

Welcome to InSuLa - INNOVATIVE MATERIALS AND TECHNOLOGIES FOR SUSTAINABLE LEATHER MANUFACTURING FOR AUTOMOTIVE

GENERAL INFORMATION

Project code : COFUND MANUNET III InSuLa-1

Program PN III : European and International Cooperation; Subprogram 3.2 - Horizon 2020

Project type: ERANET

Contracting authority : Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI)

Contract No.: 37/2018 (for Romania); Finalization Year: 2020; Project duration: 24 months

Romanian coordinator: INCDTP-ICPI, Bucharest

Project Director : Elena Badea

OBJECTIVES AND CHALLENGES

InSuLa focuses on chrome/metal-free leather for automotive industry that meets the very strict technical specifications in terms of flame resistance, anti-fogging and stain resistance characteristics as well as the demand for recycling materials, while increasing the eco-compatibility of chemical auxiliaries and minimising the environmental and health impact of tanning and finishing processes.

WHY? The leather automotive industry is facing a number of challenges including a continuously tightening regulatory framework for safer and cleaner chemicals and technologies and the ongoing need to differentiate in terms of innovativeness, design, appearance and comfort. The new auxiliaries and chrome/metal free technologies envisaged by the Project are in line with the current driving demand for leather chemicals and leather technology in the future years.

The InSuLa project will focus on the **development of novel safe and non-toxic nanocomposites** as

- **inorganic fillers** allowing to decrease the amount of synthetic tannins, typically phenol or naphthalene-formaldehyde-based resins with high environmental impact
- main **constituents of additives imparting fire resistance and self-cleaning properties**, targeting the substitution of brominated (PBB, PBDE, HBCD, TBBPA, TBP) flame-retardants which were shown to be persistent in the environment, bio-accumulative in wildlife and humans, toxic to laboratory animals and wildlife, producing reproductive, developmental, and systemic effects in lab tests. Their use is restricted from July 2006 by the Restriction on Hazardous Substances (RoHS) Directive implemented by EU.
- A **new knowledge based organic tanning agent (KTA) from a natural polymer**, easily biodegradable with low toxicity, naturally occurring in the cell walls (https://en.wikipedia.org/wiki/Cell_wall) of brown algae (https://en.wikipedia.org/wiki/Brown_algae). The new KTA from renewable sources is a sustainable alternative to formaldehyde (FA) and glutaraldehyde (GA) which were shown to have adverse health effects on humans and contribute to greenhouse gas emission as petroleum derived chemicals.
- A **new chrome/metal-free technology** for pre-tanning / tanning / retanning leathers without the use of FA, GA and/or metals, and including eco-friendly flame-retardant treatments for the production of high performance leathers which meet the demanding standards requested by the automotive industry: soft but resilient, perspiration- and migration-resistance, low in volatile organic compounds, fog and odour reduced emissions in car interior, less weight (that means less fuel consumption and less CO₂ output), light and heat fastness, high dyeability.

The **objectives of InSuLa** require **advanced solutions** at the cutting edge of **modern tanning chemistry** and **material science** in an interdisciplinary framework that will be developed within the project.

IMPACT The automotive leather segment remains the fastest growing sector in the leather industry and the whole supply chain is undergoing a major industry transformation with a major issue as environmental sustainability. So far, the growth of the leather chemicals market has been spurred by the development of the automotive industry.

It is therefore highly expected that the accomplishment of the Project objectives will generate a new business opportunity for tanneries and chemical suppliers, and thus stimulate the whole supply and value chain.

In **InSuLa, enterprises** acting in the business of chemicals for leather tanning and finishing, and leather tanning, **academic and research centers** of excellence in the field of synthesis and characterization of nano- and advanced materials, and in tanning chemistry have joined forces in this **multidisciplinary approach** aiming at developing different nano-materials and auxiliaries, as well as technologies in response to real market needs, the testing of such materials and technologies, the assessment of their environmental impact, and their industrial scalability.

INTERNATIONAL CONSORTIUM

InSuLa is industry-driven project led by the experienced Italian company **KEMIA TAU (KT)**, and the consortium comprises a partnership with complementary skills in leather chemistry (KT), leather process technology at lab and pilot scale (**INCDTP-ICPI, Bucharest**), and industrial scale (**PIELOREX S.A.**), LCA and LCCA of innovative manufacturing processes (**Department of Economics, University of Turin, UNITO**), research and innovation in (nano)materials (**Department of Chemistry, University of Turin, UNITO**) and of their application to leather technologies (**INCDTP-ICPI**). This results in a tight interconnection among technological, sectoral and commercial aspects (KT and PIEL), sustainability analysis (UNITO) and scientific/technological research (ICPI, UNITO).

KEMIA TAU (KT), the coordinator of the project, has an extensive experience in consortium and project management involving both industrial and academic partners. Since 1973 KT has been operating at on world markets, opening headquarters and branch offices in the countries which are global leaders of leather industry as Poland, Portugal, Russia, Turkey, India, China, Korea, Argentina and Brasile, and supplying its clients with advanced products, qualified technical assistance and technology consulting. KT's portfolio of solutions for the specific needs of world-wide clients is the result of a constant expert chemical specialized research and proves its ability to carry out independent and/or collaborative research to solve practical business technology.

So far, KT is closely working with prestigious industrial partners such as Berluti of Louis Vuiton Group and a number of important tanneries from Italy (Mastrotto Group, Dani) and abroad (Tata, India and Ecco, Holland) and a number of tanneries which supply leather for luxury brands (Gucci, Prada, Salvatore Ferragamo, Valentino, TOD's, Hermes, etc.), design furniture (Poltrona Frau), motorcycle clothing, sportswear and protective gear (Dainese, Kering Group), etc.

The quality and environmental management systems applied by KEMIA TAU are ruled by UNI EN ISO 9001:08 and UNI EN ISO 14001/2004 standards. According to UNI EN ISO 9001:08, KT follows a specific procedure for design and development. The quality of KT's solutions is supported by special safety and control measures that cover the entire INDUSTRIAL cycle in full accordance with the REACH protocol, from raw materials to the final product.



<http://www.kemiatau.com/> (<http://www.kemiatau.com/>)

The **National Research & Development Institute for Textiles and Leather (INCDTP)**, Bucharest, was established in 1996, by merging Textile Research Institute (established in 1951) with **Leather-Footwear Research Institute (ICPI)**, established in 1956, being the only Romanian institute performing R&D in textile and leather fields. INCDTP-ICPI have 176 employees of which 68% are attested RD personnel. Since 2005 INCDTP-ICPI has managed 67 international projects and more than 200 national projects. Scientific results for 2012-2016 period: 121 ISI-indexed articles, 160 peer-reviewed articles, 25 books, 9 book chapters, 591 scientific communications, 42 patents, 46 patent applications and 96 innovation awards (<http://www.certex.ro/Rapoarte/> (<http://www.certex.ro/Rapoarte/>)).

The Leather Research Department

Leather Research Department of ICPI is recognized for developing new chemical auxiliaries, new materials (compact retanning agents, wet-white leather), nanomaterials (nano silver, nano titanium dioxide doped with nano silica, iron, nitrogen, silver) and smart technologies in the area of biocides, flame retardants, self-cleaning materials with low impact on the environment and consumers, green technologies for recovery of collagen and keratin based by-products.



<http://www.icpi.ro> (<http://www.icpi.ro/>)

<https://erris.gov.ro/Leather-Research-Department> (<https://erris.gov.ro/Leather-Research-Department>)

PIELOREX S.A., former Jilava Mineral Tannery, is the biggest tannery in Romania with integral private structure. PIELOREX processes bovine hides, manufacturing high quality finished leathers and splits for footwear, leather goods, upholstery, harnesses, protecting clothing, wet blue and crust leathers both for internal and external market. PIELOREX has an experimented R&D department that has developed applicative research activities in the frame of national and European RDI programs, in partnership with research institutes and universities (15 projects in collaboration with ICPI). In 2008-2010 PIEL coordinated two projects within the INOVATION National Program.



<https://www.pielorex.ro/> (<https://www.pielorex.ro/>)

University of Turin (UNITO) . As a whole, the Department of Chemistry (www.chimica.unito.it; 90 permanent staff, ca. 60 PhD and postdocs) carries out research activities on a wide range of subjects related to various branches of Chemistry. Since 2012 it is managing 14 European projects, 7 national projects and 45 local projects. In particular, the Chemistry@UNITO team in InSuLa brings to the project competencies in the field of preparation and characterization of nanomaterials, and in recent years intensively investigated most of the nanomaterials relevant for the project, namely nanohydroxyapatite, nanosilica and nanotitania, also in interaction with biomacromolecules.



<http://www.chimica.unito.it/do/home.pl> (<http://www.chimica.unito.it/do/home.pl>)

The role of the Management@UNITO team members of the Department of Management (www.management.unito.it; 80 permanent staff, 30 PhD and postdocs) is based on their expertise in management accounting and in environmental impact assessment of the economic activities (significant is the creation of an academic spin-off doing business with life-cycle analysis, ScatoI8, www.scatoI8.net (<http://www.scatoI8.net/>)).



<http://www.management.unito.it/do/home.pl> (<http://www.management.unito.it/do/home.pl>)

ACHIEVEMENTS

➤ Products

➤ Publications

➤ Dissemination

- **Workshop InSuLa** within the the 7th INTERNATIONAL CONFERENCE ON ADVANCED MATERIALS AND SYSTEMS (ICAMS 2018), Bucharest, Romania, 18-20 October 2018

- **Communication** at the XL National Conference on Calorimetry, Thermal Analysis and Chemical Thermodynamics, Pisa, Italy, 17-19 December 2018 (*Stabilisation of collagen by alginate dialdehyde for eco-sustainable tanning* , E. Badea, M. Crudu, C. Carsote, C. Sendrea, L. Miu)

NEWS

➤ Updates

➤ Project meetings

- **Kickoff meeting** - 17 May 2018, Kemia Tau, Cassa, Italy



➤ Dissemination events