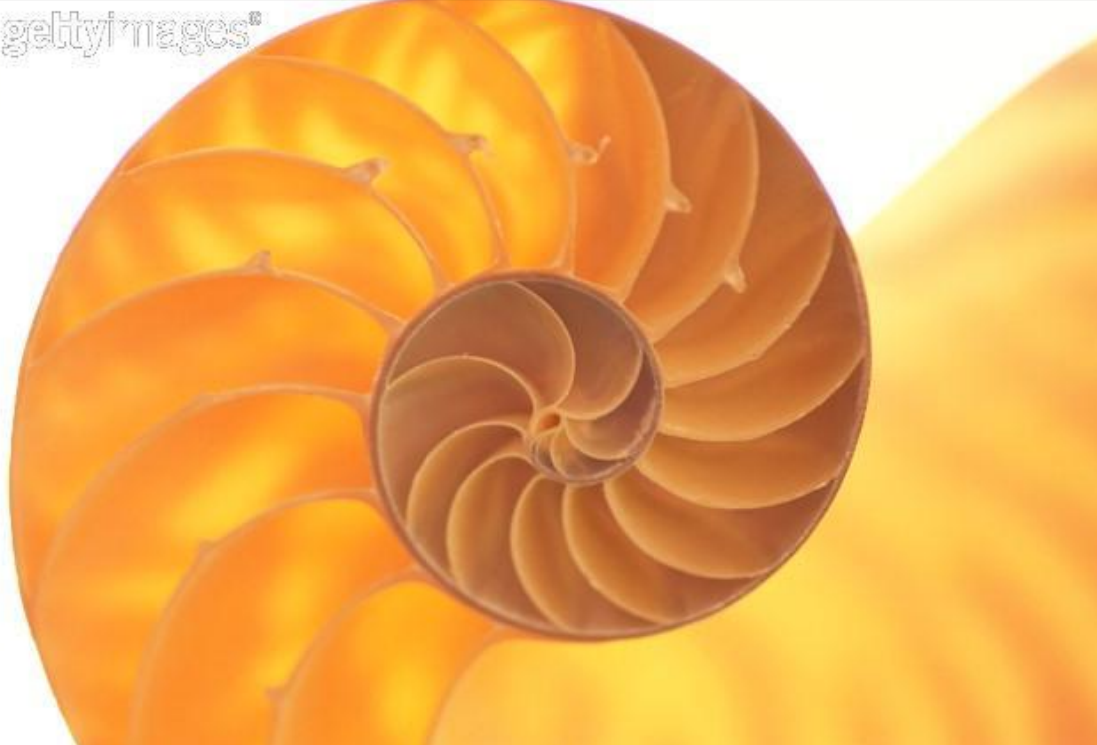
Skins of nature tell us the the **sensations** of surfaces

Old Bark



Skins of nature tell us the **feel** of time

gettyimages®



*Patterns are often coded messages, once
the key is discovered the pattern can be
read like a story- H F Judson*

Skins in nature are **patterns** to decode

Color Changing skin of chameleons



Chameleons can
communicate with others,
expressing attitudes such as
their willingness to mate

Skins in nature are **feedbacks** to response

By sight I have the ideas of light and Colours, with their several degrees and variations. By touch I perceive hard and soft, heat and cold, motion and resistance, and of all these more and less either as to quantity or degree. Smelling furnishes me with odors; the palate with tastes; and hearing conveys sounds to the mind in all their variety of tone and composition.

George Berkeley 1710

*A TREATISE CONCERNING THE PRINCIPLES OF HUMAN
KNOWLEDGE*

health

sensations

signals

patterns

feedbacks



Skins in nature are living elements of surfaces

They reveal the inner working of the body by exposing its function actively

They show the condition of the life form

Some of them respond by changing their character over time

Skins in nature give us a feel of time showing growth

The surfaces of products



We refer **Product skin** here to the **outer most visible part of the object.**

What do today's product surface
communicate?

Sensations of Surface

hard

transparent

reflective

rough

smooth

crumpled

hot

soft

Sensations of Material

Golden

chain

metal case

wooden

bat plastic

shell

The way they are made

turned

molded

baked

polished

coiled

The way you associate

Cultural Values

Social histories

Recognition

Product Skins – Can they be more than mere surfaces?

*Can Product skins help in better,
natural understanding of the product?*

Can Product Skins simulate nature?

Finding answers in Technology.....



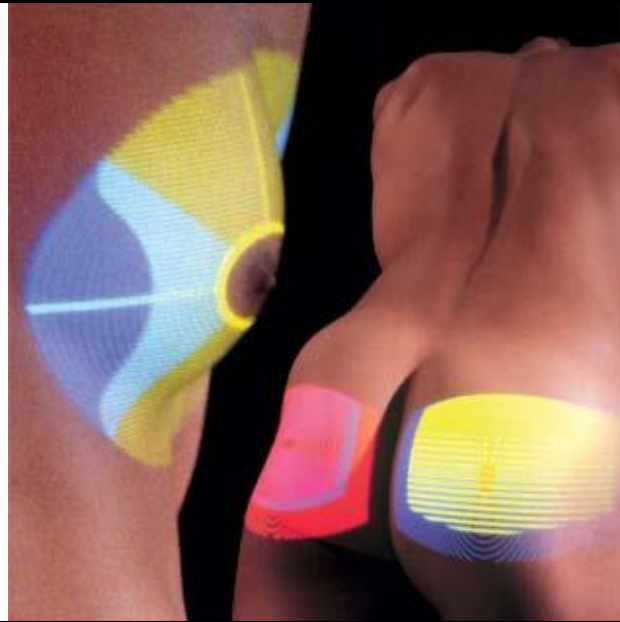
*Technological Developments have
changed our traditional ways of looking
at product surfaces. This effect is seen in
design field and approaches.*

Research, Technology, Examples, Concepts, Products.....

Color Changing Materials

Heat - Color

Thermo chromic materials



Scentoos

Thermo chromic materials change reversibly color with changes in temperature. When attached to the skin these thin films change their color depending on the skin temperature.

liquid crystals

metal compounds

Color Changing Materials

Light- Color



This T-shirt uses photochromic inks for decoration purposes



Photo chromic

Photo chromic materials change reversibly colour with changes in light intensity.

Electrodes

Insulator - zinc sulphide

Color Changing Materials

Light Emitting Materials

Light- Electricity



3 Electro luminescent materials produce a brilliant light of different colors when stimulated electronically (e.g. by AC current). While emitting light no heat is produced.

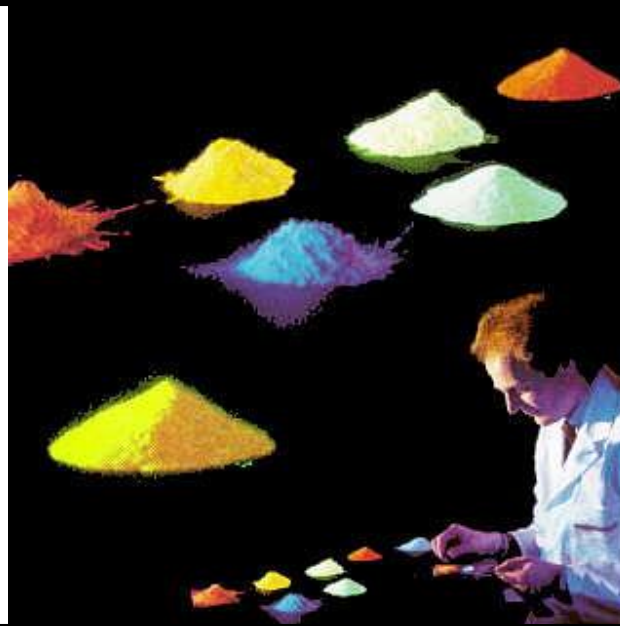
Electrodes

insulator -zinc sulphide

Light Emitting Materials

Glow- Electricity

Fluorescent materials

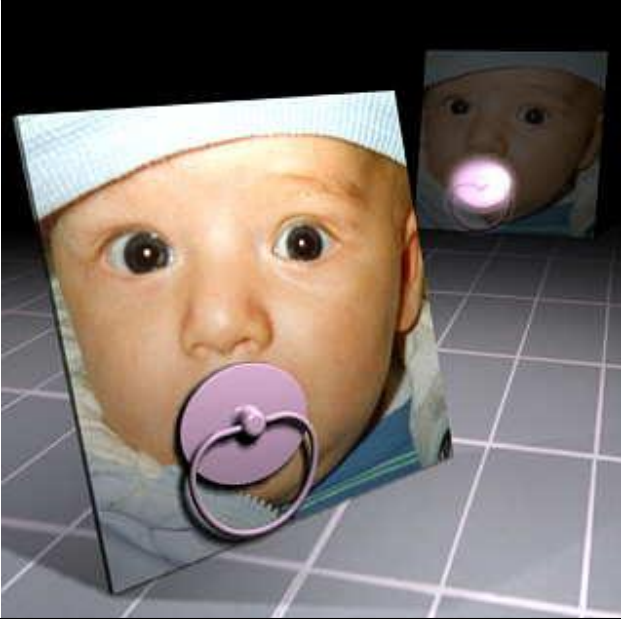


Pigments

Fluorescent materials produce visible or invisible light as a result of incident light of a shorter wavelength (i.e. X-rays, UV-rays, etc.). The effect ceases as soon as the source of excitement is removed.

Light Emitting Materials

After Glow- Electricity



Afterglow effect pigments are polycrystalline inorganic zinc sulphide (green afterglow) or alkaline earth sulphides (red or blue afterglow),

Phosphorescent materials

Afterglow materials produce visible or invisible light as a result of incident light of a shorter wavelength (i.e. X-rays, UV-rays, etc.), detectable only after the source of the excitement has been removed.

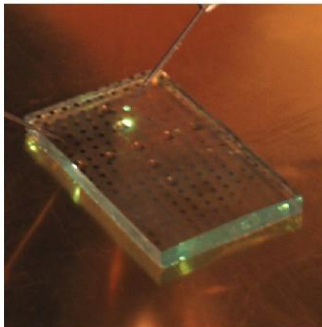
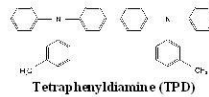
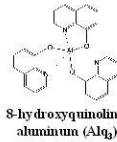
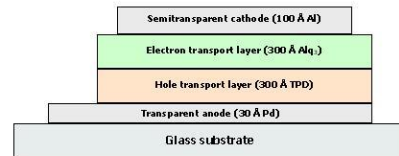
Light Emitting Materials

Alq₃/TPD Organic Thin Film Light Emitting Diodes with Transparent Metal Contacts

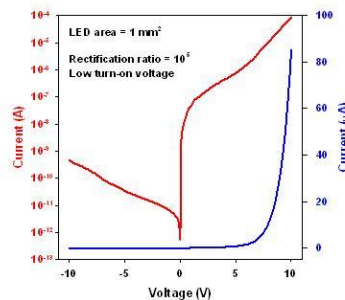
We have used transparent metal electrodes with the small-molecule materials 8-hydroxyquinoline aluminum (Alq₃) and tetraphenylamine (TPD) to fabricate organic thin film light emitting diodes. Transparent metal electrodes avoid the device degradation associated with the injection of oxygen into the organic films from transparent metal oxide electrodes.

Transparent electrodes

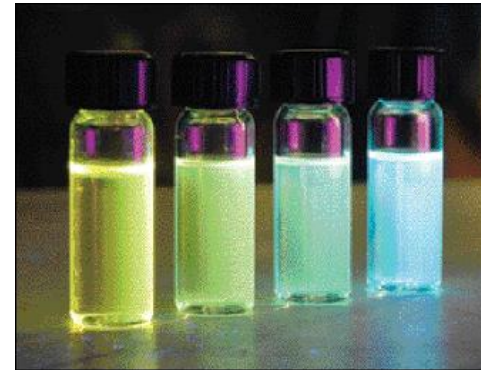
Ion-beam sputtering was used to deposit ultra-thin metal films for use as oxygen-free transparent contacts. These ion-beam deposited metal films have significantly smoother surfaces than evaporated metal films, and films as thin as 15 Å are continuous and conductive. 30 Å thick palladium films have optical transmittance near 70% and sheet resistance near 80 Ω/sq. These contacts may provide increased device reliability by avoiding the oxygen injection that may occur at indium tin oxide (ITO) or zinc oxide (ZnO) transparent contacts.



Current-voltage characteristics



Glow- Electricity



8-hydroxyquinoline
Aluminium (Alq₃)

Tetraphenylamine
(TPD)

Organic LEDs

OLEDs are small lumps of material that glow when a voltage is applied.

Light Emitting Materials

Shape changing Materials

Conductivity - Shape



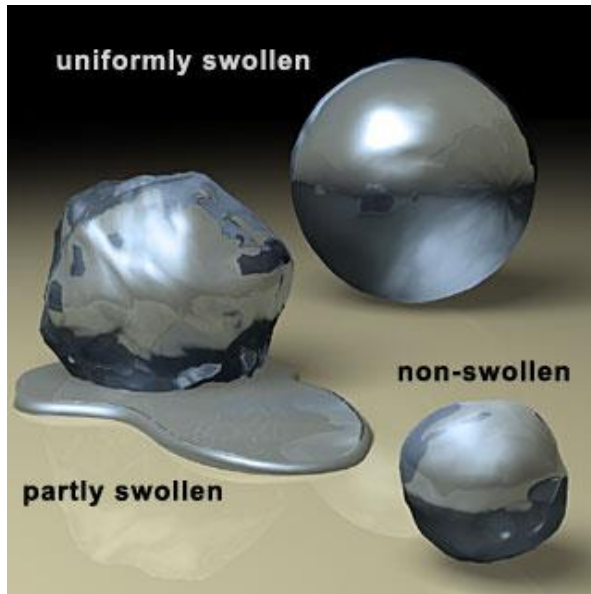
ferromagnetic

Piezoelectric polymers

They produce an electric field when exposed to a change in dimension caused by an imposed mechanical force (piezoelectric or generator effect).

Shape Changing Materials

Shape –heat/ electricity

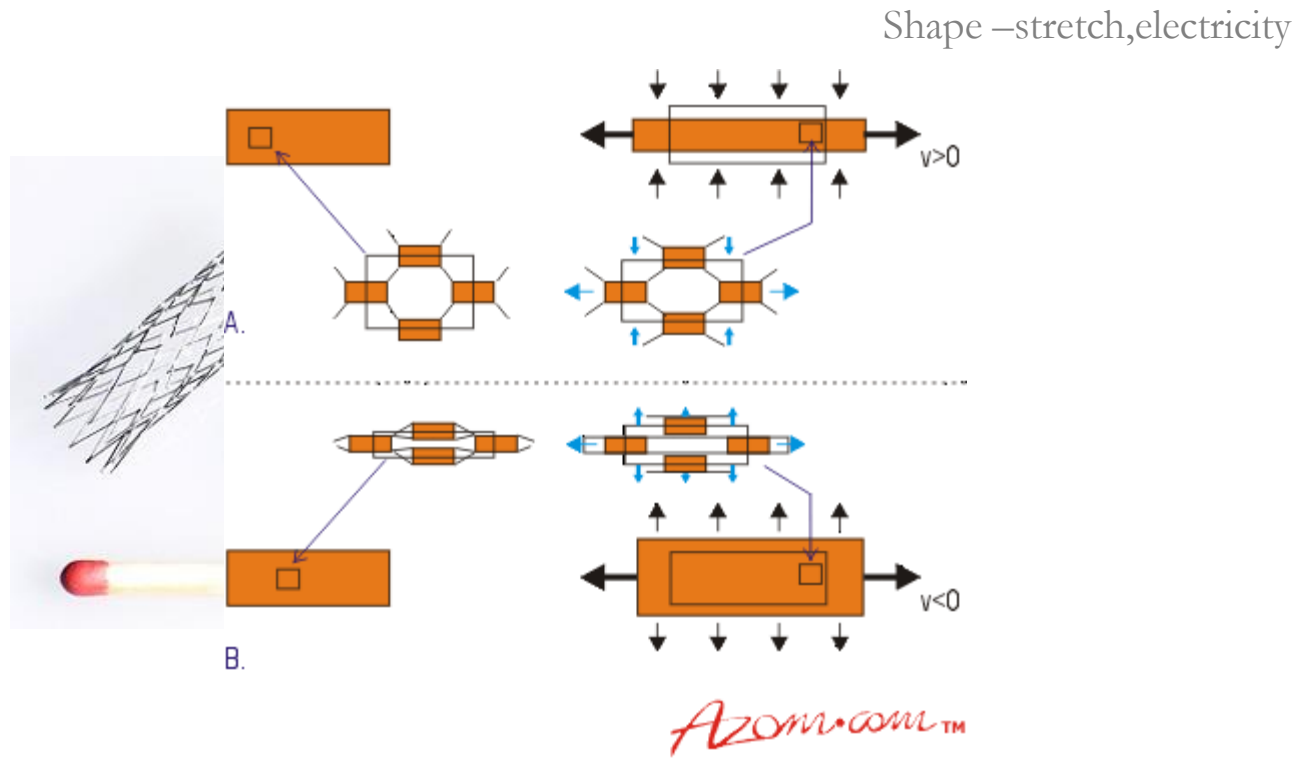


polyvinylalcohol (PVA),
polyacrylicacid (PAA) and
polyacrylonitrile (PAN)

Hydrogelic polymers

Polymer gels consist of a cross-linked polymer network inflated with a solvent such as water. They have the ability to reversibly swell or shrink (up to 1000 times in volume) due to small changes in their environment (pH, temperature, electric field).

Shape Changing Materials

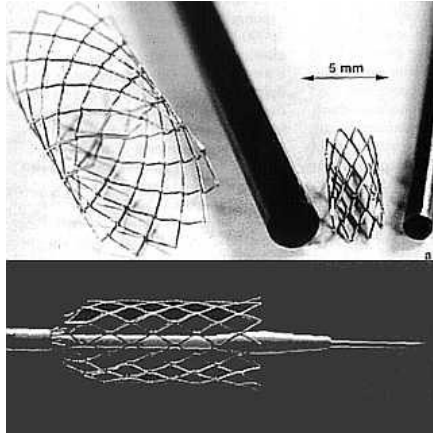


Auxetic materials

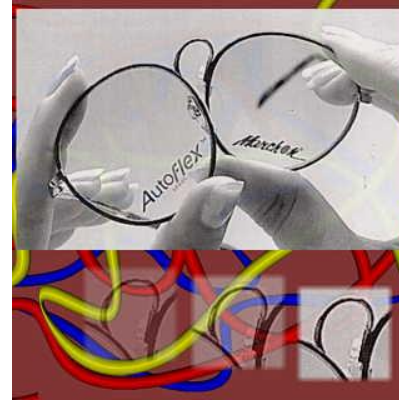
Auxetic materials behave like our elastic band and get thinner when stretched. natural and synthetic auxetic materials are known over several orders of magnitude of stiffness

Shape Changing Materials

Shape –Heat,electricity



Stent for veins



Super elastic glasses

Ni-Ti alloys.

Shape-Memory Alloys are metals that, after being strained, at a certain temperature **revert back to their original shape**

Shape memory alloys (SMA)

Shape Changing Materials

Shape – Conductivity

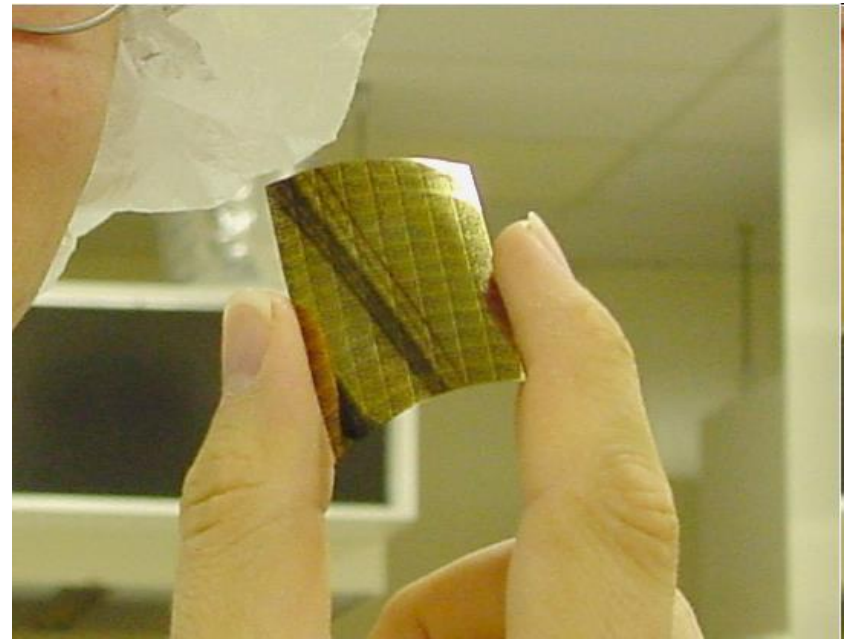
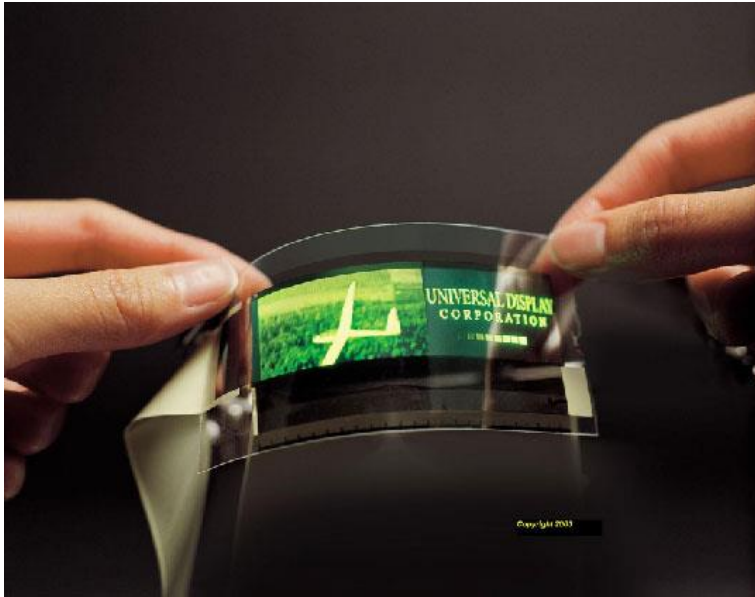


Conducting Polymers

Conducting Polymers are conjugated Polymers namely organic compounds that have P-orbital System, through electrons can move from one end of the polymer to another

Shape Changing Materials

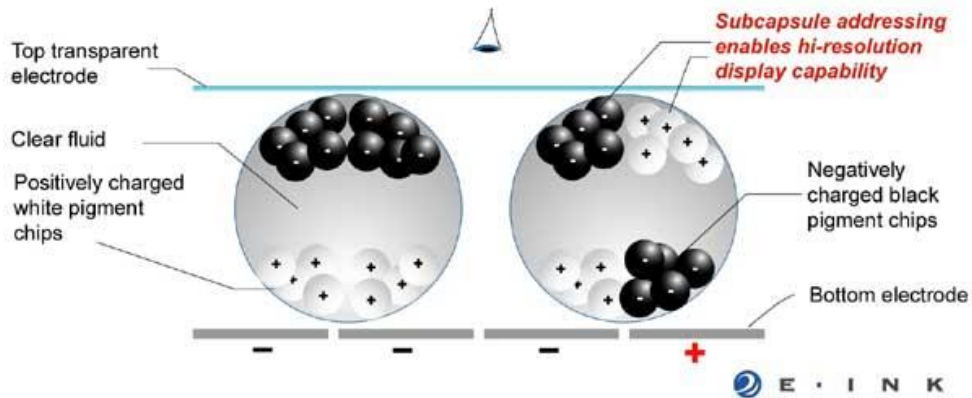
Flexible Electronics



The technology involves embedding microelectronic devices such as thermometers or infrared detectors into a flexible substrate. The flexibility of this "smart skin" would allow it to be placed over surfaces such as fabric or machines.

Flexible Electronics

Cross-Section of Electronic-Ink Microcapsules



Electronic Ink

Electronic ink is a proprietary material that is processed into a film for integration into electronic displays

Flexible Electronics



ElekTex™ can sense on three axes (X, Y and Z) within a textile fabric structure approximately 1mm thick. The resulting fabric interfaces deliver data according to the requirements

Electro textiles

Flexible Electronics

Other things!

Transparent

inv



(a)



(b)



gh a viewfinder that uses a
aken behind the wearer to give a

Figure 5. Examples of the use of thermochromic materials: (a) thermometer; (b) battery tester.

Design Examples

Design Examples



Tag

NEC Empowered by Innovation

Soft-shell mobile phone.

“Tag” is a new, malleable, casual communicator. It is not only soft but also flexible, for example, it can be hung from a belt or wrapped around the user’s arm. Shape-memorizing material and multiple pressure sensors allow the phone to change its shape according to the mode. The user can also alternate the mode by changing the shape.

Transparent, Expressive



Flacon

Virtual storage bottle.

We already have the means to store a massive amount of images in our various devices, so many that we cannot possibly see them all in a lifetime. “flacon” offers the ways to casually enjoy such a volume of visuals. The images emerge on an inorganic electroluminescent display. Among them, images selected according to anniversaries and the user’s emotions are projected outward through a projector.

NEC Empowered by Innovation



© NEC Corporation & NEC Design, Ltd.

Wacca

Looking into the landscape through an opening, this bracelet will capture visual images in the angles adapting to the distance from the viewers' faces through distance sensors installed in the device.



Using induction or direct contact recharging, there could be vases, bowls, mats or surfaces which allow products to be simply placed in or on them to recharge.



The Interactive Globe uses the attractive qualities of a traditional globe together with an interactive multimedia display, making it easier to understand the interrelations between the world's many systems. The user interacts with the globe by speech and touch. Ask a question or touch the surface and the response is shown on the globe, accompanied by a narration to explain what you are seeing

Schools

Ivrea - School of Design



Is it possible to design and prototype a soft, fluid switch - a switch that makes us really want to touch it, and that transform a banal everyday gesture into a new sensory experience?

The answer is angelic, a first step towards a world in which the softness of gel is taken from the beauty-preparations counter and put onto our bathroom walls.

Project by: Akemi Tazaki (Japan)

Tableportation - Café tables for virtual seductions

Café tables that light up if you touch them with your hands and that can interact with the other tables in the café, because their surfaces are filmed by TV cameras and projected onto a large screen, showing you a mosaic of images. This has the effect of a subtle, ambiguous game of seduction, where the hands and arms of the customers touch each other virtually, in a magic setting of light and shade.

Project by: Giorgio Olivero (Italy) and Peggy Thoeny (Liechtenstein)

Ivrea - School of Design



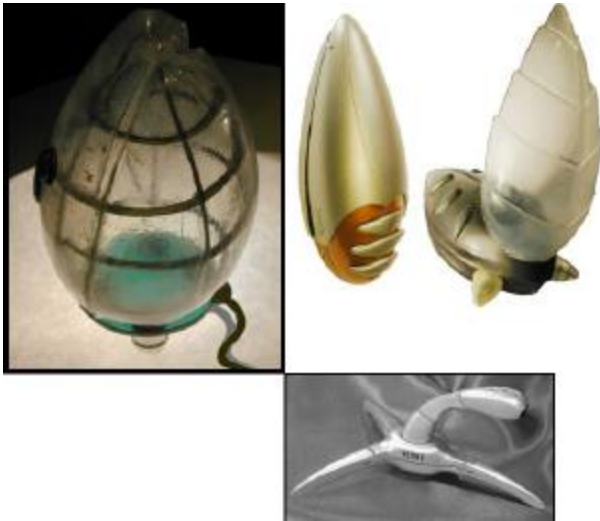
A wall covered with a cloud of 172 plastic hexagons, each of them interactive and reactive. If you move your hand across them, they light up or go out, and the light increases (or decreases) in intensity. It's a wonderful sight!

Project by: Helen Evans (United Kingdom) and Heiko Hansen (Germany)

Creative Collision - Artistic "wall-targeting"

Painting digital pictures by throwing rubber pebbles against an inflatable equipped with suitable sensors. The shape and size of the pictures depend on the intensity and the way in which you throw the pebble. The same operation can be repeated several times, using different colours, enabling you to create your own graphic.

Sensorial



The Centre for Industrial Design at the University of Northumbria

Senses.org.uk

Products in market

Products



(a)



(b)

Figure 5. Examples of the use of thermochromic materials: (a) thermometer; (b) battery tester.

Thermometer

Battery tester

Sun Glasses

Color Changing Ring

Sign Boards

Glow toys

Transparent Display Watch

Fashion- Glow



Leaky Fibers – www.Luminex.it

Fashion- Light



Leaky Fibers – www.Luminex.it



Jürgen Mayer H.

HeatSeat Pads, 2000

Installation

Heat-sensitive surfaces

Jürgen Mayer H.

Inferences from Technological Developments

Skins Becoming Active

Sensing of Skins

The relevance of the new materials in the design of product skins may influence :

The feedback systems- Skin responding to the user while he operates or performs a task (traditional being light indicators and sound indicators)

Indicators – To show the state of performing element in a product. E.g. The life of batteries, the temperature of an iron box

Interactive responders – to play with the surface for fun, to learn the operation

Information containers – surfaces transiting useful information

Dynamic appearance- dynamically changing surfaces designed to induce varying appearances of the product.

Environment observers – to constantly watching environment by reacting to the surrounding.

Design of Product Skin

Serving in FEEDBACKS

Visible storing and displaying essential data

Dynamic Interfaces provoking interaction for fun and engagement

Responding to the environment

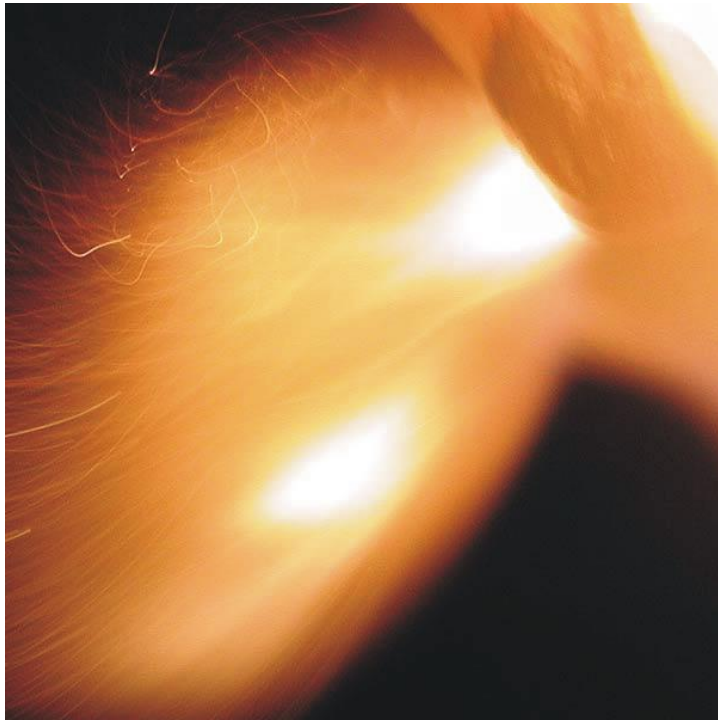
Case Example







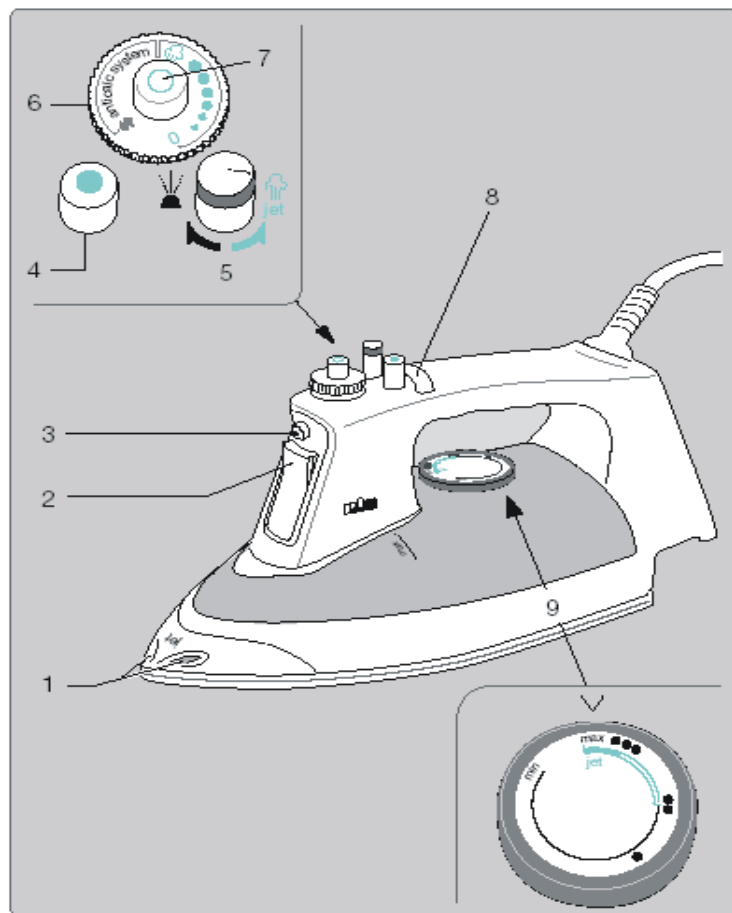






artist: Man Ray(1890 - 1976)

A



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