

# LUREDERRA TECHNOLOGICAL CENTRE

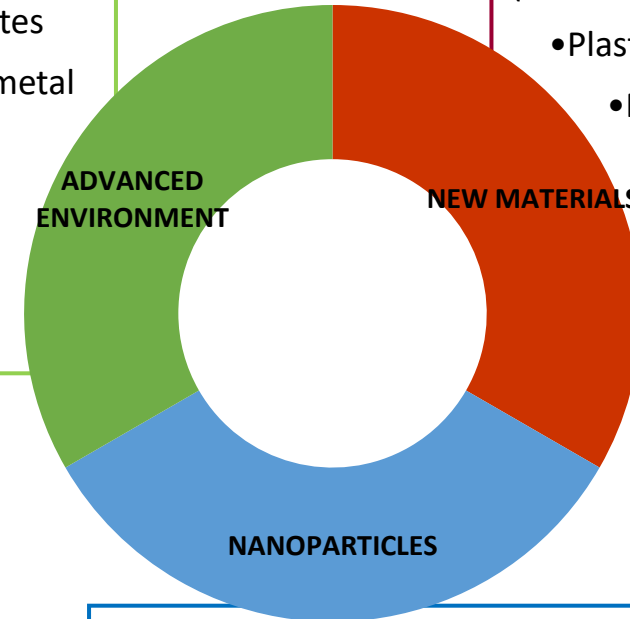


- Wastewater Treatment
- Revalorisation of organic wastes
- Metal decontamination and metal recycling from wastes
- Nanoparticles applied to environment
- Absorbents for removal and recovery pollutants

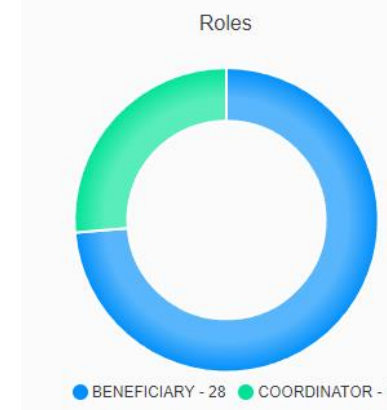
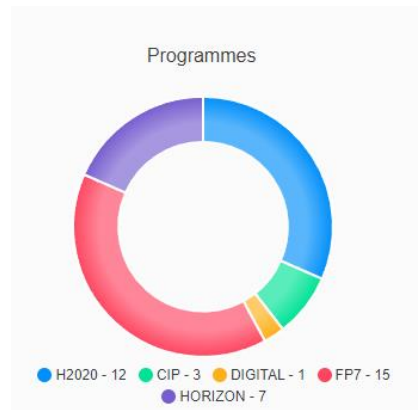
L'Urederra Foundation, **non-profit private entity created in June 1999**, conducts and promotes research and technological development activities in the service of companies and economic operators, including the subsequent implementation of innovations developed in their own production facilities not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

**Industrial vision:** Continuous development of marketable products and technologies quickly transferable and exploitable.

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

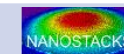


- Advanced nanoparticle production: simple and complex (mixed, doped, core-shell) nanooxides, phosphates and carbonates.
- Production of customised nanoparticle dispersions in different concentrations with high stability.
- Ready-to-use nanoproducts.
- Specific surface treatments
- Synthesis of specific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



## 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 aSessment 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



# NANOPARTICLES AND NANOTECHNOLOGY

## TAILORED SYNTHESIS OF NANOPARTICLES AND NANODISPERSIONS:

### ■ Flame Spray Pyrolysis 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 °C)
- Continuous thermal oven (up to 1.000 °C)

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
O <sub>2</sub> 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

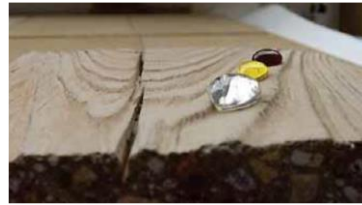


# NANOCOATINGS CAPABILITIES

## 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 ....



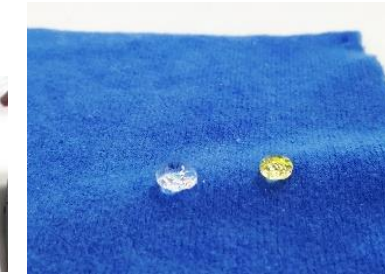
STEP 1:



STEP 2:



STEP 3:



## 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

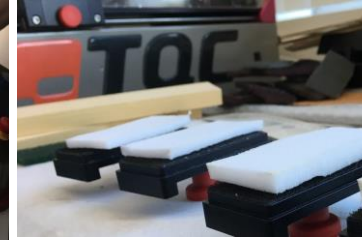




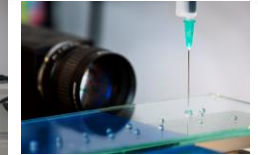
# NANOPARTICLES AND NANOTECHNOLOGY

## COATINGS CHARACTERISATION

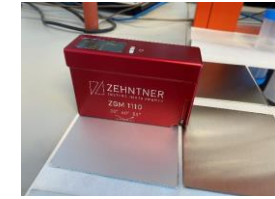
- Contact angle – goniometry ISO 15989:2004
- Cross cut – adherence ISO 2409:2007
- Roughness
- Thickness
- Hardness: Shore C and Pencil test ISO 15184:2012.
- Glossmeter (triple angle 20°, 60° and 85°)
- Transmittance
- Exposure to specific raditation: IR light and solar spectrum.
- Abrasimeter (dry/wet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



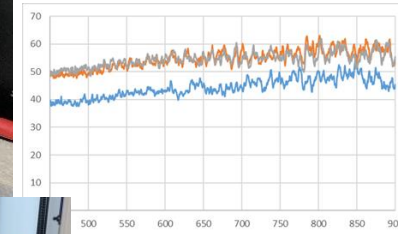
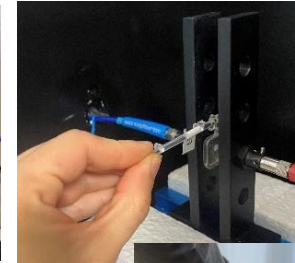
*Abrasimeter*



*Contact angle*



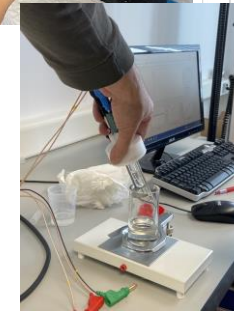
*Glossmeter*



*Transmittance*



*Potenciostat*



*Saline mist chamber*



*UV ageing*



*Microbiology*



# LUREDERRA SUCCESS CASES 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

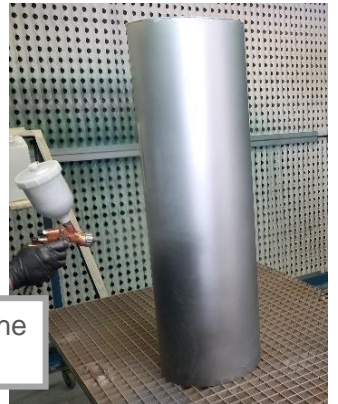
Uncoated bolt corroded after 24 hours in saline mist chamber

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.

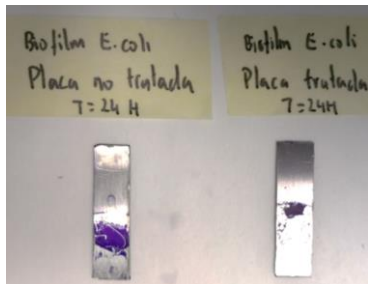


# LUREDERRA SUCCESS CASES IN FUNCTIONAL COATINGS

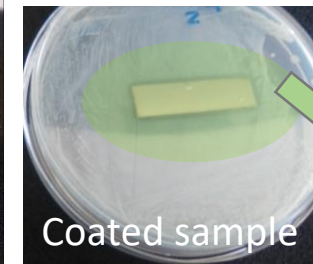
*Design, synthesis and production of ad-hoc functional coatings addressing SSbD criteria. Examples of successful coating solutions developed by the centre include **anticorrosion, antifouling, antimicrobial, cultural heritage protection, easy to clean – FOOD contact surfaces**, etc.*

## ANTIMICROBIAL & VIRUCIDE EFFECT COATING SOLUTIONS FOR DIFFERENT SUBSTRATES

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



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

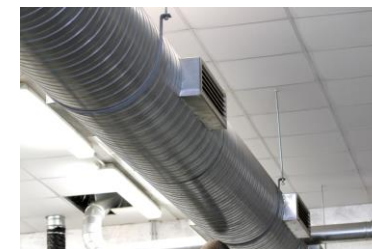


*Coated sample shows inhibition halo*



- 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 %



# LUREDERRA CAPABILITIES IN CLUSTER 4<sup>th</sup>

Lurederra holds great experience in the participation of the projects funded under the destinations in the Cluster 4. With the development of novel nanomaterials with tailored properties and performance, with the extraction of critical raw materials from end-of-life products or principal or secondary mining streams and has developed different alternatives to PFAS in respect to liquid repellence functionalisation in different substrates (glass, textiles).

Has capabilities for the participation in the destinations of:

- **Destination 1 (TWIN-TRANSITION):** Achieving global leadership in climate-neutral, circular and digitised industrial and digital value chains
- **Destination 2 (MATERIALS):** Achieving technological leadership for Europe's open strategic autonomy in raw materials, chemicals and innovative materials

## NEXT STEPS IN CL4:

- Currently Lurederra is leading a proposal for the topic **HORIZON-CL4-INDUSTRY-2025-01-MATERIALS-43**: IAMs for robust, fast curing sealants and coatings for manufacturing and final assembly and is looking for partners to develop a consortium.



4. DIGITAL,  
INDUSTRY & SPACE

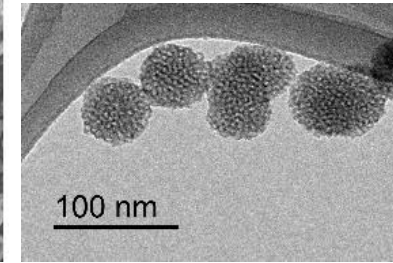
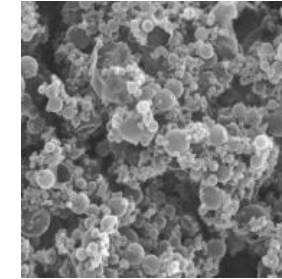


# INDUSTRY-2025-01-MATERIALS-43: IAMs for robust, fast curing sealants and coatings for manufacturing and final assembly

## LUREDERRA CAPABILITIES IN MATERIALS-43

### 1) IAM design, production and modification (functionalization):

- Different IAMs: complex nanoparticles, microcapsules, metal fillers, 2D materials...
- IAM to provide anticorrosion, UV filter, hardness, hydrophobicity, self-healing....
- IAM for photothermal curing, encapsulation of catalysers



### 2) Matrix formulation and design for good substrate adherence

- Selection of additives and matrix for multifunctional performance
- Some examples:

#### MULTIFUNCTIONAL COATINGS

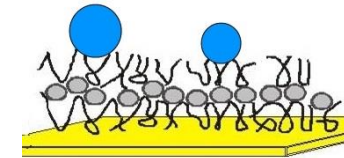
#### UV curing (photoinitiators)

1. Hydrophobic (Contact angle  $>100^\circ$ ), Oleophobic ( $> 60^\circ$ )
2. Easy to clean / Antigraffiti
3. Antimicrobial (Antibacterial test  $R > 2$ )
4. Corrosion resistance
5. Abrasion test cycles  $> 1.250$  (ISO 11998)
6. Adhesion test (lattice cut) (ISO 2409 – GT0)

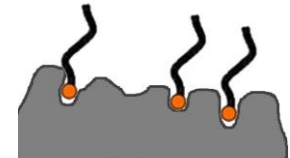


#### Low temperature curing ( $< 100^\circ\text{C}$ )

1. Corrosion resistance
2. Good adhesion to substrate  
ISO2409 - GT0
1. Easy to clean and non-stick
2. Hardness (9H)
3. Abrasion (durability to rubbing)



Non-porous substrates: Metal, polymers...



Porous substrates



### 3) Optimisation of curing and application process, easy to apply

- Versatility of application in large and small areas and complex geometries
- Easy to apply, compatible with automated processing
- Spray booth and robot available for testing



Respects tolerances



# INDUSTRY-2025-01-MATERIALS-43: IAMs for robust, fast curing sealants and coatings for manufacturing and final assembly

## LUREDERRA COORDINATOR LOOKING FOR PARTNERS FOR MATERIALS-43

### Topic Description:

CALL conditions	
Expected EU contribution per project	6 M€
Indicative budget	The total indicative budget for the topic is EUR 30 million <b>(5 projects will be financed)</b>
Type of Action	Innovation Actions (IA)
Technology Readiness Level	To start at TRL 3-4 and achieve TRL 6-7 by the end of the project
Deadlines (Two Stage)	<b>23 September 2025 (First Stage), 14 April 2026 (Second Stage)</b>

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

# INDUSTRY-2025-01-MATERIALS-43: IAMs for robust, fast curing sealants and coatings for manufacturing and final assembly

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## Expected Outcome:

- Support communication of IAMs for industrial leadership.
- Increase performance and durability of components through coatings, surface treatments and/or sealants.
- Reduce maintenance costs and ownership related costs.
- Improve resource efficiency by reducing energy consumption and improving recyclability.
- Proof of concept of the 'safe and sustainable by design' (SSbD) framework.
- Promote industrial uptake of IAMs by enabling scalability.

## Scope:

- **Combined functionalities like:** fast curing, robustness, protection from environmental agents and several other properties: thermal, electric, acoustic, tribological, etc.
- **Target sectors:** electronics; (renewable) energy production and storage; automotive; maritime; aviation and rail infrastructures; construction, including HVAC components (Heating, Ventilation and Air Conditioning);
- **Multidisciplinary research** (two of the following): accelerate performance testing; possible complex areas (small/large) and high ratio geometries; automated application and curing times reduced by 90% at room temperature; synthesis of IAM masterbatch; multi-scale and multi-physics studies for performance assessment.
- **Digital technologies** to support IAMs development. Performance and scalability assessments.
- **Contribute to FAIRification** of the produced data.
- **Explore the transfer of the produced material into other sectors.**
- **Assess safety, sustainability and circularity** of all components during the entire innovation cycle together with recyclability.



# LUREDERRA TECHNOLOGICAL CENTRE

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