

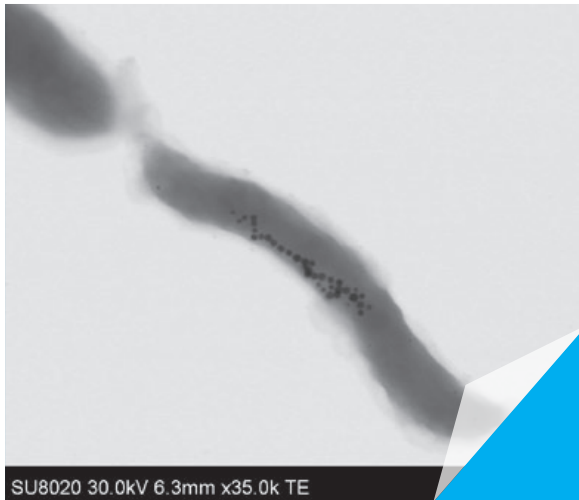


**WHITE
BIOTECHNOLOGY**

CELLS FOR MATERIALS AND MATERIALS FOR CELLS

WHITE BIOTECHNOLOGY

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SU8020 30.0kV 6.3mm x35.0k TE

APPLICATIONS

- ▶ Durable and profitable products and processes issued from biomass
- ▶ Replacement of traditional production processes for chemicals and nanomaterials by more environmentally friendly ones or based on a circular economy scheme
- ▶ Focus on high added-value molecules for application as materials in chemical, packaging, cosmetics, food and agricultural sectors
- ▶ Replacement of traditional antifouling or antimicrobial solutions with more sustainable ones

SKILLS

Full bioprocess development from nano-scale research (idea) to pre-industrial scale production (150 L)

FERMENTATION & BIOCATALYSIS

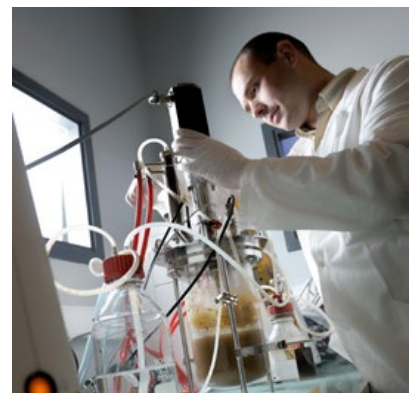
- ▶ Production of building blocks for polymers with bacteria using synthetic biology
- ▶ Production of high added-value molecules, enzymes and nanomaterials
- ▶ Down-stream processing and formulation
- ▶ Development of novel bacterial and fungal culture strategies

ANTIFOULING & ANTIMICROBIAL

- ▶ Development of novel antifouling agents and strategies (non-toxic)
- ▶ Testing: anti-biofilm, anti-algal, anti-bacterial, anti-fungal

BIOMASS

- ▶ Physico-chemical characterisation of biomass-derived biopolymers (polysaccharides, lignin, proteins)
- ▶ Identification, extraction, fractioning and development of applications for high added-value molecules
- ▶ Use of environmentally friendly catalysis to transform biomass into fermentation friendly substrate or into simple and/or bio-sourced materials
- ▶ Development of tailor made approaches for bioactive oligosaccharides production





**MULTIFUNCTIONAL
SURFACES**

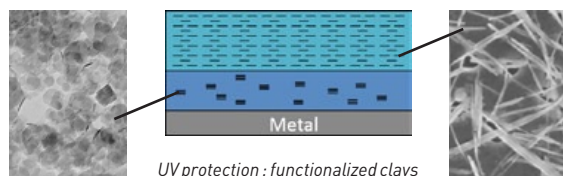
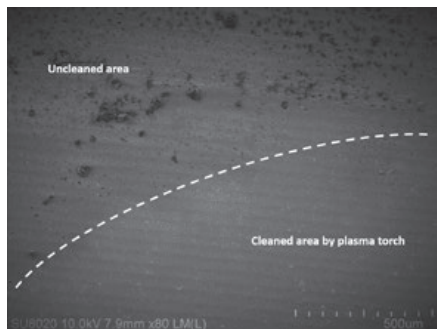
HIGH DURABILITY COATINGS

MULTIFUNCTIONAL SURFACES

HIGH DURABILITY COATINGS

GLASSES, METALS AND POLYMERS TREATMENT

- ▶ Surface preparation and cleaning
- ▶ Hard, scratch and wear resistant coatings
- ▶ Optical/Thermal tunable properties layers
- ▶ Smart enhanced corrosion resistant coatings
- ▶ Low friction coefficient layers
- ▶ TCO's and TSO's thin films
- ▶ Easy to clean, Anti fingerprint and Anti-graffiti coatings
- ▶ Bioactive, Biocompatible and Anti-bacterial films
- ▶ Aesthetic surfaces

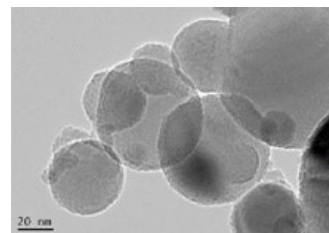


TECHNICAL SUPPORT

- ▶ Semi industrial and industrial production
- ▶ Dedicated characterization and analysis platform
- ▶ Pilot systems design support
- ▶ On-site assistance
- ▶ High power bipolar power supplies

POWDERS AND FIBERS MODIFICATION

- ▶ Enhanced wettability
- ▶ New chemical elements added
- ▶ Fine tuning composition
- ▶ New functionalities
- ▶ Protective layers



TECHNOLOGIES

- ▶ **PVD magnetron, μ waves reactors and PECVD:** fine tunable properties, very good adhesion...
- ▶ **Sol-gels:** hybrid and composite solutions, new curing processes, formulation tuning regarding the application methods and substrates...
- ▶ **Atmospheric plasmas:** surface cleaning and preparation, deposition processes...
- ▶ **Hardion Ion gun:** no added layers, any materials might be treated...
- ▶ **Electrochemical processes:** controlled surface structuration by anodization, formulation of non toxic electrolytes for metal plating,...

ELECTROCHEMICAL COATINGS

ENVIRONMENTALLY FRIENDLY PROCESSES

ELECTROCHEMICAL COATINGS

FROM ELECTROPLATING TO ANODIZATION MATERIA NOVA DEVELOPS NEW COATINGS AND ELECTROLYTE FORMULATIONS FOR SEVERAL APPLICATIONS AND OFFERS SUPPORT AND SERVICES TO THE INDUSTRY.



SKILLS / KNOW-HOW

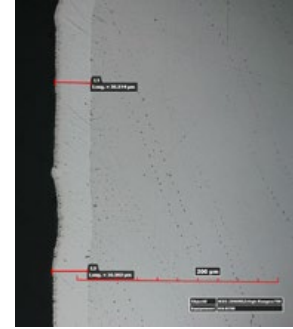
- ▶ Formulation of environment-friendly electrolytes for metal plating
- ▶ Plating facilities: plates (up to A4) and small pieces (barrel) of technical coatings or precious metals
- ▶ Characterization platform: chemical analysis, morphology and structure, interaction with environment, durability

APPLICATIONS

- ▶ Protection of metals against wear and corrosion
- ▶ Decorative coatings
- ▶ Black coatings for absorbers

HARD CHROMIUM

Formulation of an environment-friendly electroplating electrolyte based on trivalent chromium and optimization of process parameters to obtain crack-free thick layers of hard chromium.



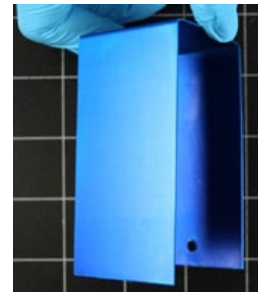
ALTERNATIVE SILVER PLATING



Formulation of cyanide-free electrolyte for batch and continuous silver electroplating.

ANODIZATION (ALUMINIUM, TITANIUM)

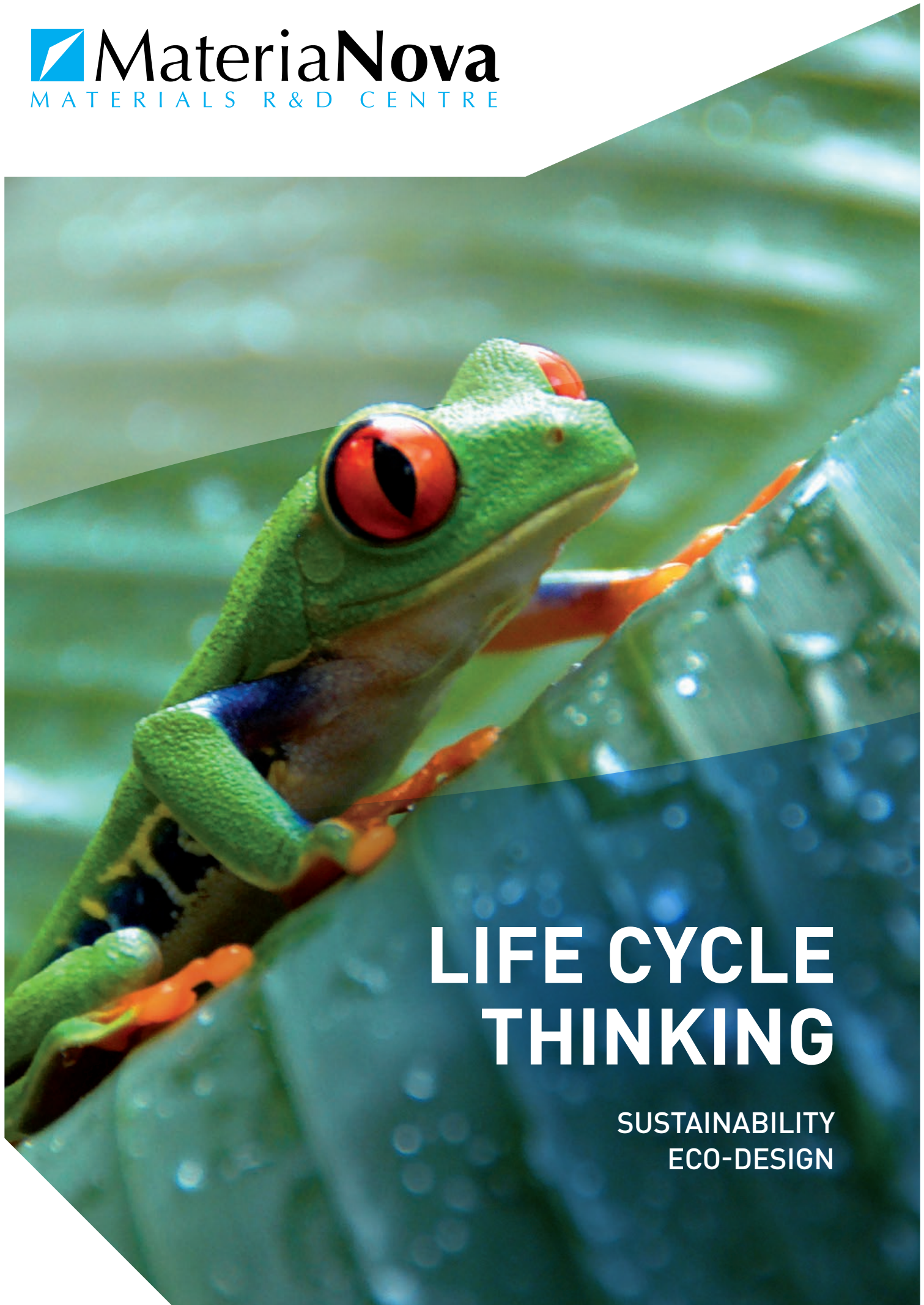
Coating parameter optimization, coloration, alternative sealing or top coat process (sol gel).



PRECIOUS METAL PLATING



Development and application of post-treatment for increased plating lifetime with conservation of the aesthetical aspect.



LIFE CYCLE THINKING

SUSTAINABILITY
ECO-DESIGN



ENVIRONMENTAL IMPACT UNIT

ECO-DESIGN IN R&D PROJECTS THROUGH LIFE CYCLE THINKING

Life Cycle Assessment (LCA) is a tool for evaluating the environmental impacts of a product or a process. LCA methodology, ruled by the ISO 14040 and 14044 standards, consists of identifying and quantifying the flows (raw materials, greenhouse gas emissions...) exchanged between the environment and the system on its entire life cycle (from raw materials extraction to waste treatment) and translating these flows into impacts on indicators such as global warming, resource consumption, eutrophication, human health...

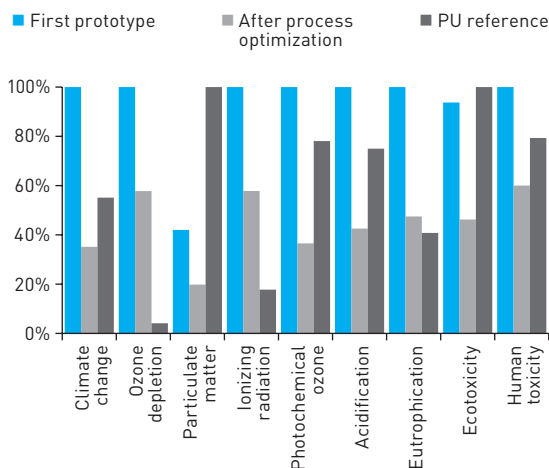
BENEFITS OF THE LCA APPROACH



- ▶ Validate the presupposed greenness of the innovation project
- ▶ Quantify and optimize the environmental benefits
- ▶ Identify hotspots in order to focus eco-design efforts where they are most relevant
- ▶ Help companies in their eco-design approach

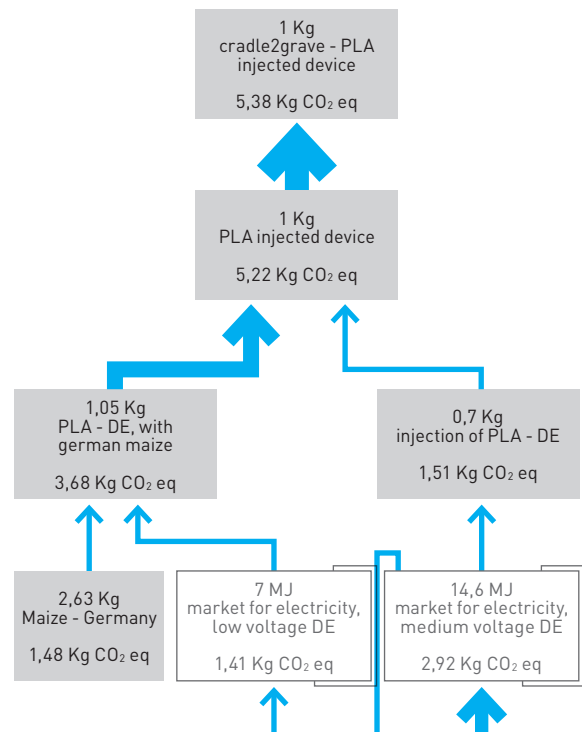
LCA, A REAL TOOL FOR ECO-DESIGNING INNOVATION IN R&D

A project on bio-based insulating materials made of flax by-products was the first one in Materia Nova to benefit from the LCA approach. The LCA study led to identify the process steps to optimize in order to minimize the environmental footprint of the products under development. This approach was then used in an increasing number of projects.



PAST AND PRESENT STUDIES

- ▶ Cellulose nanocrystals extraction with ionic liquids
- ▶ Flax-based insulating materials
- ▶ Polylactide production process
- ▶ Antifouling paints
- ▶ CrVI-free surface treatments
- ▶ Plasma-assisted conversion of CO₂
- ▶ Bio-based paints
- ▶ and more...



METALLIZATION

METALLIZATION

BY USING AND DEVELOPING HIGH POTENTIAL TECHNOLOGIES, MATERIA NOVA OFFERS INNOVATIVE SOLUTIONS FOR THE DEPOSITION OF METALS AND THEIR COMPOUNDS ON DIFFERENT SUBSTRATES



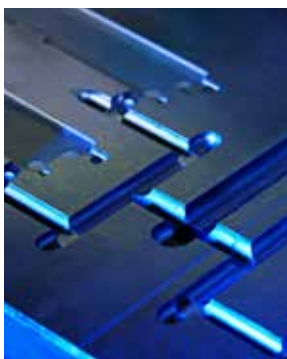
APPLICATIONS

- ▶ Protection of metals against wear and corrosion
- ▶ Conductive coatings for electronic applications and EMI shielding
- ▶ Decorative coatings
- ▶ Coatings for optical properties

SKILLS/KNOW-HOW

- ▶ Low pressure and atmospheric plasma techniques for the deposition of metals and ceramics (oxides, carbides, nitrides)
- ▶ Deposition on 2D and 3D substrates. Development of customized solutions for particular shapes and problematic substrates (powder, hollow substrates).
- ▶ Formulation of environment-friendly electrolytes for metal electroplating
- ▶ Characterization platform: chemical analysis, morphology and structure, interaction

PLASTIC METALLIZATION



Development of green solutions to metallize non-conductive materials: incorporation of conductive charges (composites) or surface preparation and activation by efficient and environmental alternatives to chromic acid based treatments.

COATING FACILITIES

- ▶ **ELECTROPLATING:** flat substrates (up to A4) or small pieces



- ▶ **PHYSICAL VAPOR DEPOSITION:** flat substrates, 3D objects and powders (specific design of barrel)



- ▶ **ATMOSPHERIC PLASMA TORCHES:** surface cleaning, preparation (chemical)





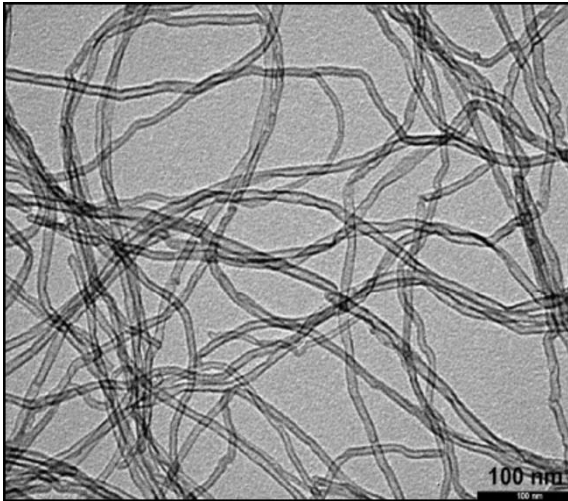
FUNCTIONAL TEXTILES

ONE TEXTILE, MULTIPLE FUNCTIONALITIES



FUNCTIONAL TEXTILES

ONE TEXTILE, MULTIPLES FUNCTIONALITIES



APPLICATIONS

- ▶ Today, textiles must meet a number of high requirements. They are not only used for clothing but as high performance product with additional functional characteristics such as UV protection, antimicrobial, flame retardant or de-polluting properties. These innovations have opened up new areas leading to market diversification and bring new challenges for R&D. Materia Nova, specialized in developing and producing new functional materials, guiding you in the development of new products or process.

Improving Performances, Protection and Health

Optimization of existing and development of novel innovative functional textiles

ANTIMICROBIAL, UV PROTECTION & FLAME RETARDANT BIOBASED TEXTILES

- ▶ Development of structural, lightweight and low carbon footprint composites
- ▶ Development of Innovative sustainable organic matrices exhibiting high mechanical, thermal, fire resistance
- ▶ Textile functionalization for anti-UV radiation and anti-microbial textiles capacities



SMART TEXTILES

- ▶ OLED-lighting technology on textile for indoor design applications
- ▶ Autonomous smart prototypes for energy management and future off-grid use
- ▶ Versatile innovation throughout fabrication process compatible with a wide range of textile materials



AIR POLLUTION ANALYSIS AND TREATMENT

- ▶ Integrated of Chemical Sensors on flexible substrates for environmental monitoring
- ▶ VOCs Degradation using functionalized textiles by photocatalytic oxidation

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