



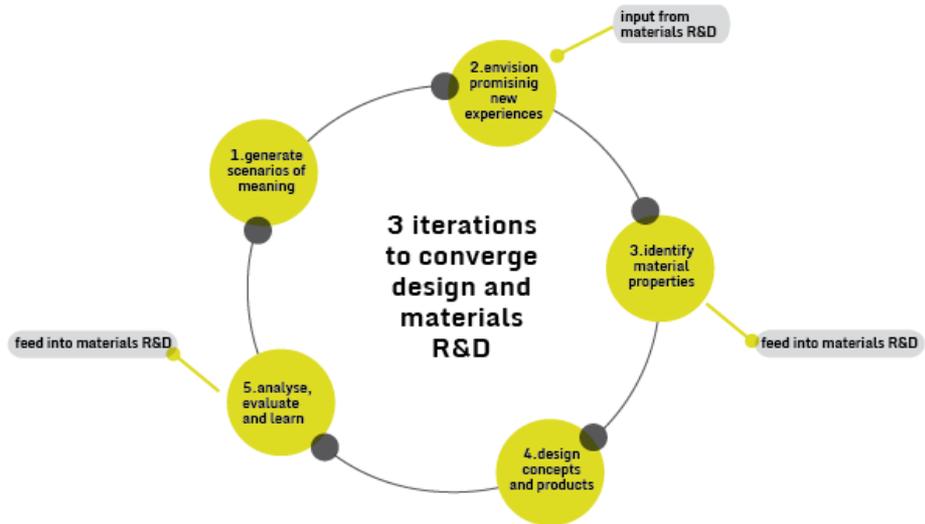
light.touch.matters
the product is the interface

A ONE-OF-A-KIND INITIATIVE



Light.Touch.Matters is a cooperation between product designers and materials scientists to create **new smart materials** that combine touch sensitivity with luminosity. The key new technologies are flexible **OLEDs** and polymeric **PIEZO** materials.

In this “**design-driven materials innovation**” project, designers and scientists work on new products and materials in parallel. The one activity stream feeds into the other, with direct and prolonged **designer-scientist interaction**.



KEY PROJECT DATA & PARTNERS



The project started on February 1st 2013 and finished on **July 31st 2016** after 42 months duration. Project size is ~40 man-years (m/f). **17 entities** from all around the EU joined forces in this innovative project, establishing a heterogeneous **consortium** formed by:

MATERIAL SCIENTISTS

Brunel University WMP [UK]
TU Delft NovAM [NL]
Holst Centre / TNO [NL]
Aito Interactive Oy [FIN]

FACILITATORS

Brunel University HCDI [UK]
University College of London [UK]
TU Delft IDE [NL]
Material Connexion Italia Srl [IT]
Politecnico di Milano [IT]
Studio Edelkoort [FR]
Bax & Willems [ES]

PRODUCT DESIGNERS

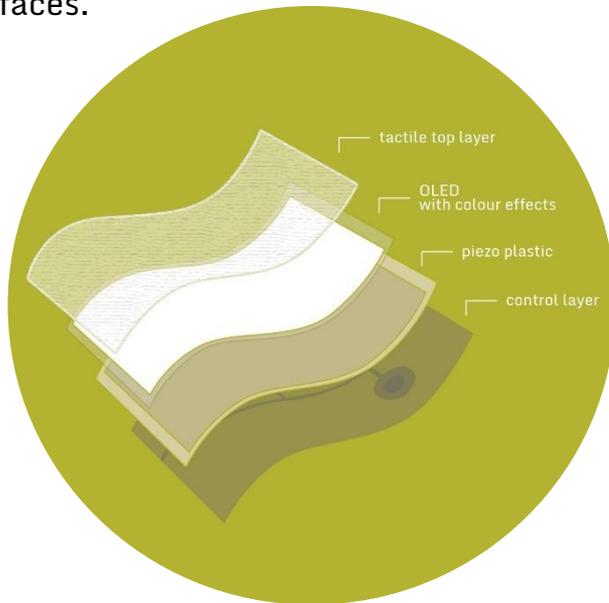
Lamb Industries Ltd [UK]
Minima Design Ltd [UK]
VanBerlo BV [NL]
GradoZero Espace Srl [IT]
Fjord Spain SLU [ES]
Fuelfor Design & Consulting SL [ES]
Diffus Design IS [DK]
Pilotfish GmbH [DE]
+design students from academic partners



UNIQUE VALUE PROPOSITION



The novel “LTM materials” are **thin, flexible, luminous and touch-sensitive**, thanks to flexible and transparent **OLEDs** combined with an advanced polymeric **piezo material**. Manufactured on plastic substrates, they **expand design freedom** and unlock totally new ways of product-user interaction through affordable and intuitive user interfaces.



Together, these **unique features** allow seamless integration of the LTM materials into parts and products up to the point where **the product becomes the interface**.



HIGH LUMINOSITY
Maximum light output 1000 cd/m²



ADAPTABILITY
seamless and sealable integration in products



WEARABLE
ideal for portable products



HIGH FLEXIBILITY
2d curvature deformation



ENERGY EFFICIENT
efficient energy consumption



HIGH SENSITIVITY
sensing variable levels of pressure



COSTUMIZABLE
shape & print/pattern customization



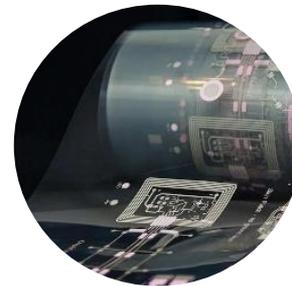
R2R FLEXIBLE OLEDS



Holst Centre / TNO has developed technologies for the roll-to-roll production of reliable **ultra-thin and transparent OLED panels** on an industrial scale. This “printable light” is the breakthrough that **lighting and signage** applications are waiting for.

Following the LTM designers’ suggestions, researchers at Holst Centre have developed **OLEDs with transparent electrodes**, which can now be produced with a variety of colours and allow emission over a wide spectral range. It has been demonstrated that a laminated stack of two or more transparent OLEDs permits mixing the emitted light in a controlled manner.

In parallel, researchers at **Brunel University / WMP** worked on additional colour effects, using downconversion layers: thin, transparent and flexible coatings based on fluorescent molecules, embedded in polymer matrices. Their chemical and physical properties allow for easy application directly on the top layers of OLEDs by screen printing technology.



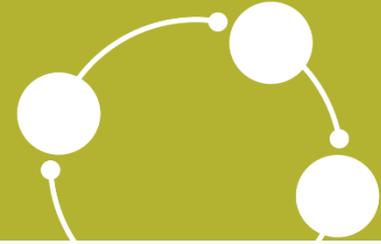
[video on flexible OLEDs](#)



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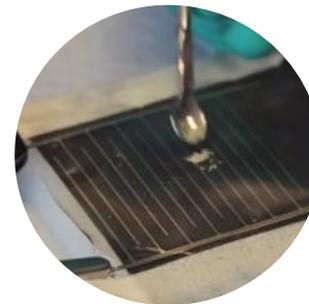
PIEZO PLASTICS



Piezoelectric materials have existed for more than 60 years, but are commercially available only as fragile ceramics or as very expensive plastics. This restricts their use and limits design freedom.

Recently, **TU Delft NovAM** reached a breakthrough developing a new piezo material: a structured composite of the ceramic piezo powder within a polymer matrix. Inherently flexible, these “piezo plastics” are **the ideal touch-sensitive material**. This mix of components can be tuned for specific applications. With this brand-new technology, the **features of the piezo-plastic can be designed**.

Moreover, in summer 2015 NovAM showed that this new piezo plastic even works with lead-free base materials: the properties of the material for sensing applications matches the performance of lead containing composites with a significantly reduced amount of piezo ceramic powder.



[video on Lead free PIEZO](#)



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DESIGN PROJECTS



The LTM materials can have a **broad range of applications**. LTM designers have explored the potentials by developing several design concepts (thus feeding the material R&D stream), such as rehabilitation aids, wearable products, or diet coaches.

The sector of **care & well-being** was the starting point. However, the consortium expects **strong spin-off** to other sectors contributing to innovation and competitiveness in many strategic EU industries. Currently, several designs are being prepared in the sectors of **consumer electronics** and **automotive interiors**.

Watch the project videos on [LTM YouTube Channel](#)

MeLITE by
Pilotfish



Hackroll by
Minima



Globuddys by
Fuelfor



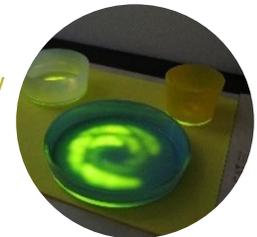
LiveSafer by
Van Berlo



PhysioFriend by
Lamb Industries



EAT by
Diffus



Glowe by
Grado Zero Espace



DDMI METHODOLOGY RESEARCH

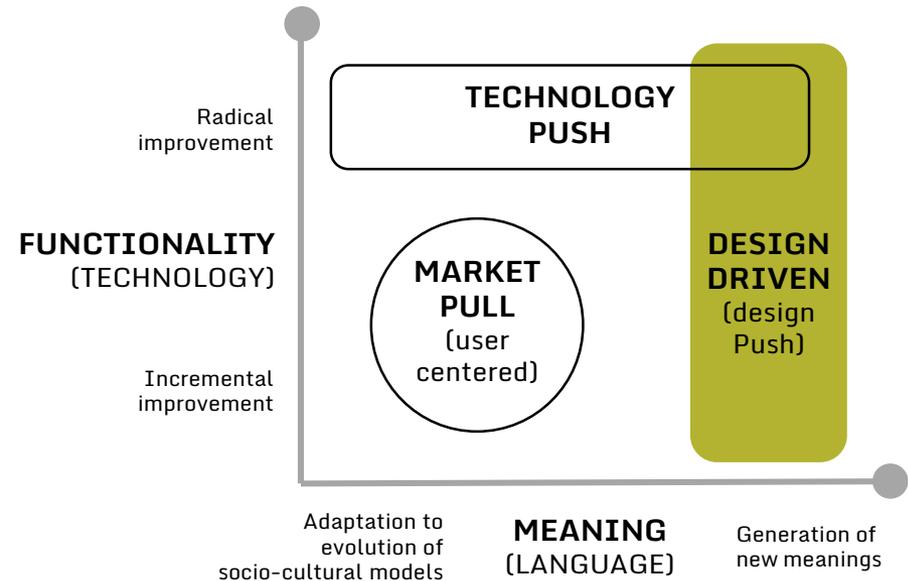


New materials take long to go from research to reality. Coming out of the lab, they are usually over-specified on some properties and under-specified on others. Following a traditional approach on materials development, **opportunities for innovation are often missed.**

Design-Driven Materials Innovation, or **DDMI**, promises a better way: by involving designers early on, and by developing material and application in parallel, **exploring new meanings.**

Project LTM had its own stream of methodological research, led by **Politecnico di Milano**. This design-driven research approach has been tailor-made specifically to suit the project and constituent partners.

The outcomes are summarized in “**The White Book - Lessons from a four-year journey into design-driven materials innovation**” a useful document to export the methodology to other contexts.



POTENTIALITIES



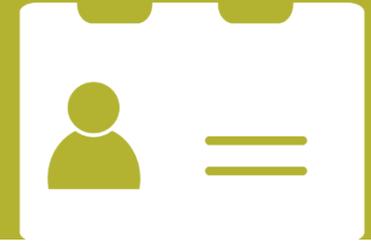
Thin, flexible, luminous and with integrated touch-sensitivity, the **LTM materials** enable to create smart interfaces for any kind of application and industry: from consumer goods and visual communication [signage, printing, packaging] to healthcare, sports and even the automotive sector.

Highly attractive, the LTM materials are easy to use and integrate into products, able to push forward product interface design by combining new touch-sensitive piezo plastics and flexible and thin OLEDs.

future materials for smart interfaces



WOULD YOU LIKE TO KNOW MORE?



For project outcomes, videos and downloadable documentation please visit:

io.tudelft.nl/ltm



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