TECHNOLOGICAL CENTRE LUREDERRA

Lurederra
centro tecnológico

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Lurederra in brief

L'Urederra Foundation, **non-profit private entity created in June 1999**, conducts and promotes research and technological development activities in the service of companies and economic operators, including the subsequent implementation of innovations developed in their own production facilities not only nationally but also internationally.

EVOLUTION

INSTALLATIONS:

- Year 2011: Own headquarters of 5.500 m2 (2.500 m2 built)
- Year 2013: Expansion of Industrial Unit rented in Los Arcos (+900 m2)
- Year 2016: Expansion of Industrial Unit, own adquisition, in Los Arcos 2.230 m^2

CURRENTLY IN TOTAL: **8.630 m^2 (4.530 m^2 built)**

PERSONNEL:

- October 2000: 4 people
- 2025: 35 people

Industrial vision:

Continuous development of marketable products and technologies quickly transferable and exploitable.

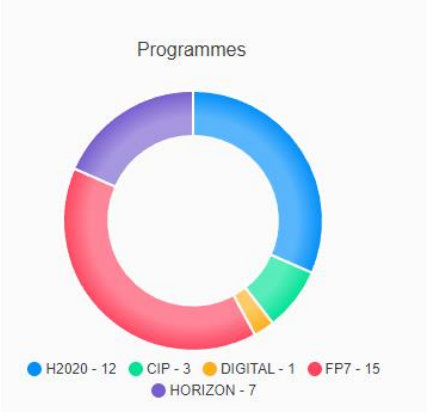
Main activities and strategy

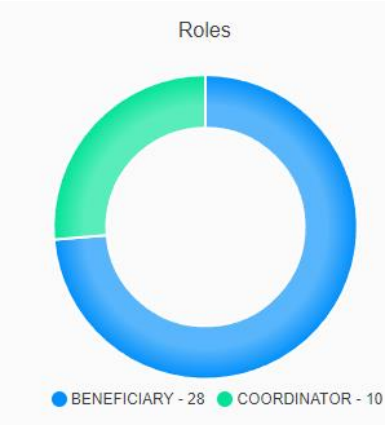
- Internal research activities for the development of technologies and products: RESEARCH FOR EXPLOITATION, diverse active formulations are becoming market products by the sale or transference of technology: AQUASHIELD, TECNADIS PRS PERFORMANCE, TECNADIS GWR, TECNADIS METALCOAT, TECNADIS SELFCLEAN PV, TECNADIS MULTICOAT, TECNADIS COATEX, recycled PVB, special nanocoatings, new products based on sophisticated nanoparticles, etc.
- Participation and coordination in collaborative projects at national and international level: implying cutting-edge technologies to be rentabilised in the near future.
    - RTD Projects of large scope: 400 (Under contract/technology acquisition)
    - International Projects, EU Framework Programme: 34 (Coordinator of 10) – one of the most active agents in Navarre.
    - LIFE/ CIP International Projects: 12 (Coordinator of 12)
    - International Patents published: 3 completed
    - National and International recognition as a Technological Centre with high experience in Nanotechnology
- RTD developments with private companies
- Investment in new commercialisation routes, creation of Spin-off companies: The concept of technological centre transformed into "production entity". First case in 2007, Tecnología Navarra de Nanoproductos S.L. (*TECNAN) production and commercialisation of nanoproducts at industrial scale*

TECNAN
TECNOLOGÍA NAVARRA DE NANOPRODUCTOS, S.L.

"Think Big, Act Nano"

https://tecnan-nanomat.es/





H2020 Projects (on-going)

NANOSTACKS: "Nanostack printing for materials research" H2020-EIC-FETPROACT-2019-951949

WASTE2FRESH: "Smart innovative system for recycling wastewater and creating closed loops in textile manufacturing industrial processes" H2020-SPIRE-2020-958491

MAREWIND: MAterials solutions for cost Reduction and Extended service life on WIND off-shore facilities. H2020-NMBP-2020-952960. **COORDINATOR**

SUNRISE: MultiSensor sorting tools in a circular economy approach for the efficient recycling of PVB interlayer material in high-quality prodUcts from laminated glass coNstRuction and demolItion waStEs. H2020-LCCI-2020-958243. **COORDINATOR**

Horizon Europe

SUSAAN "SUStainable Antimicrobial and Antiviral Nanocoating" HORIZON-CL4-2021-101057988 **COORDINATOR**

FREE4LIB "Feasible recovery of critical raw materials through a new circular ecosystem for a Li-ion battery cross-value chain in Europe" HORIZON-CL5-2021-101069890

Platform-ZERO "Customizable AI-based in-line process monitoring platform for achieving zero-defect manufacturing in the PV industry" HORIZON-CL4-2021-101058459

SUNRISE "Safe and sUstainable by desigN: integRated approaches for Impact aSsessment of advanced matErials" HORIZON-CL4-2023-RESILIENCE-101137324

SOLINDARITY "SOLar-driven INDustrial power And heat upgRaded with hIgh-temperature heaT pumps for enhanced integrated process efficiencY" HORIZON-CL5-2023-D3-101136148

BEETHOVEN "SUBSTITUTION OF RARE-EARTHS FOR ADVANCED NOVEL MAGNETS IN ENERGY AND TRANSPORT APPLICATIONS" HORIZON-CL4-2023-RESILIENCE-101129912

NEOCYCLE "UPCYCLING OF NdFeB MAGNETS IN THE EU FOR GREEN APPLICATIONS (NEO-CYCLE)" HORIZON-CL4-2023-TWIN-TRANSITION-01-101138058

IV FRAMEWORK PROGRAMME

1.- INNOREGIO: Support to Innovation Management and competitivity in the European Regions. RECITE II _ Subcontractor

2.- ECOSITES: Industrial production of high-performance ecological polymeric composites based on residual/renewable cellulose fibres and post-consumer thermoplastics G5RD-CT2000-00337 _ Subcontractor

V FRAMEWORK PROGRAMME

1.- ABSORB: Novel Absorbent for Heavy Oil Clean-Up G5ST-CT2002-50295_ Partner

2.- SEQUEF: Spectrographic quality evaluation of fruits and vegetables G6ST-CT2002-50376_ Partner

VI FRAMEWORK PROGRAMME

1.- PURILEACH: Modular purification system for heavily polluted leachate. COOP-CT2004-508698_ **Coordinator**

2.- NANORUB: Customised nanocomposites based on rubber matrices for high demand aplications. COOP-CT2005-018003_ **Coordinator**

3.- FLARETPOL: Development of an innovative, cost-effective technology to produce halogen-free, high-performance flame retarded polyolefins. NMP3-CT2005-516998_ Partner

4.- RECFINMIX: Primary recycling of polyolefin-mixed films for high-added value applications within the blow-moulding industry COOP-CT2006-032766_ **Coordinator**

VII FRAMEWORK PROGRAMME

1.- SORBENT: Soil remediation technique for in situ cleaning of soils contaminated with heavy hydrocarbons mixtures. SME-2008-232533_ Partner

2.- NANOPOLYTOX: Toxicological impact of nanomaterials derived from processing, weathering and recycling of polymer nanocomposites used in various industrial applications. NMP-ENV-2009-247899_ Partner

3.- ADVANCE-FSP: Large scale production of tailored nano-oxides by advanced high-output, high versality flame spray pyrolysis" NMP3-SL-2009-228885_ **Coordinator.**

4.- MANANO: Manufacturing and applications of nanostructured materials. PEOPLE-2010-264710_ Partner.

5.- BioSURFEST: Development of novel environmentally added-value surfactants and esters by biotechnological processes from fats and oils waste streams. SME-2011-286834_ Partner.

6.- NEXTGENCAT: Development of NEXT GENeration cost efficient automotive CATalysts. SMP3-SL-2011-280890_ Partner.

7.- ArtipHyction: Fully artificial photo-electrochemical device for low temperature hydrogen production. FCH-JU-2011-303435_ Partner.

8.- ECONANOSORB: Ecological application of nanosorbents on the base of natural and synthetic ionites and carbons. PIRSES-GA-2011-295260_ **Coordinator.**

9.- STABLE: STable high-capacity lithium-Air Batteries with Long cycle life for Electric cars. FP7-2012-GC-MATERIALS-314508_ Partner.

10.- RECYVAL-NANO: Development of recovery processes for recycling of valuable components from FPDs (In, Y, Nd) for the production of high added value NPs. NMP2-SE-2012-310312_ **Coordinator**

11.- NATURAL: Standardised metrology of Nano-sTrUctuRed CoAtings with Low surface energy. NMP4-SE-2013-310397_ Partner

12.- WELDAPRIME: Self-repairable Zinc-free Weldable Anti-corrosion Primer for the Steel protection. FP7-SME-AG-2013-605371_ Partner

13.- SORBENT-DEMO: Demonstration of soil remediation technique for in situ cleaning of soils contaminated with heavy hydrocarbon mixtures. FP7-SME-CP-605607_ Partner

14.- HIPOCRATES: Self-healing polymers for concepts on self-repaired aeronautical composites. FP7-AAT-2013-RTD-1-605412_ Partner

15.- WOODFLARETCOAT: Flame-retardant coatings based on nano-magnesium hydroxide, huntite and hydromagnesite for wood applications. FP7-SME-AG-2012-315425_ **Coordinator**

HORIZON 2020

1.- INFINITY: Indium-free transparent conducting oxides for glass and plastic substrates. H2020-SC5-2014-641927 _ Partner

2.- PARTIAL-PGMs: Development of novel, high Performance hybrid TWV/GPF Automotive afteR treatment systems by raTIonAl design: substitution of PGMs and Rare earth materials. H2020-NMP-2015-686086 _ Partner

3.- INNOVIP: Innovative multi-functional Vacuum-Insulation-Panels (VIPs) for use in the building sector. H2020-EEB-2016- 723441 _ Partner

4.- AFTERLIFE: Advanced Filtration TEchnologies for the Recovery and Later conversIon of relevant Fractions from wastewater. H2020-BBi-JTI-2016-745737 _ Partner

5.- MARKETPLACE: Materials Modelling Marketplace for Increased Industrial Innovation. H2020-NMBP-2017-760173 _ Partner

6.- SUPER-PV: CoSt redUction and enhanced PERformance of PV systems. H2020-LCE-10-2017-792245 _ Partner

7.- ZEOCAT-3D: Development of a bifunctional hierarchically structured zeolite based nano-catalyst using 3D-technology for direct conversion of methane into aromatic hydrocarbons via methane dehydroaromatization. H2020-NMBP-24-2018-814548 _ Partner

8.- ION4RAW: Ionometallurgy of primary sources for an enhanced raw materials recovery. H2020-SC5-2018-2-815748_ Partner

9.- NANOSTACKS: Nanostack printing for materials research. H2020-EIC-FETPROACT-2019-951949_ Partner

10.- WASTE2FRESH: Smart innovative system for recycling wastewater and creating closed loops in textile manufacturing industrial processes" H2020-SPIRE-2020-958491_ Partner

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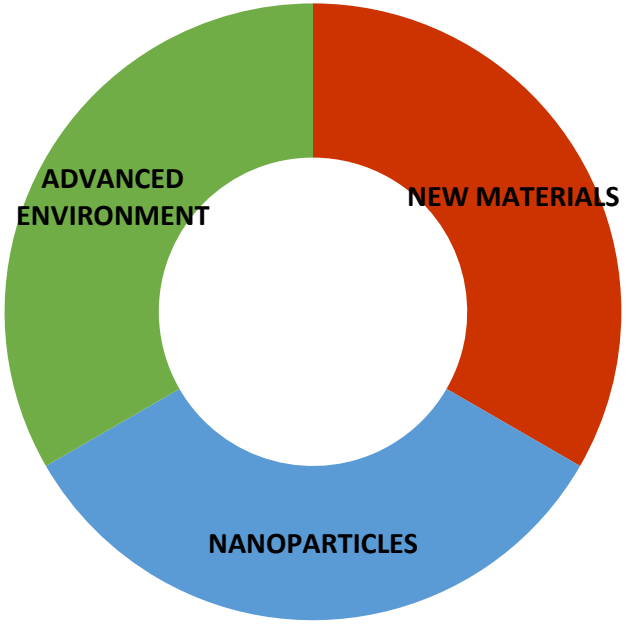
LUREDERRA RTD AREAS

- Wastewater Treatment
- Revalorisation of organic wastes
- Metal decontamination and metal recycling from wastes
- Nanoparticles applied to environment
- Absorbents for removal and recovery pollutants



- Advanced materials development (functionalised)
- Plastic processing technologies.
- Plastics recycling
- Materials for construction with special properties

- Advanced nanoparticle production: simple and complex (mixed, doped, core-shell) nanooxides, phosphates and carbonates.
- Production of customised nanoparticle dispersions in different concentrations with high stability.
- Ready-to-use nanoproducts.
- Specific surface treatments
- Synthesis of specific functional compounds.
- Synthesis and modification of nanoclays.

NANOPARTICLES AND NANOTECHNOLOGY

TAILORED SYNTHESIS OF NANOPARTICLES AND NANODISPERSIONS:

- **Flame Spray Pyrolisis production technology:**
  - Wide range of nanomaterials: single, doped, multi-component
  - Control of particle properties: Small sizes (7-25 nm)
  - Short process chain and automation
  - High thermal stability and purity
  - Scalability up to kilograms/hour

- **Dispersion technology / chemical functionalisation:** (ultrasonic forces, milling deagglomeration techniques)
  - Laboratory scale reactors (1-20 litres)
  - Pilot scale reactors (50-1000 litres)
  - Dispersion lines at lab scale (30L/h) and pilot scale (100L/h)
  - Wet milling lines
- **Thermal treatments**
  - Inert and Reduction ovens: H_2 (0-100%) (up to 2.000 ºC)
  - Continuous thermal oven (up to 1.000 ºC)

FSP Configurations	Advanced nanomaterials
Standard	**Simple and mixed oxides, phosphates HEOs, noble metals**
Ring deposition	**Core-shells**
Double-Nozzle & Sequential deposition	**Well distributed supported materials**
O2 lean/Reductant atmosphere	**Oxygen vacancies in oxides Non-oxides: metals, carbon doping, metal-sulphides and oxynitrides**
Thin-film deposition	**Nanoporous thin films for electrodes**

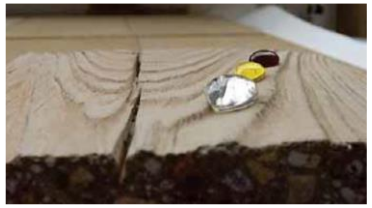
Different FSP configurations enable the tailoring of the materials

NANOPARTICLES AND NANOTECHNOLOGY

NANOSURFACE TREATMENT / NANOENABLE MATERIALS / COATINGS:

Different properties on different substrates (*stone, gypsum, wood, mortar, glass, metal, epoxy, textile, plastics):*

- Hydrophobicity/Oleophobicity
- Anti-stick/Easy-to-clean/Antifouling
- Anticorrosion
- Anti-bacterial/virucide
- Hardness
- Photocatalysis
- Infrared radiation barrier
- Aesthetic effects ….




PILOT APPLICATIONS ON SITE AND FINISHED REAL PRODUCTS

Manual on-site applications

Automated coating line for pipelines

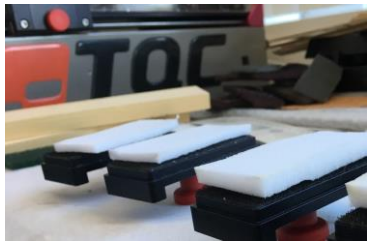
Motoman MH6 Robot

Spray booth and curing oven

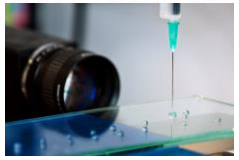
NANOPARTICLES AND NANOTECHNOLOGY

COATINGS CHARACTERISATION

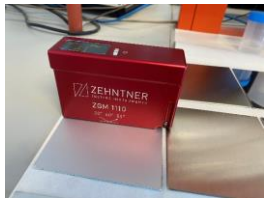
- Contact angle – goniometry ISO 15989:2004
- Cross cut – adherence ISO 2409:2007
- Roughness
- Thickness
- Hardness: Shore C and Pencil test ISO 15184:2012.
- Glossmeter (triple angle 20º, 60º and 85º)
- Transmittance
- Exposure to specific raditation: IR light and solar spectrum.
- Abrasimeter (dry/wet scrub) – durability ISO 11998
- Saline mist chamber
- UV ageing
- Antimicrobial activity (ISO 22196)
- Anticorrosion by LSV and EIS



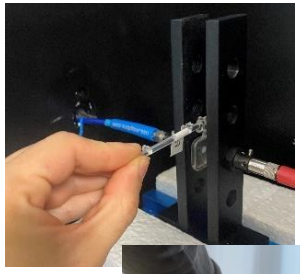
Abrasimeter

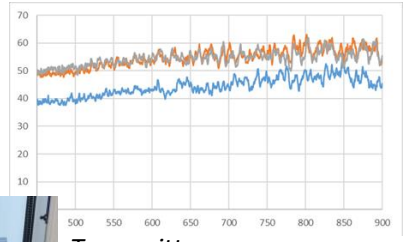


Contact angle



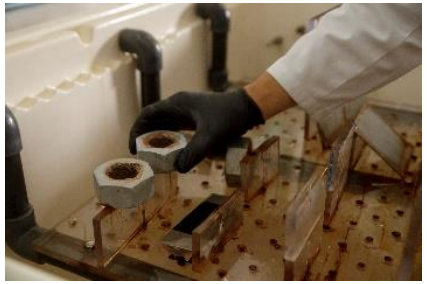
Glossmeter





Transmittance

Potenciostat



Saline mist chamber

UV ageing

Microbiology

ADVANCED ENVIRONMENT

WASTE WATER TREATMENT

- Innovative materials for pollutants removal (hydrocarbons, FOGs, heavy metals, PPCPs) and waste water treatment:
  - Elastomeric material for removal of fats, oils, grease and hydrocarbons in contaminated waters.
  - Novel absorbents and nanoresins for metals removal and organic pollutants.
  - Functionalised clays.
  - Nanoparticles: simple or mixed oxides (FeO, MnO_2, doped TiO_2…) for adsorption or photocatalytic effect.
- Facilities for testing: Modular Waste Water Treatment Plant for physical-chemical treatment of variable polluted waters: coagulation-flocculation module, advanced oxidation process, filtration module and decanter (0,5-2 m^3/h capacity).







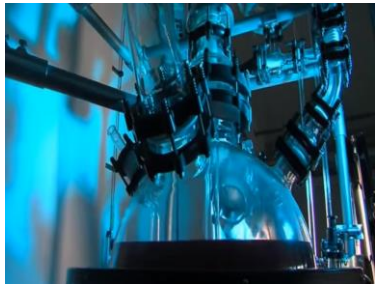

ADVANCED ENVIRONMENT

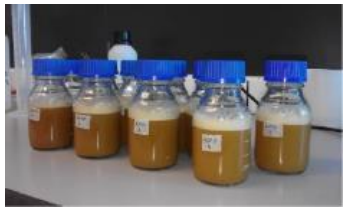
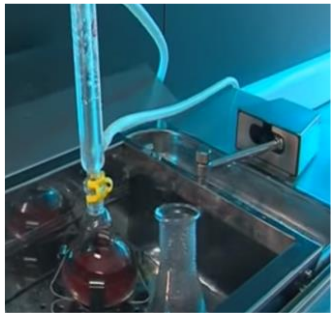
RECYCLING AND WASTES VALORIZATION:

- Materials and metal recycling from WEEEs: Leaching, solvent extraction and precipitation technologies for recovery of precious metals, rare earths and Critical Raw Materials.

- Extraction of added value chemicals from agro industrial-wastes: mild processing techniques of milling, extraction, concentration and purification of bioactive compounds.



NEW MATERIALS

PLASTICS PROCESSING AND FUNCTIONALISATION:

- Additivation of plastics and paints, functionalisation and modification of nanocharges (nanoclays and nanoparticles)
- Plastics processing capabilities
  - Rollers, hot and cold plates press
  - Single and double screw extrusion (20 kg/h)
  - Injection and moulding (60 Tn)
  - Blown extrusion

PLASTICS RECYCLING:

- Recycling solutions for end-of life plastic (single and mixed plastics)
  - Chemical recycling
  - Pilot line for PVB recycling from laminated glass
  - Pilot line for polyolefins separation
  - Pyrolysis equipment and distillation reactor for plastic pyrolysis and fraction separation

LUREDERRA CAPABILITIES IN CLUSTER 4th

- Critical Raw Materials extraction and recovery
- Innovative Advanced Materials development and processing
- SSbD alternatives to PFAS
- Synergy with IA for the materials synthesis
- LCA performing data

CRITICAL RAW MATERIALS

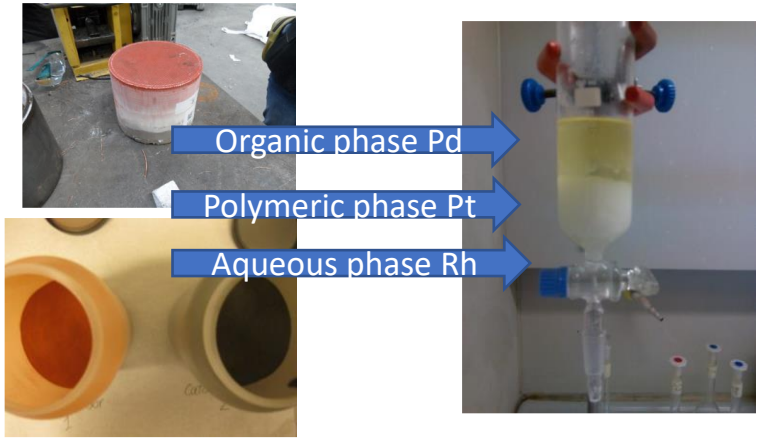
RECYCLING AND RECOVERY OF RAW MATERIALS FROM END-OF-LIFE PRODUCTS AND SECONDARY SOURCES:

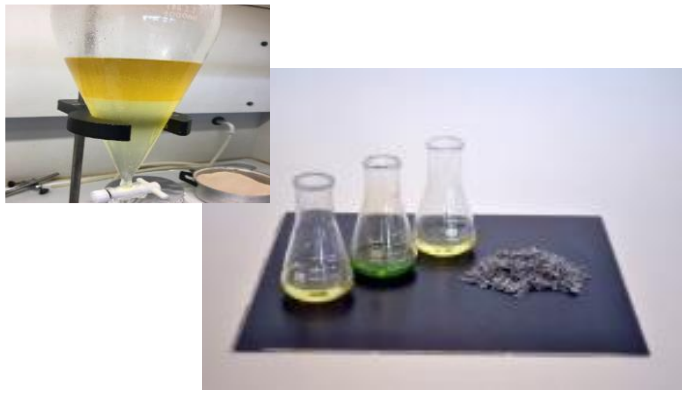
- ***Physical and mechanical sorting of complex streams:*** Pilot equipment for optimizing mechanical pretreatment of complex fraction including separation technologies using density differences, size reduction and sieving and magnetic separation.





- ***Leaching, solvent extraction and precipitation technologies for metals recovery:*** Expertise in extraction of critical raw materials from PCBs, catalyst, FPDs and secondary sources of mining activities etc. Pilot reactors.






INDUSTRY-2025-01-MATERIALS-61: Technologies for critical raw materials and strategic raw materials from End-of-Life products

RECYCLING AND RECOVERY OF RAW MATERIALS:

Lurederra works on the recycling and recovery of precious metals from **Printed Circuit Boards, batteries, Automobile Residues,** among other **scrap and WEEEs.**

Different elements such as **Rare Earths** and **Critical Raw Materials,** even other **precious metals** can be recovered from these wastes and other end of life products.

Lurederra has developed **pilot equipment for** selective recovery of targeted elements. The **pilot plant** is composed of **three reactors of 1.000 litres capacity** including the steps of **leaching-precipitation and solvent extraction,** with different recuperation rates depending on the composition of the wastes and the targeted element to be recovered.

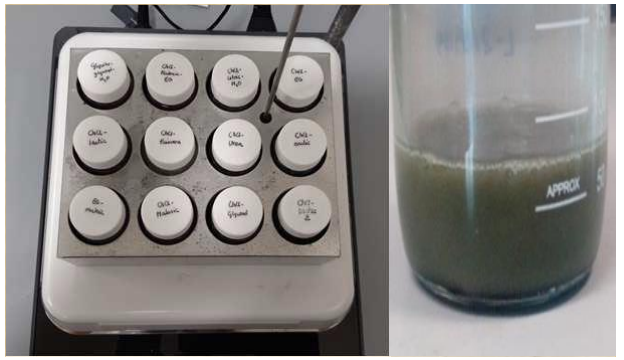
Mixtures of DES for different targeted elements:
Ag, Au, Co, Cu Fe, Pb, Zn
Choline Chloride/Lactic Acid (1:2) *OR*
Choline Chloride/Etilenglicol (1:2)

Waste treated	CRM recovered	PROCESSES
Catalysts	Pd, Pt, Rh	Acid leaching/Selective Extraction
Printed Circuit Boards (PCBs)	Cu, Sn	Acid leaching
WEEEs conectors	Au	Acid leaching
FPDs (Flat Pannel Display)	Indium, Yttrium	Acid leaching/Selective Extraction/Precipitation
PVs (photovoltaics)	Ag	DES
PCBs	Ag	DES

INDUSTRY-2025-01-MATERIALS-62: Strategic Partnerships for Raw Materials: Innovative Approaches for sustainable production of Critical Raw Materials

EXTRACTION OF RAW MATERIALS FROM SECONDARY SOURCES OF MINING INDUSTRY:

Lurederra also works on the tailored recovery of metals present in small fractions in mining extracts.



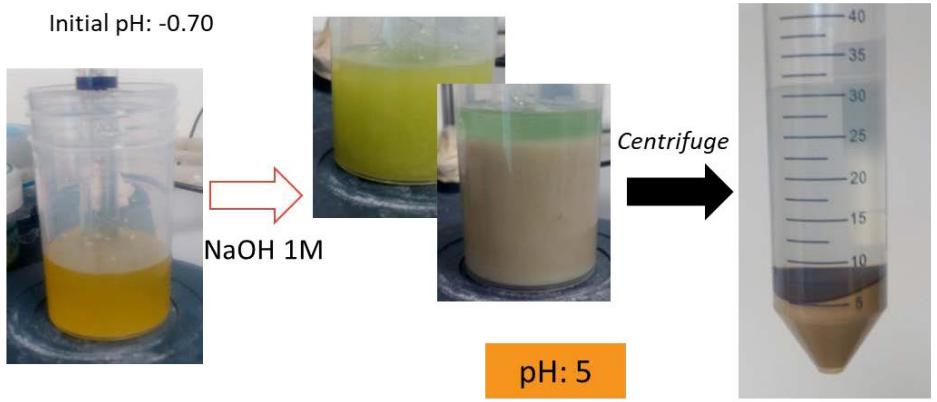
Applying environmentally friendly techniques such as **DES based leaching** the centre is able to extract several different scarce metals from heterogenous mining subproducts. The differential knowledge of the centre resides in the **electrochemical and or chemical post-treatment** of those leachates for the individual recovery of the **CRM** and **Rare Earth Elements**.

Lurederra also increases the circularity of the extraction processes giving a second life for the solid residues yielding environmentally friendly concrete formulations.

DES solvents' compositions can be adjusted to increase their **affinity towards single specific elements.** This is of great interest in terms of extracting metals from heterogeneous sources.

ION4RAW

CE-SC5-06-2018: H2020 ION4RAW project partner covering the recovery of metals from leachates and solid fractions.



INDUSTRY-2025-01-MATERIALS-63: Innovative solutions for the sustainable production for semiconductor raw materials

MINING SUBPRODUCTS FOR THE PRODUCTION OF SEMIICONDUCTORS

- Recovery of gallium from bauxite extraction mines subproducts. (Riotinto (Huelva))
- Extraction of germanium from zinc ore exploiting mines (Riotinto (Huelva))
- Extraction of germanium from coal ore exploitation (Palencia)

RECOVERY OF SEMICONDUCTORS FROM PV PANELS

- Recovery of silicon from crystalline silicon panels.
- Recovery of indium and gallium from CIGS typology of panels.
- Recovery of indium from perovskite type panels

VALUE CHAIN COMPLETION

- Nanoparticles and semiconductor ink manufacture.
- Use of inks in LIFT technology for sensor and circuit development

Waste treated	CRM recovered	PROCESSES
FPDs (Flat Pannel Display)	Indium	Acid leaching/Selective Extraction/Precipitation

LUREDERRA EXPERTISE IN FUNCTIONAL COATINGS

Design, synthesis and production of ad-hoc functional coatings addressing SSbD criteria. Examples of successful coating solutions developed by the centre include ***anticorrosion, antifouling, antimicrobial, environmental exposure protection, easy to clean – FOOD contact surfaces****, etc.*

EFFICIENCY OF ANTICORROSION SOLUTION IN REAL FASTENING ELEMENTS for OFFSHORE WIND energy

Uncoated bolt

Uncoated bolt corroded after 24 hours in saline mist chamber

Coated bolt after **> 4200 hours** in saline mist chamber (No corrosion damage)

Coated bolt (before saline mist chamber)

The anticorrosion system developed has been tested based on specific conditions from **ISO 12944-9** (*Protective paint systems and laboratory performance test methods for offshore and marine related structures*)

Easy and direct application of the coating by spray gun

ANTIFOULING SOLUTIONS SUCCESSFULLY TESTED IN REAL EXPOSURE IMMERSED IN THE SEA

Nylon coated – non coated

Biocide free solutions

Stainless steel coated – non coated

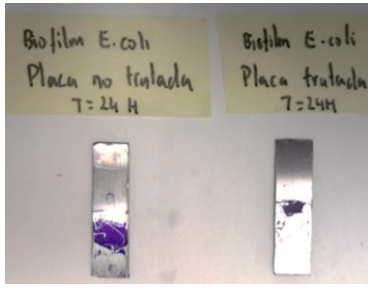
Samples tested in PLOCAN facilities (PLataforma Oceánica de CANarias) according to ASTM 3623 regulation, in conditions of full immersion after 2 months.

LUREDERRA EXPERTISE IN FUNCTIONAL COATINGS

Design, synthesis and production of ad-hoc functional coatings addressing SSbD criteria. Examples of successful coating solutions developed by the centre include ***anticorrosion, antifouling, antimicrobial, cultural heritage protection, easy to clean – FOOD contact surfaces****, etc.*

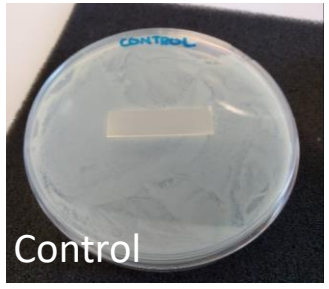
ANTIMICROBIAL & VIRUCIDE EFFECT COATING SOLUTIONS FOR DIFFERENT SUBSTRATES

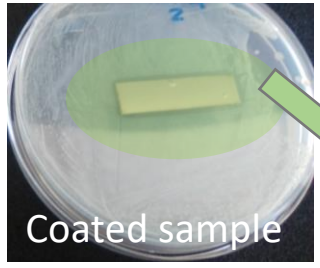
- **Biocide-free** coating show biofilm reduction against Pseudomonas aeruginosa (97,9%) and Staphylococcus aureus (99,5 %).



Biofilm Grown using a Drip Flow Biofilm Reactor with Low Shear and Continuous Flow according to a SOP based on ASTM E-2647.

- **Non- stick and antibacterial** coating show antimicrobial activity against Escherichia coli (99,94%) and Staphylococcus aureus (99,37%). According to the standard operating procedure (SOP) based on ISO 22196.

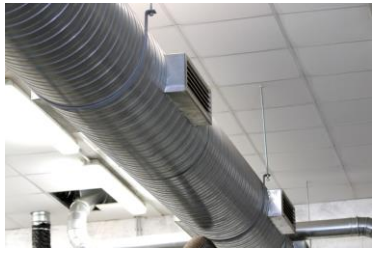




Coated sample shows inhibition halo

- Formulations including active nanoparticles that has been developed for coating **surfaces killing bacteria (ISO 22196:2011) and virus (EN 14476 standard).**

Contact time	Virus reduction
15 min	81,4 %
60 min	99,2 %
24 hours	99,9 %



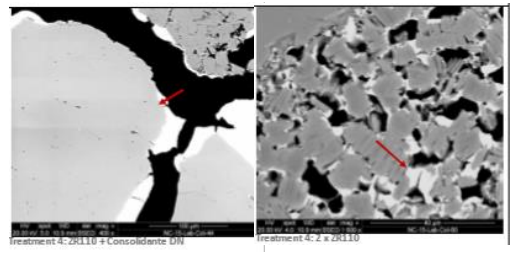
INDUSTRY-2025-01-MATERIALS-42: IAMs for product monitoring, smart maintenance and repair strategies in the construction sector

• Advanced nanomaterials for construction sector

- Expertise in synthesis (bottom up) of **core-shells nanofillers** and **microcapsules**. Inorganic or organic shells can be designed for different purposes including **improved function of the nanofiller, compatibility with the matrix, stability, wettability (hydrophilic/hydrophobic properties), graded reactivity with the matrix, core release control**, etc.
- Applications on self-healing, improving microstructure and mechanical properties of concrete, improving curing reactions…
- Nanofillers can be produced also from secondary raw materials by top down methods such as wet milling techniques looking for circularity and reduced costs in construction sector

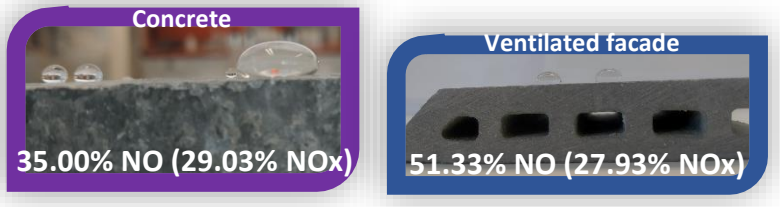
• Advanced consolidation treatments using nanotechnology

- Compatible with different petreous materials
- Good penetration and efficient coupling of nanofillers
- Filling of porous and micro-cracks
- Faster reaction
- Exceptional adhesion
- Low contraction
- Increasing elastic properties (Young modulus)

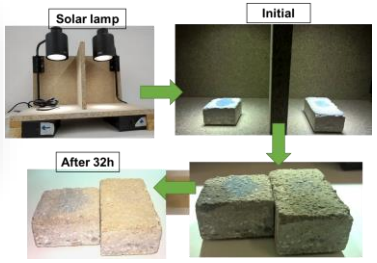


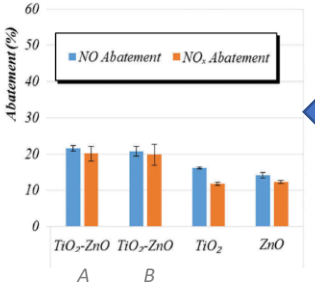
• Expertise in advanced self-cleaning coatings

Photocatalytic coatings including doped TiO_x based materials for activation under visible light



Photocatalytic effect under solar radiation (Class 3 acording UNE 127197-1) and protection of porous materials versus water.

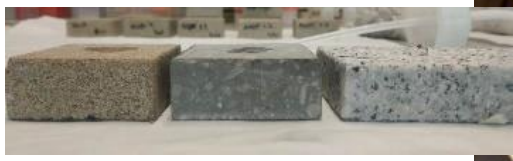




Visible light:
Heterojunctions like TiO2-ZnO increase NOx abatement for indoor applications

INDUSTRY-2025-01-MATERIALS-42: IAMs for product monitoring, smart maintenance and repair strategies in the construction sector

Lurederra centro tecnológico



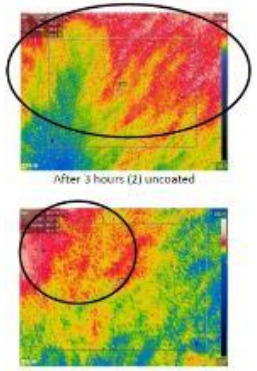
- ***Easy to apply protective treatments for increase durability and reduce maintenance of construction sector*** including water protection (allowing air permeability), antibacterial and fungus protection, UV protection, corrosion protection, vandalism protection, etc.

- ***Nano enhanced Phase Change Materials-PCMs.*** Nanoparticles can **improve and tune thermal properties of PCMs**. Lurederra could synthesize a wide variety of metallic nano-oxides such as SiO2, TiO2, Al2O3 or CuO, as few examples for additives for PCMs. We can work also with other carbon based or metallic enhancers at **pilot scale using our dispersions lines. Core-shell and microcapsules can be also produced in order to improve thermal conductivity and provide protection to the PCM**.

- ***Materials for construction with special properties:*** Coating mortars with microencapsulated PCMs as thermoregulator materials in building envelopes.

- ***Enhancing durability of reinforced concrete:*** Steel rebars with corrosion protective coatings

- ***Advanced materials and coatings for energy efficiency :***
  - <u>Passive radiative sky cooling:</u> High solar reflectance and high emissivity of heat through the atmospheric transparency window at 8–13 µm.
  - <u>Infrared reflective coatings</u>: Indium free TCOs (AZO, ZnSiO, etc.) or metal oxides
  - <u>Insulating materials:</u> Based on hollow silica nanoparticles



INDUSTRY-2025-03-MATERIALS-46: IAMs for photonics, enabling low-power and ultra-broadband performance for telecommunication (RIA)
INDUSTRY-2025-03-MATERIALS-47: IAMs for conformable, flexible or stretchable electronics (RIA)

ELECTRONICS: *Inks, optical coatings and semiconductor nanomaterials for electronics*

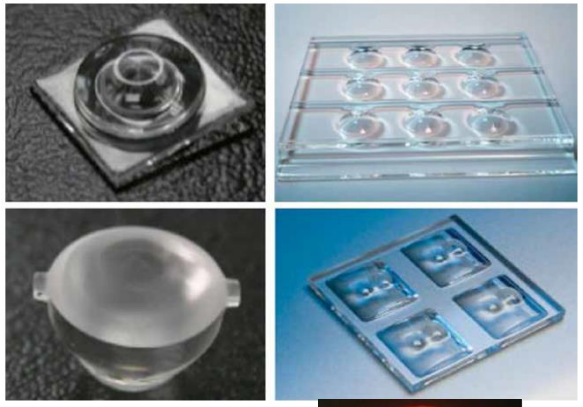
- **Indium-free inks for transparent conductive thin coatings:** Applications in electronic devices including flat panel displays, photovoltaics cells, smart windows, LEDs, etc. Synthesis of TCOs including indium-free compositions such as AZO, Zn-Silica, etc.

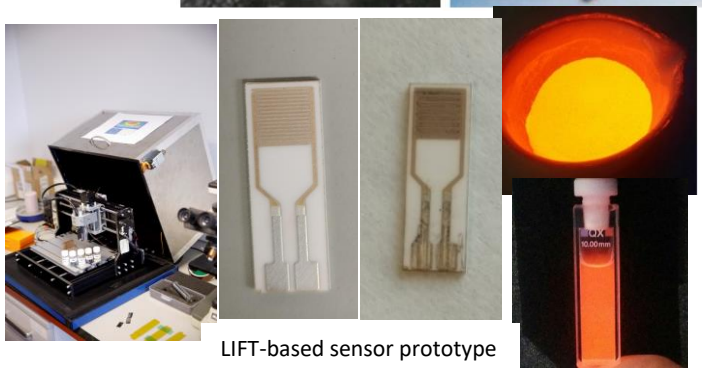
- **Metal based conductive inks:** Core-shell NPs (SiO_2@M) with a thin conductive-shell for decrease use of expensive materials.

- **Thin film coatings for electronic devices:** Optical coatings able to interact with different wavelength including active nanoparticles for generating textures, patterns, providing dielectric, protective and/or repellent properties applied to transparent glass or flexible substrates. The coatings are easy to apply suitable for roll-to-roll manufacturing processes and large-area electronic devices.

- **Optoelectronics:** Luminescent nanoparticles based on rare-earth doped oxides to be applied on LEDs, optical detectors, lasers or other electronic equipment, thin nano treatment with no interference.

- **Laser Induced Forward Transport (LIFT):** 3D Nanosized deposition of sensing and/or conducting materials for the development of sensors and miniaturized circuits, with possibility of stacking different materials for nanosized devices.





LIFT-based sensor prototype

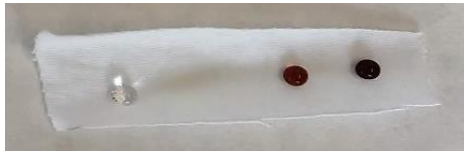
INDUSTRY-2025-01-MATERIALS-51: Development of safe and sustainable by design alternatives to PFAS

Lurederra centro tecnológico

PFAS free COATINGS

- **DWOR** Durable Water and Oil Repelence in **TEXTILES**

Hydrophobicity $Cobb_{60} > 90\%$



- **PFAS FREE** for **PAPER**

$Cobb_{60} > 90\%$ and KIT 4-6

- **PFAS FREE** water repellent for **GLASS**

Biobased coatings

Biobased alternatives as components of coatings (additives, matrix/binder)

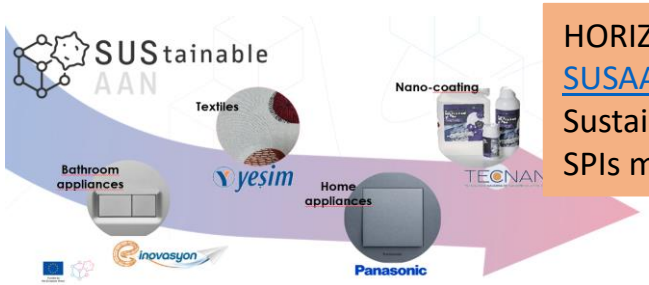
Different lignin fractions (nano, micro, ultra) antimicrobial effect
Nanocellulose as support
Quitosane, EOs and other extracts for AM effect

Bio-Based surfactants to substitute PFAS based ones

BIOECONOMY: Biosurfactants and bioplasticisers from biowastes

Sophorolipids and Ramnolipids
Succinic acid and 1,3 propanodiol by fermentation routes.

SSbD coatings



HORIZON-CL4-2021-RESILIENCE-01: HE
SUSAAN Coordinator
Sustainable precursors and solvents
SPIs methodology

SUSAAN
SUStainable Antimicrobial and Antiviral Nanocoating

INDUSTRY-2025-01-MATERIALS-52: Accelerate the uptake of life-cycLe assessment (LCA) for Safe and SSbD chemicals and materials and resulting products

INDUSTRY-2025-01-DIGITAL-61: AI foundation models in science

- Lurederra covers the whole value chain of the production of several Surface functionalisation materials and can act as a data feeder for Life Cycle Analysis performance. Lurederra could give data related to the production process of the materials in a product for the further sustainability assessment of surface functionalisation products.

- Lurederra also counts with facilities to perform Flame Spray Pyrolysis at small scale. This infrastructure enables the **fast screening of different compositions**. Also, the different configurations of the FSP permit the synthesis of different types of nanoparticles and structures.

- This knowledge on the production of several types of materials serves for training different models for further predictions.

NanomatIA

NanomatIA (MCIU /AEI /10.13039/501100011033): National level funded Project for the optimization of materials composition through the assistance of AI. Lurederra covers the role of materials synthesis.

FSP Configurations	Advanced nanomaterials
Standard	Simple and mixed oxides, phosphates HEOs, noble metals
Ring deposition	Core-shells
Double-Nozzle & Sequential deposition	Well distributed supported materials
O2 lean/Reductant atmosphere	Oxygen vacancies in oxides Non-oxides: metals, carbon doping, metal-sulphides and oxynitrides
Thin-film deposition	Nanoporous thin films for electrodes

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