AIMEN TECHNOLOGY CENTER

AIMEN Technology Centre

1967 • **AIMEN**, was established with the aim of promoting **R&D** and high-added value **technology services** to the industry.

• **Industry supported, private centre**

2023 • Main technological capabilities in:
  - Smart Manufacturing
  - Materials research
  - Advanced Processes
  - LASER Technologies
  - Environmental Technologies
- Multisectorial Centre
- International activities in 20 countries
- Over 750 active customers
- More than **50 R&D projects per year**
- Headcount: **300** *(50% in R&D&i)*
- **21 M€** average annual income
- Over **50 M€** in assets

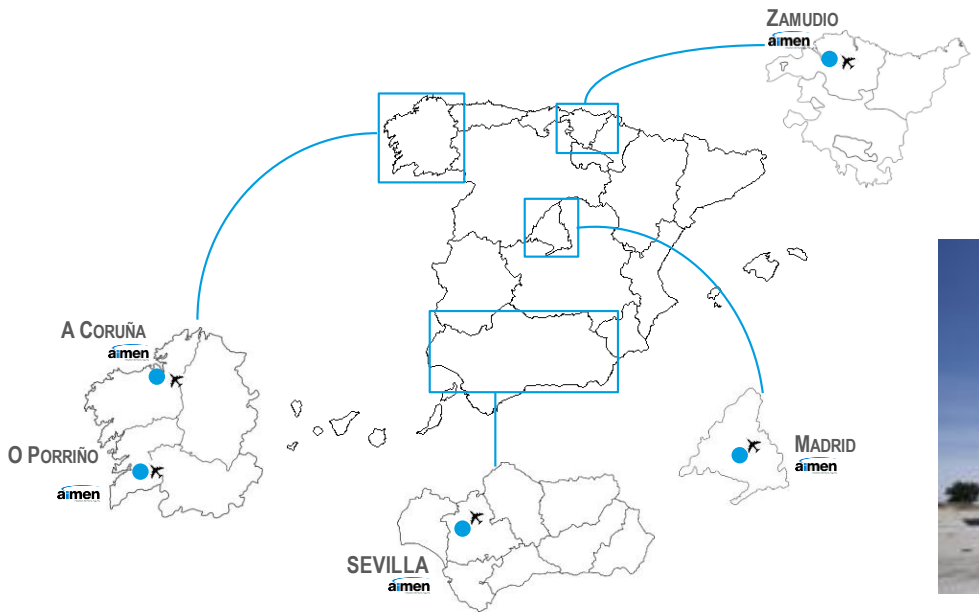
Testing & Analysis

Industrial Services

R&D&I

Headquarters and Laser Processing Centre (O Porriño, Galicia)

Offices in A Coruña, Sevilla, Basque Country and Madrid.

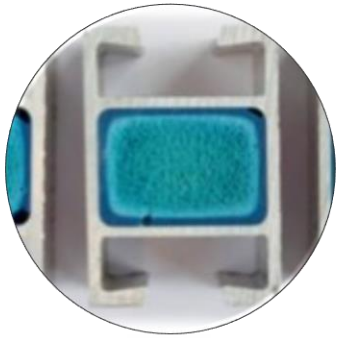


AIMEN Technology Centre

Additive manufacturing

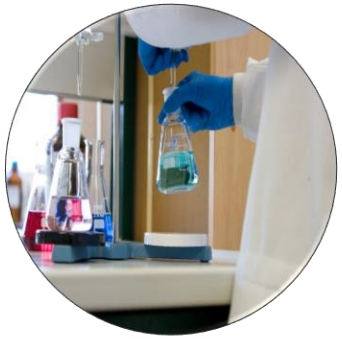
Advanced Composites Processing

Laser based Manufacturing



Advanced Materials

Smart Systems and Smart Manufacturing



Circular Economy & Resource Efficiency

METAL-MECHANICS

AUTOMOTIVE

ICT

AEROSPACE

SHIPBUILDING

ENERGY

BIO-FOOD

TEXTILE

EFFRA
EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION

SPIRE
Sustainable Process Industry through Resource and Energy Efficiency

eu Robotics

Water Europe
Technology & Innovation

WATERBORNE

fotónica21
Plataforma Tecnológica Española de Fotónica

PHOTONICS21

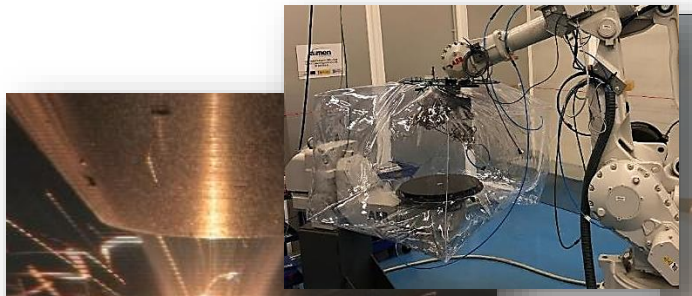
LARGE METAL PARTS AM

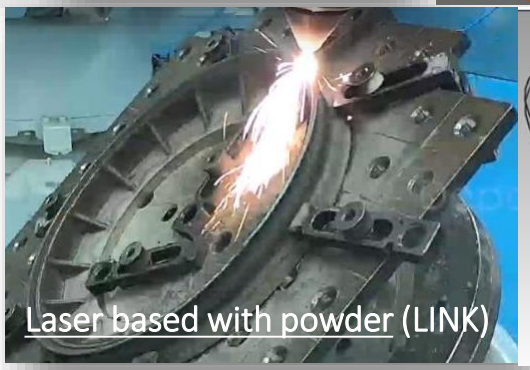
Laser or in combination with other technologies, for direct production of features, parts or products, by means of cladding, wire melting and directed material deposition. Includes material issues, quality (geometrical and functional), equipment (optical heads), programming (3D geometry, reconstruction).

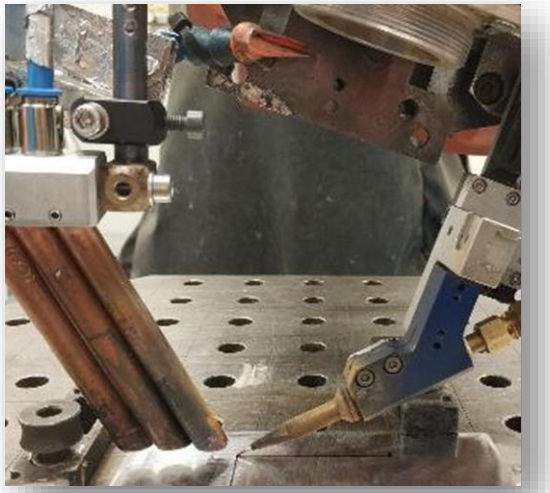
LASER METAL DEPOSITION (LMD): **Powder feedstock** (< 1 kg /h, Surface finishing: 30-200 µm), **Wire feedstock** (0.5 – 2 kg /h, Surface finishing: 30-200 µm). **Materials:** Steel, tool steel and Stainless Steel, Aluminum, Inconel, Bronze and Titanium

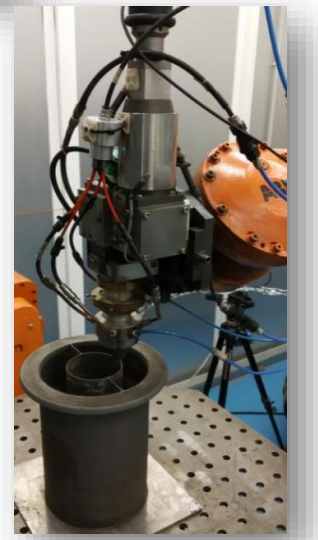
WIRE ARC ADDITIVE MANUFACTURING (WAAM): **1-5 kg/h,** Surface finishing: **200-500 µm,** Limited complexity, Large dimension > 500mm. **Materials**: teel, stainless steel, aluminium, inconel, bronze

integradde · lightme · REMEDI · ADDIFLAP · FORTISSIMO · Cossta · orbital · DIMOFAC







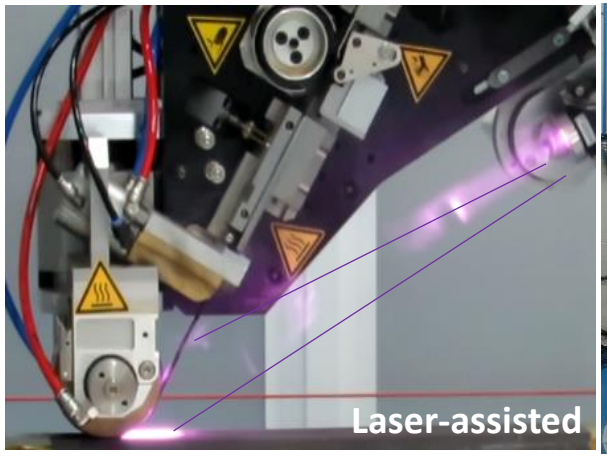


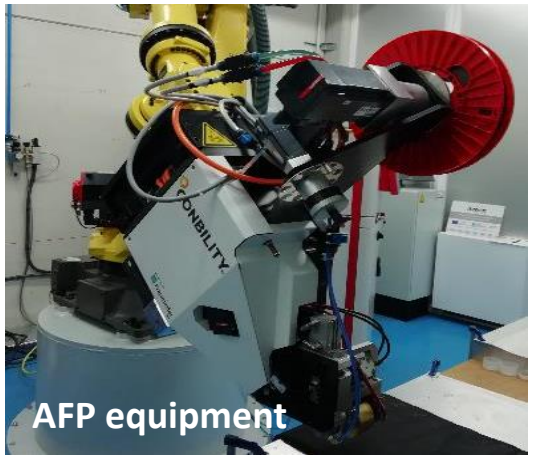
POLYMERS AND COMPOSITES AM

AUTOMATED FIBRE PLACEMENT, AFP

Robotized, 6kw diode laser & IR heating, thermoset, thermoplastic & dry fiber materials
Commercial materials but also on-development materials
Laser control, process monitoring, in-line quality control

CARBO4POWER · COMMUNION · LAY2FORM · LEVIS LIGHT MATERIALS FOR ELECTRIC VEHICLES · ALBATROSS

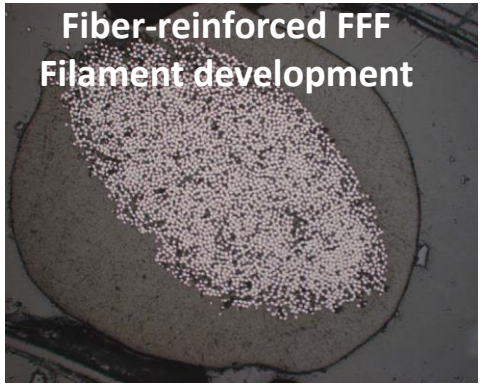

Laser-assisted

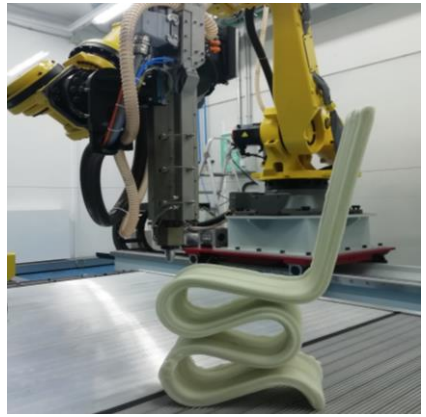

AFP equipment

FUSED FILAMENT FABRICACION, FFF

FFF robotized pilot cell (CCF 3D printing). **7m x 4m**
Desktop printers (up to A2 and 450ºC)
Materials development, Continuous Fiber Filament & Pellets
Laser control, process monitoring, quality control

domminio · RETPAIR Research on thermoplastic repairs · **WELDER** · INEDIT

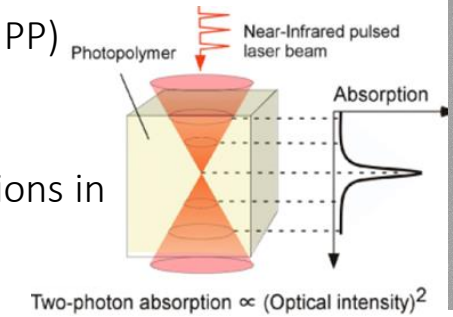

Fiber-reinforced FFF Filament development

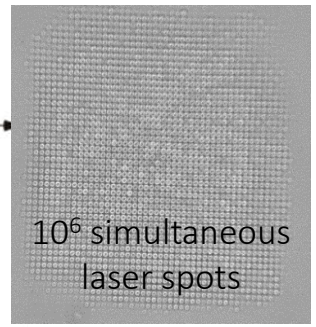


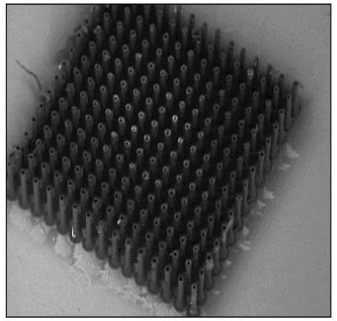
MICRO ADDITIVE OF PHOTOCURABLE RESINS

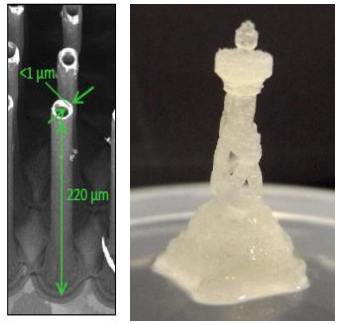
Multiphoton polymerization, beam forming paralellization (MPP)
Laser induced forward transfer (lift)
Large area and high-speed processing
Optostructures at scales 100 nm to 10 microns, with applications in lighting, displays, sensing, etc.

FLOIM · PHENOmenon · BIOMAC




10^6 simultaneous laser spots


3D MICROSTRUCTURES



ADVANCED MANUFACTURING OF COMPOSITES

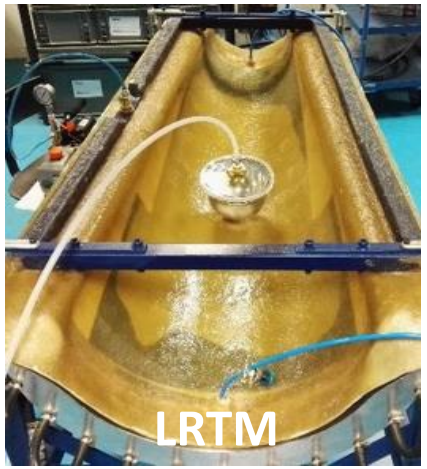
THERMOPLASTIC COMPOSITES: injection and over-molding, 3D press forming (up to 400 ºC, including PEEK, PPS, PEI, etc.).

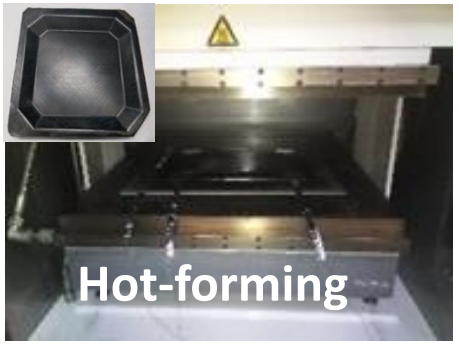
OUT-OF-AUTOCLAVE THERMOSET COMPOSITE PROCESSING: VBI, LRI, LRTM, RTM, filament winding, VBO curing, hot-press curing (prepregs), wet compression.

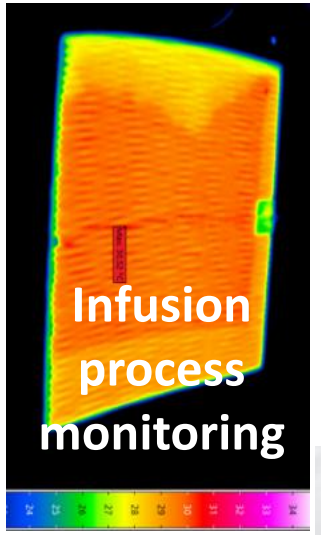
COMPOSITE WELDING: Development of welding heads, continuous welding equipment and thermoplastic welding process optimization (ultrasounds, induction, resistive, laser).

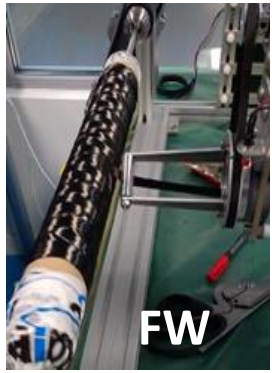
PROCESS MONITORING - resin flow and cure evolution using DC-Dielectric sensors, fiber optics sensors (FOS), Electrochemical-Impedance Spectroscopy and electrical resistance sensors.

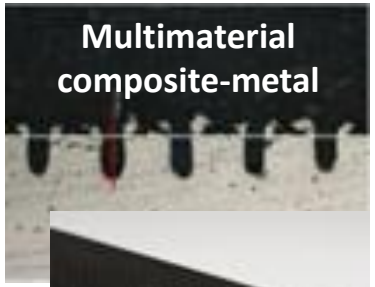
MULTIMATERIAL COMPOSITE-METAL: Metal (Ti, Al, Steel) – thermosetting & thermoplastic polymer/composites manufactured by One-shot Processes and using surface treatments (laser, plasma, abrasive, others) and adhesives.



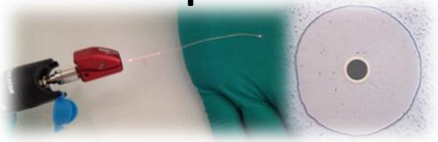








Fiber optic sensors



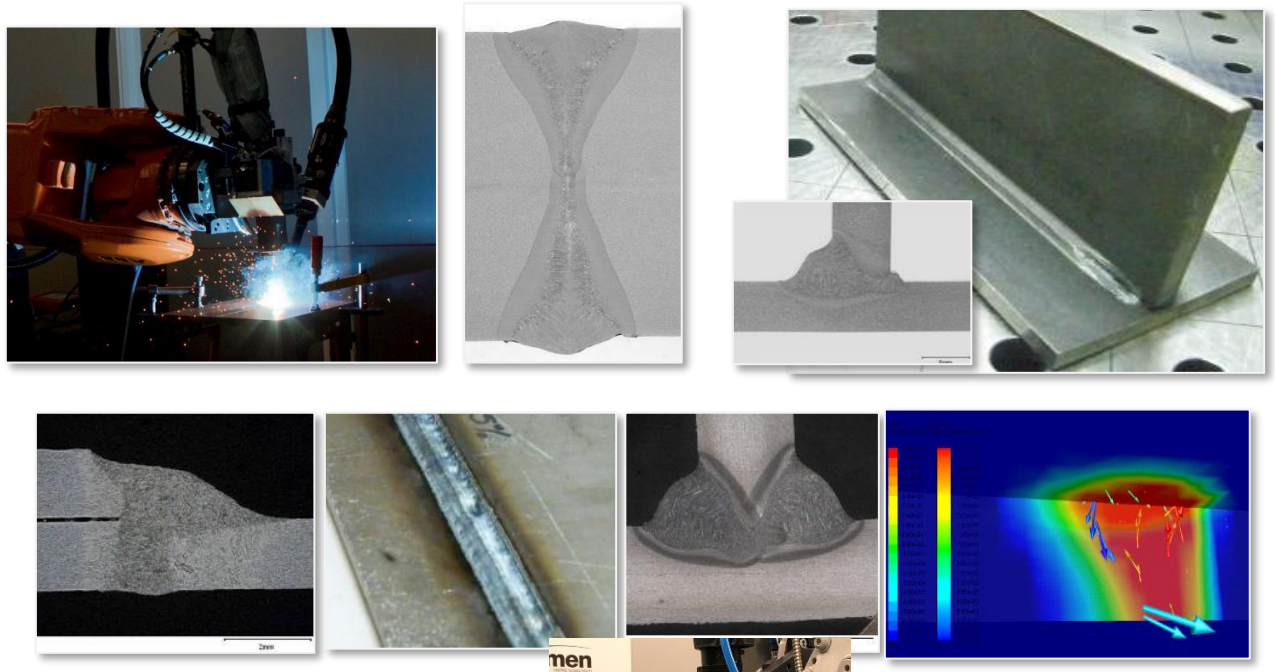
LASER-BASED MANUFACTURING

HIGH POWER PROCESSES AND APPLICATIONS

ADVANCED JOINING TECHNOLOGIES, Laser and hybrid welding processes. Highly reflective alloys: aluminum alloys (series 1XXX, 2XXX, 5XXX, 6XXX, 7XXX), Copper alloys. Improvements on productivity, depth, material range, etc… in laser welding and cutting

SURFACE TECHNOLOGIES, cladding, heat treatment over many different metallic materials.

LASER ASSISTED PROCESSES, cladding, heat treatment over many different metallic materials.

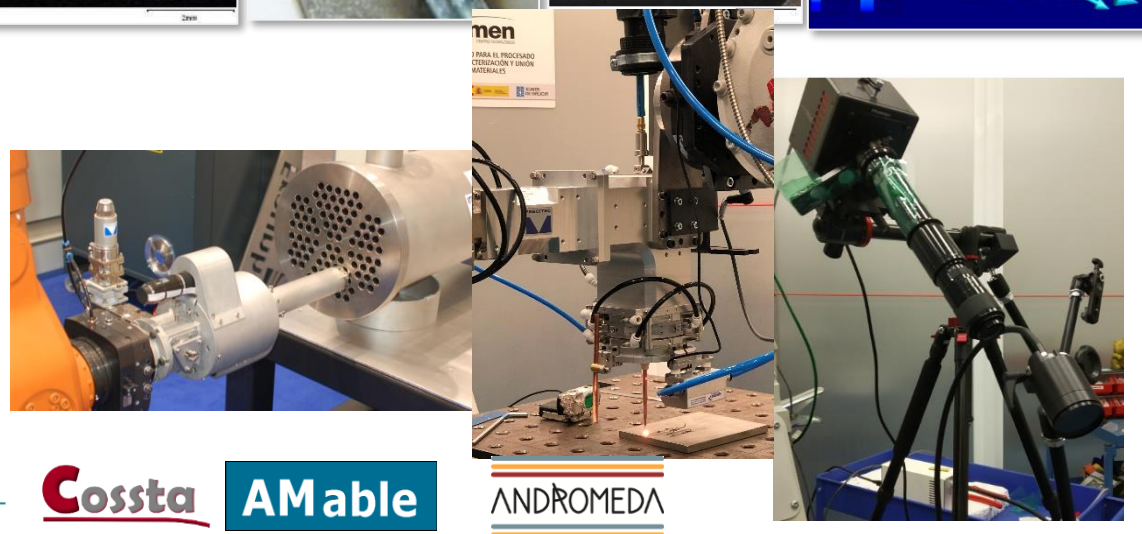


SYSTEM TECHNOLOGY FOR LASER PROCESSING

OPTICAL SYSTEM SOLUTIONS, Optical system solutions for laser material processing (application-tailored and hybridisation

IN-LINE MONITORING SOLUTIONS Optical solutions for process monitoring and inspection of materials processed by laser

DIGITISATION and system integration of laser-based Manufacturing

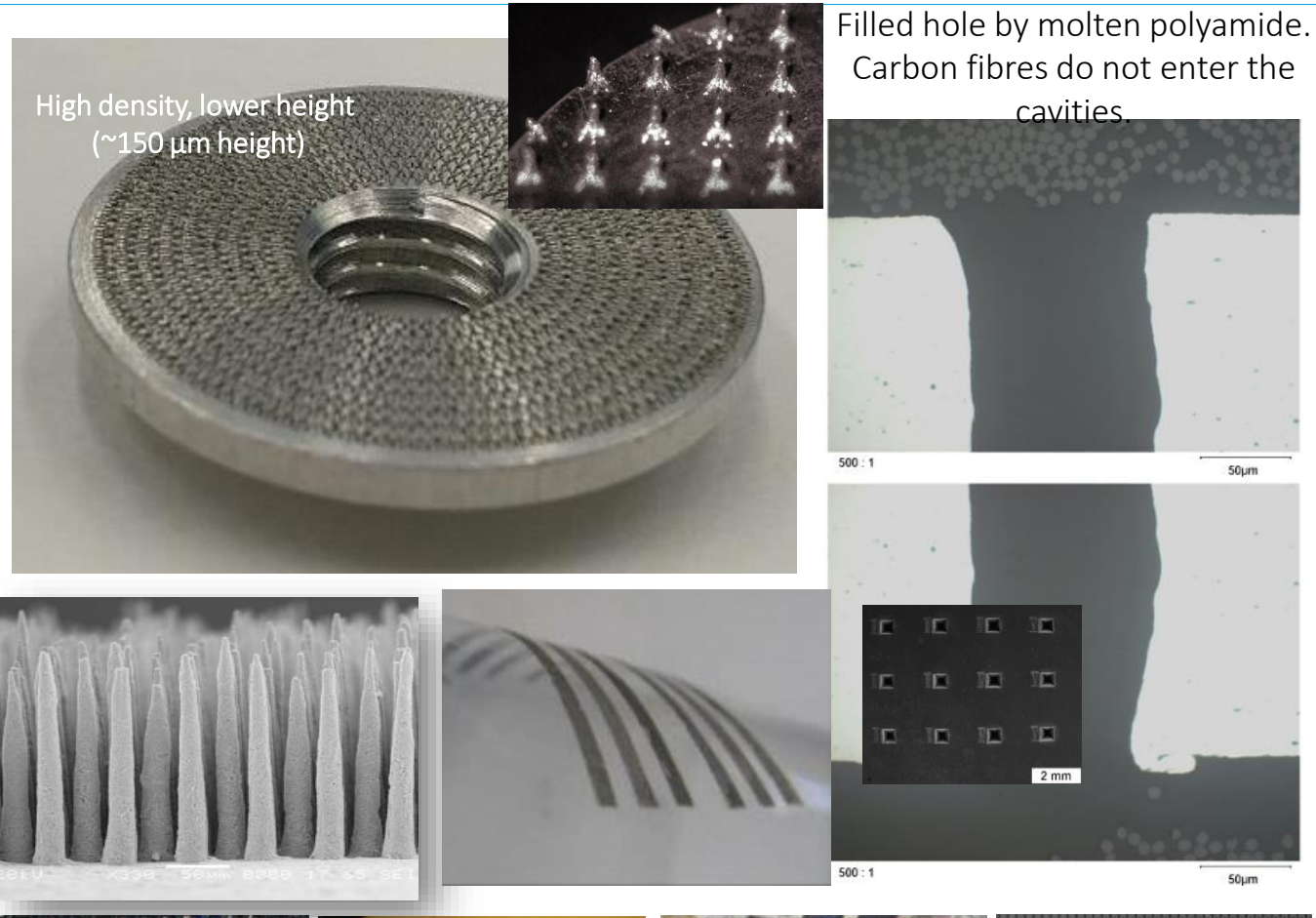


HIGH PRECISION MANUFACTURING

MICROMACHINING, drilling, high precision welding & cutting, surface texturing. Direct laser patterning by melting, ablating or combination of both regimes

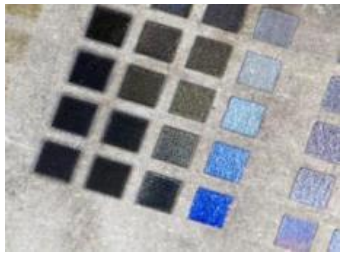
Metals, polymers, textiles, composites, ceramics, polymers, ceramics etc.

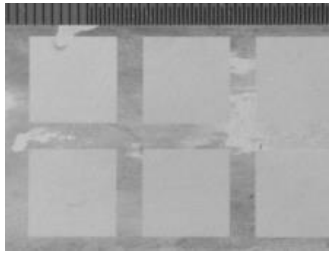
SURFACE MODIFICATION AND FUNCTIONALIZATION, Metallization, enhancement of heat transfer and conductivity, improvement of tribology properties, optical properties, adhesion improvement, wettability control, biocompatible and antibacterial surfaces. Contaminants and demoulding agents removal, Chemical modifications, Tailored roughness. Painting/gluing improvement through superficial laser treatment.




Textile


Composite


Titanium


Magnesium

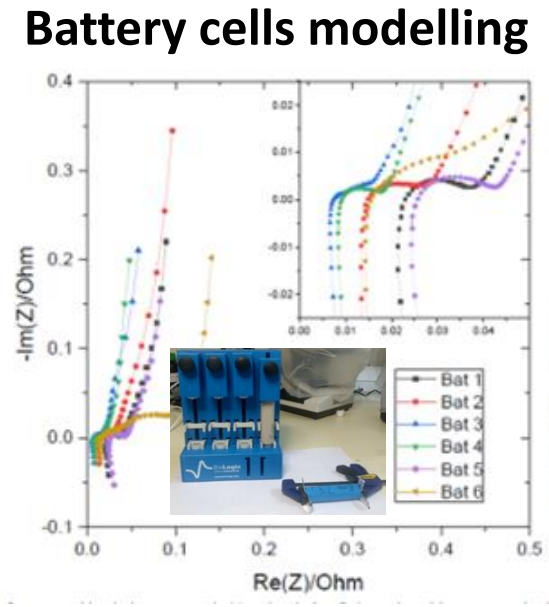
ADVANCED MATERIALS

ELECTRIC ENERGY STORAGE AND GENERATING SYSTEMS: Wet-spun piezoelectric composite fibers, battery performance and lifetime (battery cells modelling based on equivalent electrical circuit -EEC-)

NANO-ADDITIVATION IN POLYMERS, FOAMS AND COMPOSITES: melt-mixing and extrusion process for manufacturing of multifunctionality and self-sensing materials.

CORROSION MONITORING: electrochemical techniques and embedded fiber optic sensors applied in energy systems.

GEOPOLYMER CONCRETE, FOAMS AND COMPOSITES: development of eco-materials based on waste/recycled sources to produce new multifunctional cements/concrete, etc.

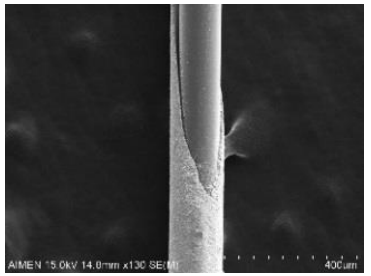


SMART SYSTEMS AND SMART MANUFACTURING

PHOTONICS SENSING:

Fiber Optics Sensors: specific sensor development, integration in smart materials and structures, harsh environment monitoring systems .

Optical sensors: biosensors for water quality, VIS/NIR/SWIR spectroscopy sensors for inspection.

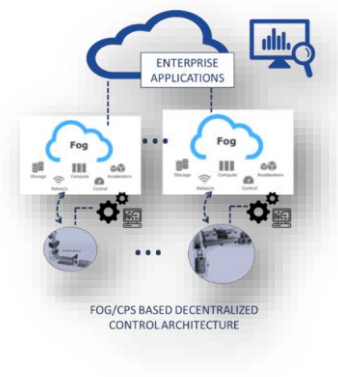


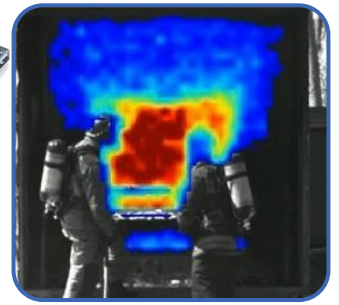
COMPUTER VISION AND SIGNAL PROCESSING:

Embedded vision systems processing (FPGA/ARM/GPU) and Edge Computing systems (NVIDIA Jetson Nano, NVIDIA XAVIER, Google Coral).

Distributed sensor networks for decentralized monitoring (Edge/Fog/Cloud).

Energy harvesting for IoT applications.





COLLABORATIVE ROBOTICS:

Multi-layer control systems, visual servoing and dynamic task execution.

Assistance to operators in shared work spaces.

Multi-level perception systems.

SMART SYSTEMS AND SMART MANUFACTURING

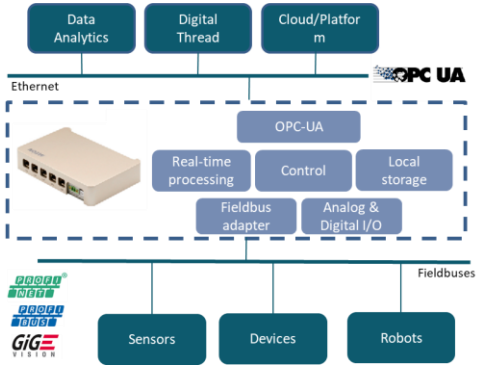
AUTONOMOUS SYSTEMS & FACTORY AUTOMATION:

Automation for adaptative and flexible manufacturing. Reconfigurability.

Common interoperable hardware and interoperability for data sharing.

End-to-end solutions for horizontal and vertical industrial integration.

integradde PeneloPe DIMOFAC trineflex



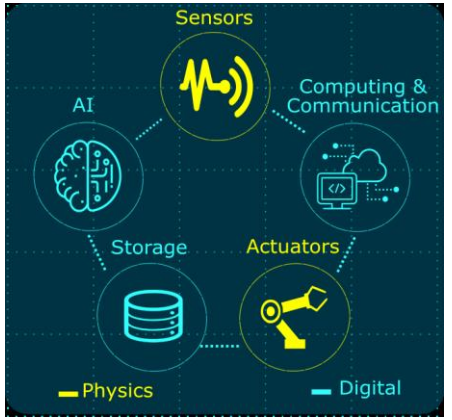
DATA ANALYTICS & ARTIFICIAL INTELLIGENCE:

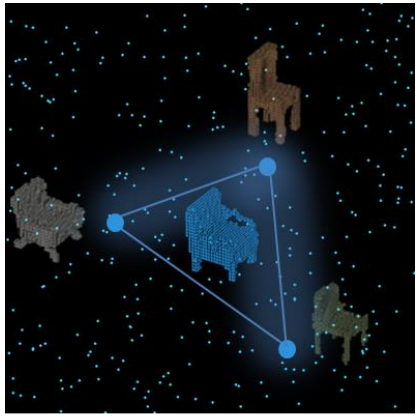
Cognitive systems for manufacturing: Multi-agent systems, Decision Support systems, self-adaptation and reconfigurability of manufacturing processes.

Predictive maintenance and pattern recognition.

Generative design for materials and products.

MAS4AI ACHIEF s-X-AIPI CIRCULAR TWAIN





CIRCULAR ECONOMY AND RESOURCE EFFICIENCY

NATURE BASED SOLUTIONS:

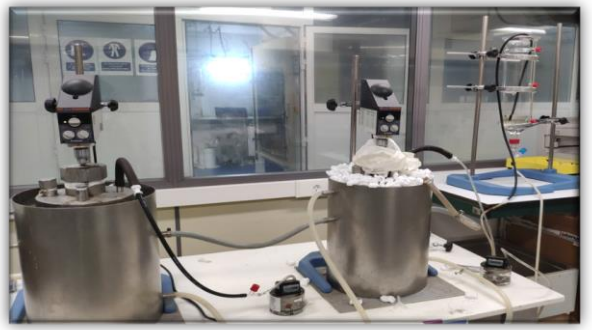
Treatment/reuse/storage of rainwater and wastewater in urban areas. Resource recovery from agro-industrial wastewater. Sewage sludge stabilisation for fertiliser production.

Solutions for climate change adaptation (floods, drought, heat wave, etc.) and mitigation (CO_2 storage).

WASTE VALORISATION:

Volatile fatty acids and biogas production from organic waste. Biogas upgrading through biological and adsorption processes. Biomethane production from CO_2 and H_2 (Chemautotrophic method).

Funcionalised adsorbents production from inorganic waste for pollutant removal or critical raw material recovery.

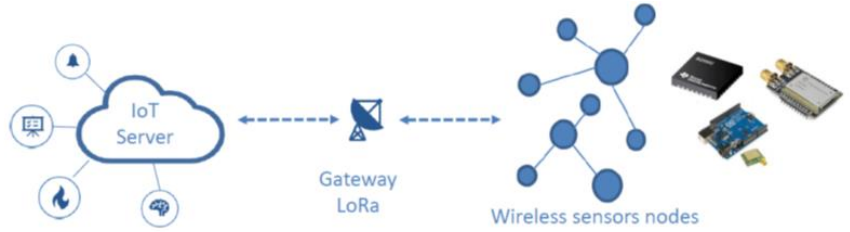


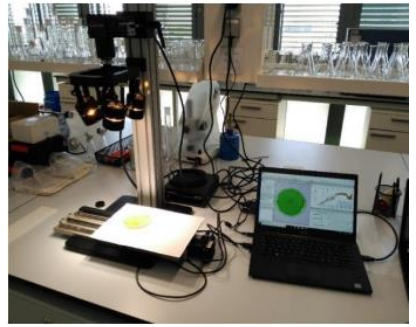
CIRCULAR ECONOMY AND RESOURCE EFFICIENCY

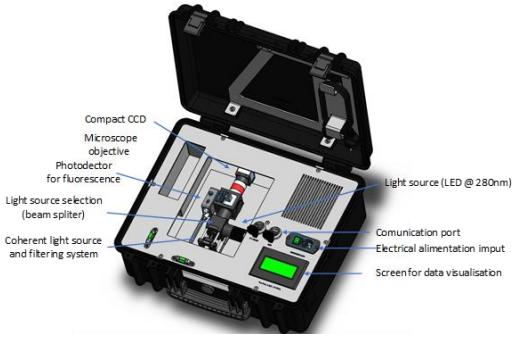
ICT FOR WATER AND AGRICULTURAL MONITORING AND CONTROL:

Sensors for bioprocess control and monitoring (VFA, CH_4, cianobacteria); water quality (organic matter, amonium, pathogens, emerging pollutants), agricultural systems (plant status and plagues).

Improvement of water cycle management through IoT, machine learning and artificial intelligence solutions.

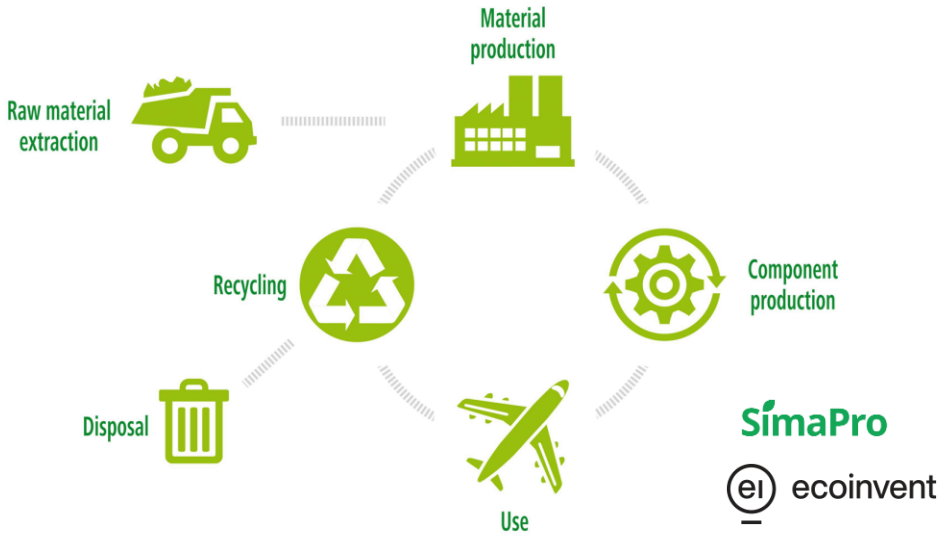






ECO-DESIGN, ECO-EFICIENCY AND SAFE and SUSTAINABLE BY DESIGN (SSbD):

New products based on principles of eco-design; environmental input-output analysis; scenario development based on Life Cycle Studies (LCA, LCCA, s-LCA); Material Flow Analysis (MFA) to foster resources efficiency and industrial symbiosis; and SSbD criteria as central tools for sustainable development and circular economy studies.



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Thanks for your attention

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