



Addition of high added value functions with surface nano-functionalization



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 882506.



Why Nano-Fabrication?



Allows the addition of different high added-value functions by surface functionalization

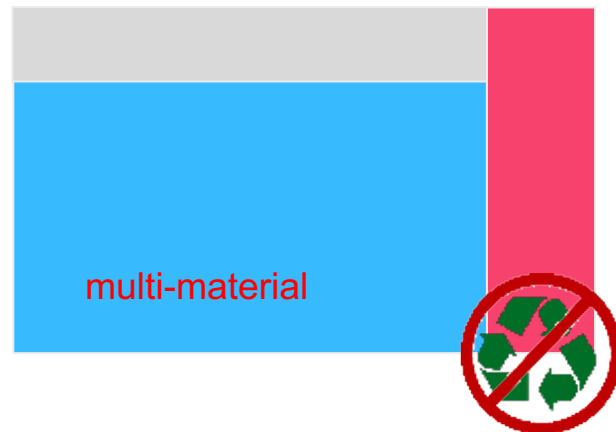


Why Nano-Fabrication?

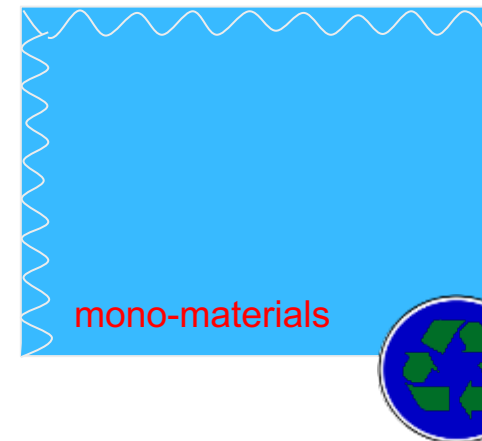
- Growing demand **for plastic parts with functionalized surfaces**:
 - Hydrophobic and self-cleaning,
 - Antibacterial,
 - Aesthetic,
 - Anti-squeak, etc.
- Need to **reduce coatings and/or surface treatments** with negative environmental impact.
- Interest in **mono-material products** with functionalized surfaces for **improved durability and recyclability**.



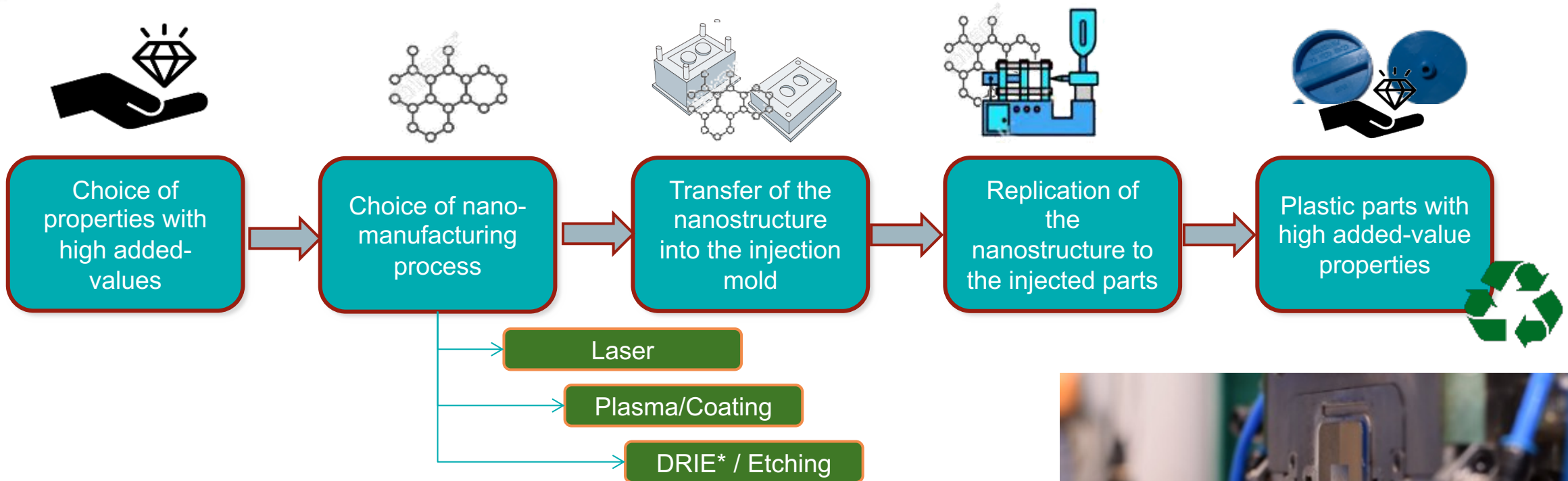
Functionalization by coating and bi-injection



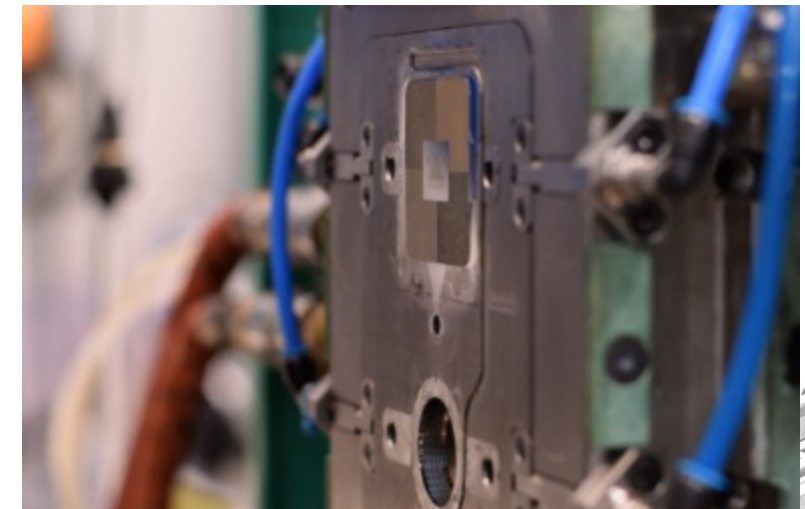
Nano-texturing for aesthetic effect and optical properties



Functionalization process



➤ **Replication of nano-structured surfaces from the injection mold to plastic parts**



Injection mold with nanostructured surface

**DRIE: Deep Reactive Ion Etching*

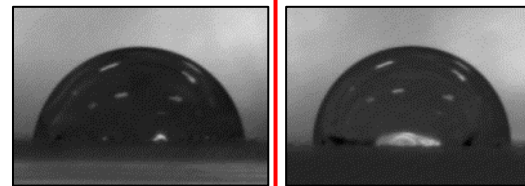
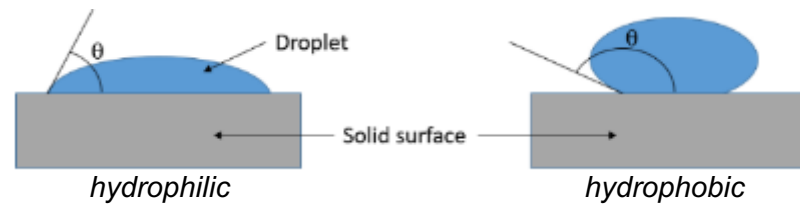
Application examples – Packaging

➤ Addition of aesthetic and anti-stain functions

- Materials evaluated: PP, PE, ABS
- Dimensions: 100mm length, 10mm diameter

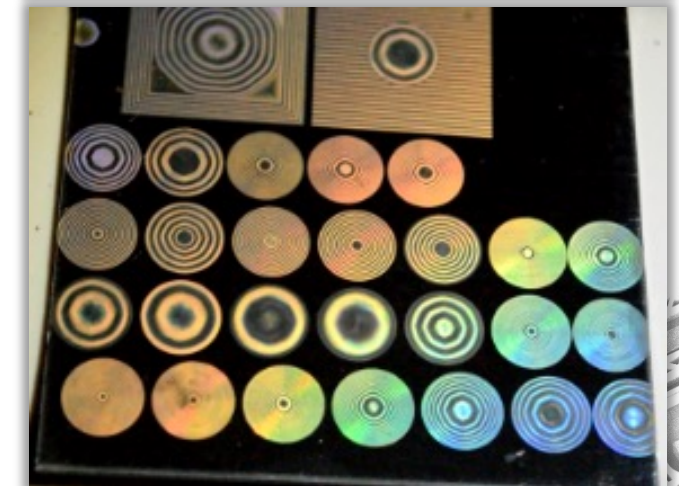


Anti-stain: super hydrophobic surface



Water-repellent,
stain-resistant,
antimicrobial,
anti-fouling...

Surface with advanced optical properties



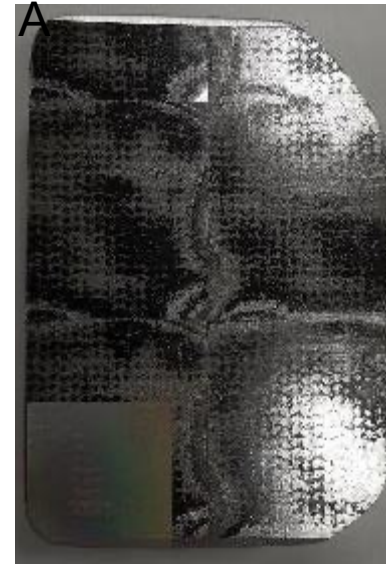
Examples of applications – Automotive

➤ Addition of anti-friction and anti-scratch functions

- Materials evaluated: PC-ABS, PP, PA-ABS
- Cabin elements – dashboard
- Objectives:
 - Limit unwanted friction and vibration noise
 - Increase resistance to scratches and dirt
 - Add antibacterial properties



Mold insert Text.



Mold insert Text.

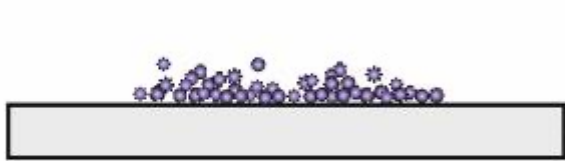
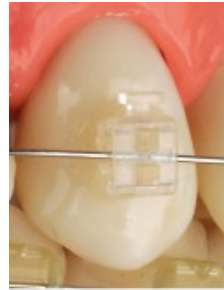
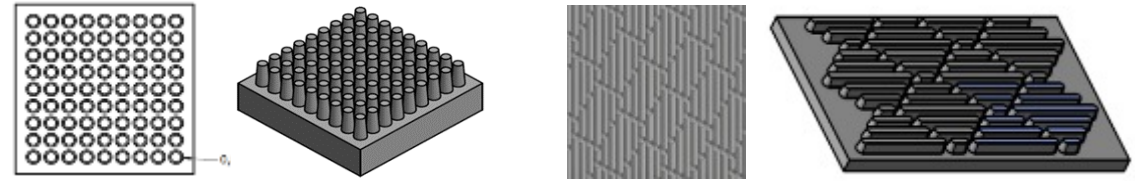


Replication of texturing on the part

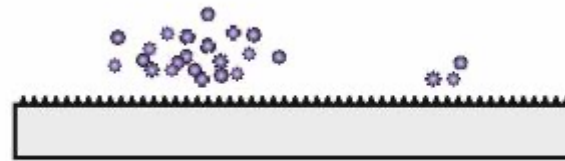
Examples of applications – Medical

➤ Addition of anti-bacterial functions

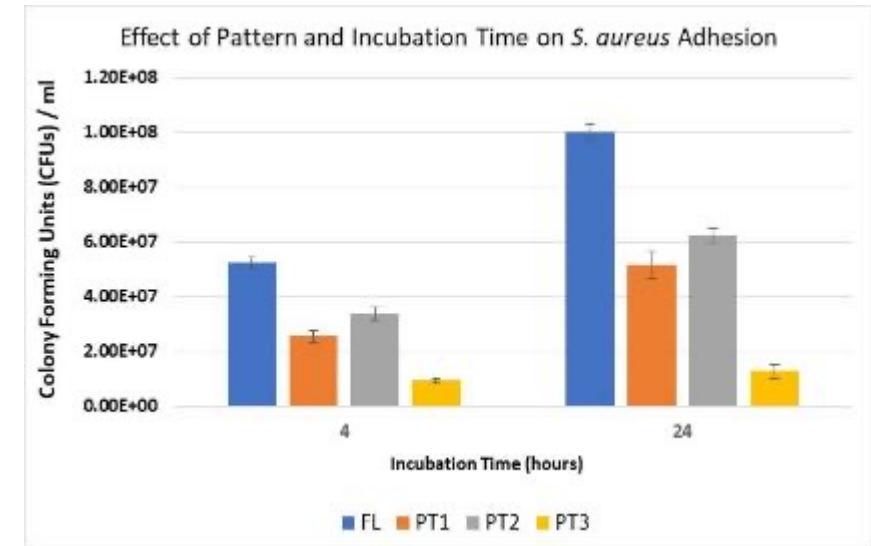
- Materials evaluated : PSU
- Orthodontic elements – complex geometry
- Objectives:
 - Reduce the appearance of bacteria



Flat surface - hydrophilic material



Micro/nano structured surface - Hydrophobic material



2D Samples

PT1: LIPSS IR Laser
PT2: LIPSS Green Laser
PT3: PN

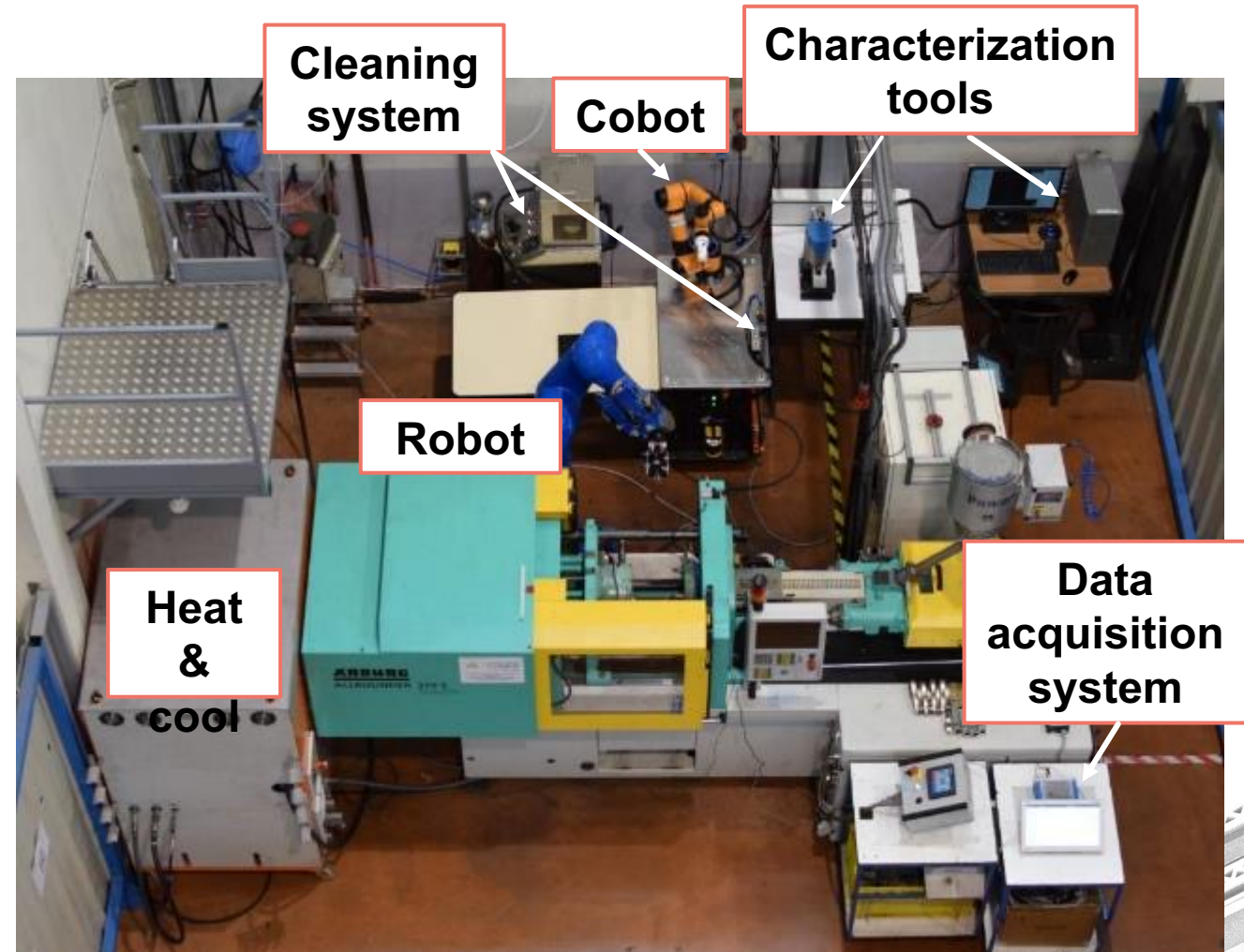


Increased anti-bacterial properties

IPC – HIMALAIA Platform

➤ **A set of technical means available to the industry to develop nano-textured parts**

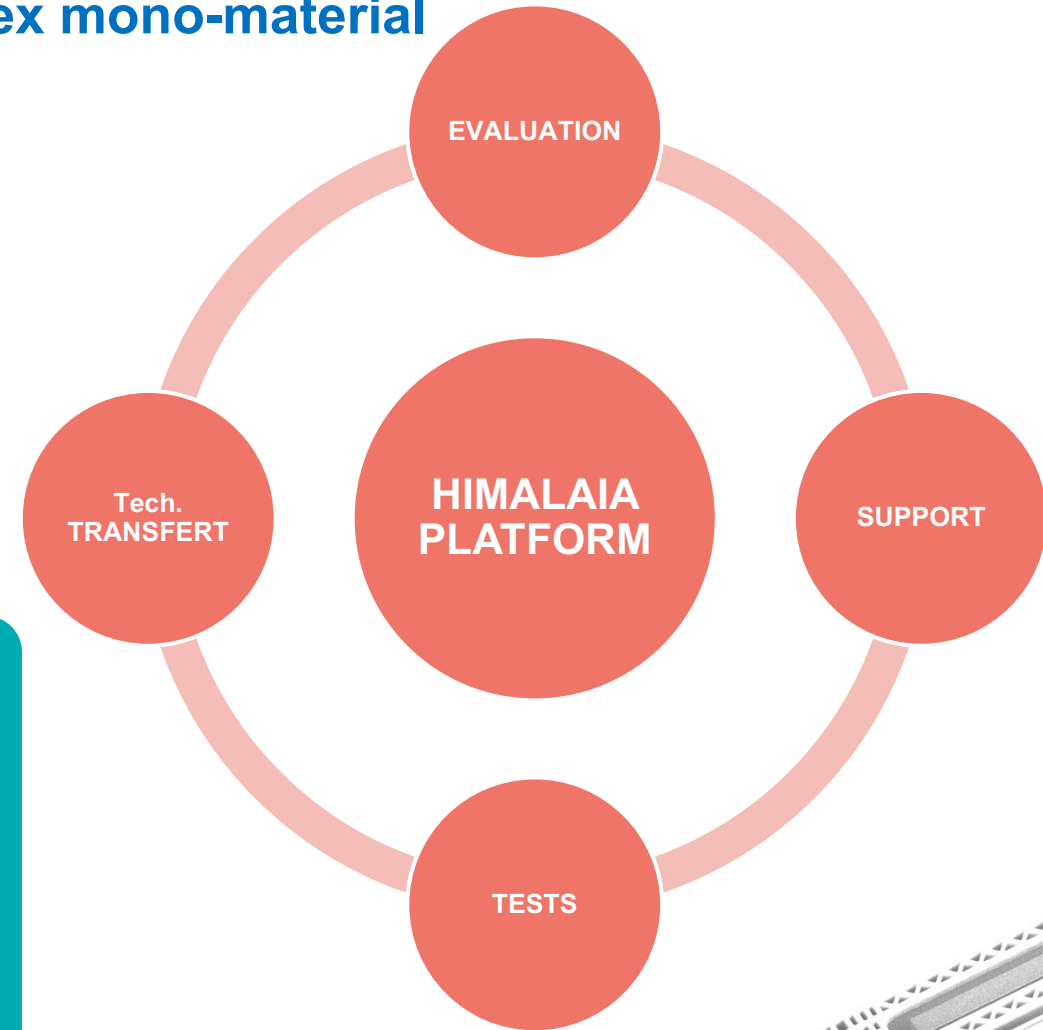
- Molds incorporating technologies such as:
 - Conformal cooling
 - Additive manufacturing
- Injection with Heat & Cool technology for better tool temperature control
- Mould cleaning by supercritical CO₂
- Online parts control



IPC offer – Technical support

➤ **A set of services for the development of complex mono-material plastic parts with functionalized 3D surfaces**

- Technological platform at your disposal for:
 - R&D activities: testing new functionalities, micro/nanostructures, new materials, etc.
 - Development of POC (Proof-of-concepts)
 - Deployment support and technology transfer
- Complementary skills and experts who support you throughout the process





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