



NewSkin: Innovation Eco-system to Accelerate the Industrial Uptake of Advanced Surface Nano-Technologies.

Value Propositions: On Laser texturing/microfabrication for Heat exchangers, Wettability control, Optical surfaces/systems, tribology, biomedicine and nano-electronics

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NewSkin Range of Services To Be Provided And Key Target Industries:

Steel Construction

Ceramics

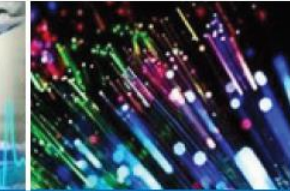
Water Treatments

Transport

Renewable Energy

Medical Device

Photonics



Commercialization of nano-enabled Consumer products with new functionalities



Design of Solutions

- Technology Transfer
- High Performance
- Added Value
- Advanced Features

Prototyping

- Enhanced
- Continuous
- Mass Production
- Processes

Performance Evaluation

- Replicating highly demanding end use conditions

Benefits Quantification

- LCA Approach
- Economic
- Social
- Environmental
- Regulatory

Industrial Uptake and Route to Market Support

- Value Chains
- Funding
- Networking
- Regulatory Issues
- Nanosafety and Security

Commercialisation of Nano-enabled Consumer Products

- New Functionalities
- General Industry Focus:
 - Steel Construction
 - Ceramics
 - Water Treatments
 - Transport
 - Renewable Energy
 - Medical Device
 - Photonics



Focus on NewSkin Value Propositions for Laser texturing



- Initial case-studies with NewSkin partners will provide a first showcase of the NewSkin OITB facilities
- Others have the chance to apply for access to NewSkin OITB facilities through 4 open calls 2022-24
- NewSkin OITB upscaling/testing facilities for these value propositions include:
 - Laser texturing facility
 - R2R facility



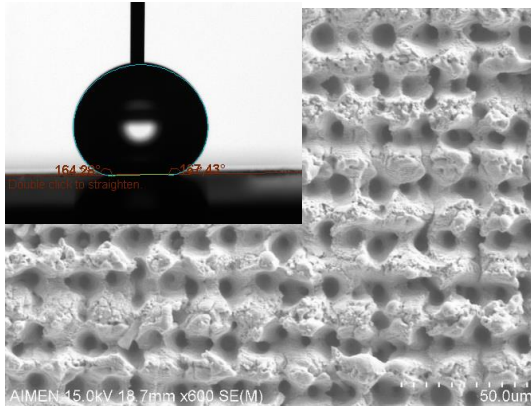
Focus on NewSkin Value Propositions (VP) for reduced friction



- **Target 1:** initial demonstrative case study on laser texturing for reduced friction with NewSkin partners LUH and ITA
 - Laser texturing for reduced friction in moving parts
- **Target 2:** new value propositions for other case studies
 - **VP1: Anti-icing surfaces** (Airplane parts, Energy generation and distribution, bridges) Superhydrophobic surfaces with anti-icing behaviour
 - **VP2: Anti-fouling surfaces** (biofilms Food and fuel tanks, large pipes, pumps and turbines) surfaces inspired by nature
 - **VP3: Anti-bacterial surfaces** (similar to first case study)
 - **VP4: Texturing of Cu charge collectors made of copper for batteries** – leading to more efficient batteries (reduce interface resistance between charger collectors and electrodes, and also capacity increase after multiple charging cycles)



Wetting controlling laser induced textured surfaces



The wettability of surfaces can be controlled through the fabrication of different patterns on the material surface. Thus, different textures can convert a surface into hydrophobic or hydrophilic. These laser fabricated textures can be also transferred to other materials through replication techniques, keeping their wettability properties.

Applications:

Hydrophobic surfaces

(Antibacterial, self-cleaning surfaces, improved corrosion resistance, surface icing prevention)

Hydrophilic

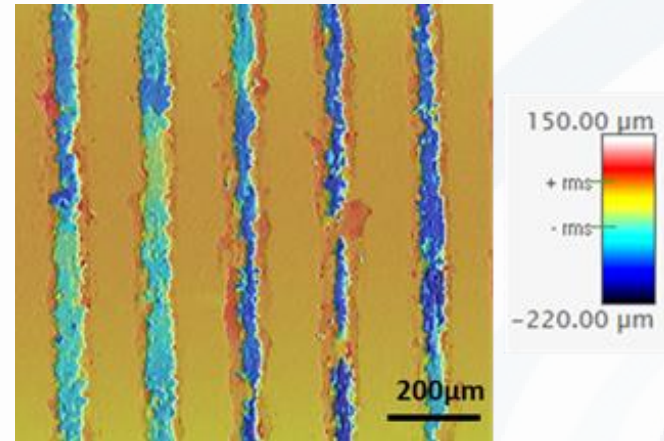
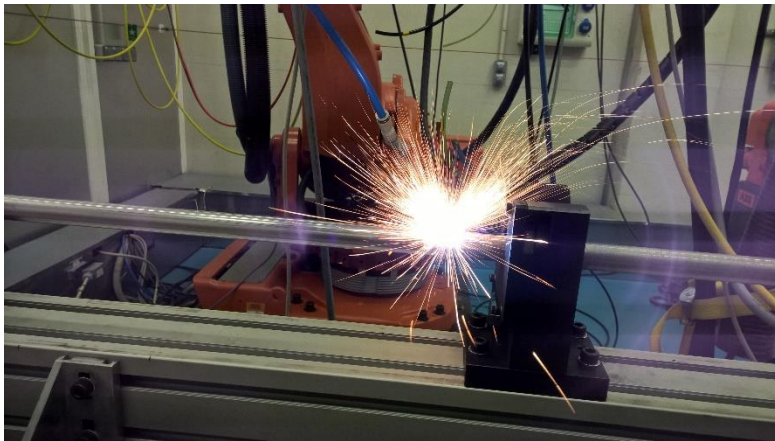
(filter membranes, reduced electrostatic charge accumulation)



Heat Exchange improving laser induced textured surfaces



The fabrication of patterned structures on the outer surface of pipelines increases the efficiency of heat exchange processes. In this way, the efficiency of heat exchangers is improved through laser texturing,



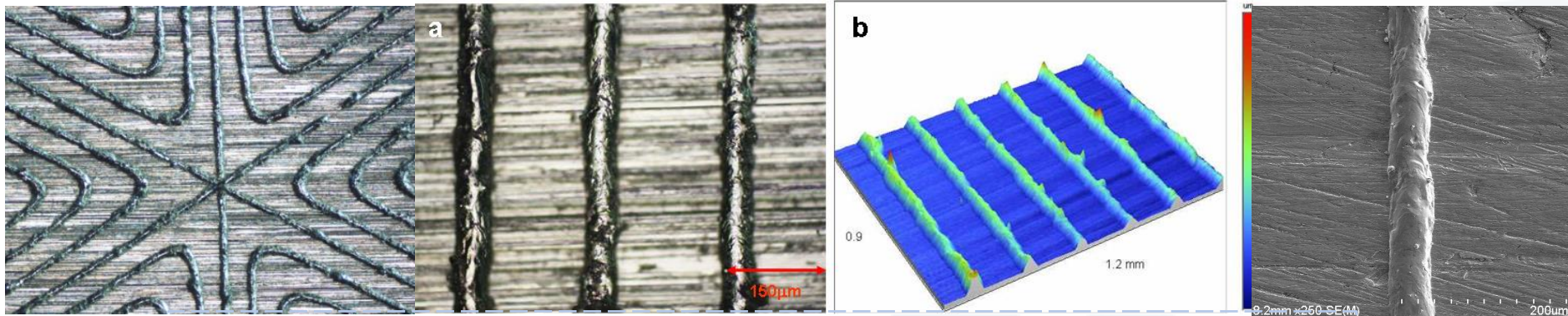
- 2 m long
- 25 mm diameter

Surface texturing for wear resistance and fluid dynamics improvement

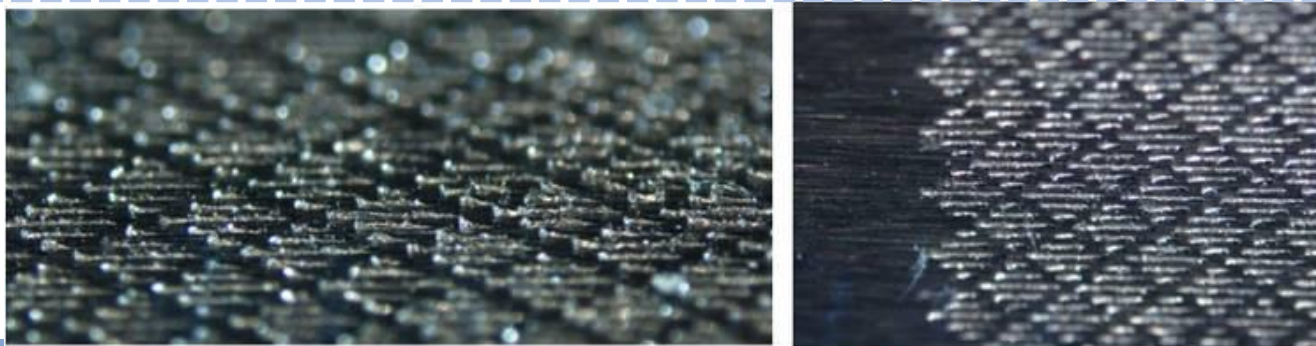


Surface texturing by a laser microcladding process

Improvement of wear resistance



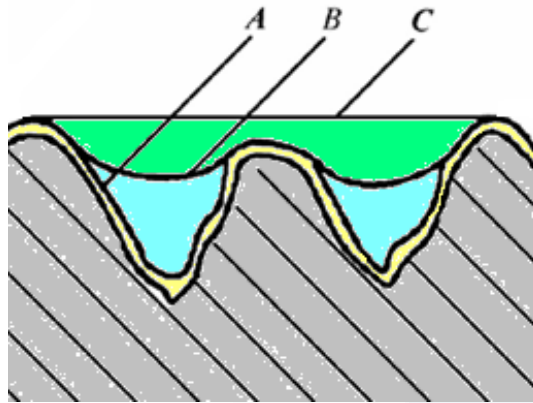
Shark Skin textures for fluid dynamics improvement



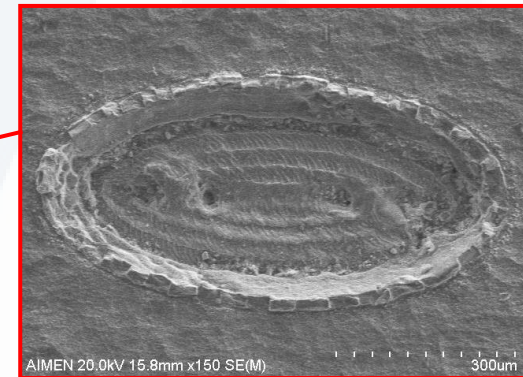
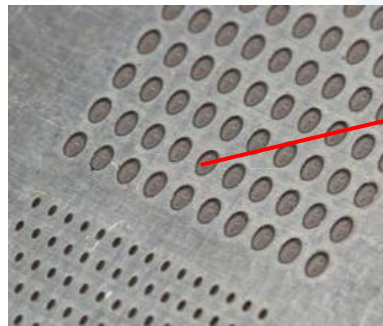
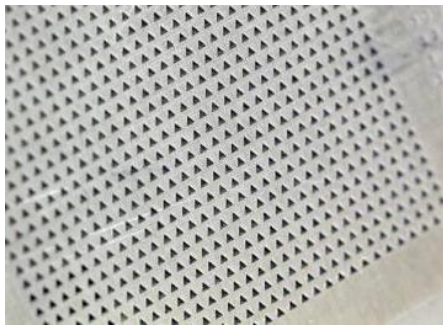
Surface texturing for friction reduction applications

Surface texturing with nanosecond pulsed lasers by a laser ablation process

Generation of **micro-cavities** in SS samples for lubrication improvement



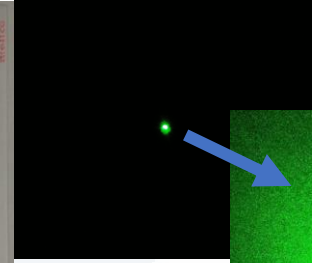
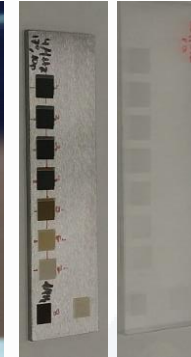
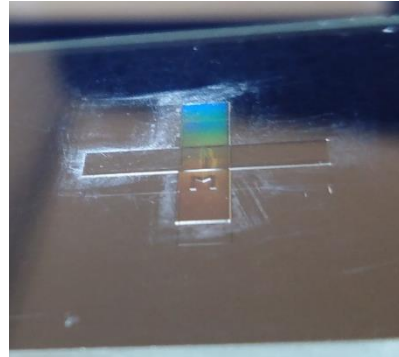
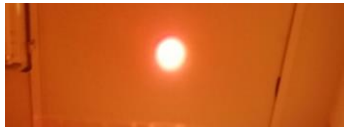
Increase in the hydrodynamic lubrication area → higher efficiency and lower lubricant consumption



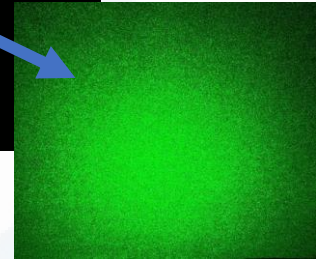
Optical laser induced/R2R textured surfaces



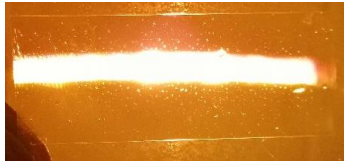
Without structure



Dispersive patterns



With structure



On polymers

On glass

On metal and polymer
(through replication)

The optical response of a certain surface can be modified through the creation of a certain texture. Optical properties of materials, such as reflectivity, colour, or transparency can be tailored through laser texturing.

Examples of applications:

Food industry (marking), solar cells (optimize absorption and light coupling), lighting industry, Automotive industry



Master fabrication by laser texturing for replication (R2R/IM) processes

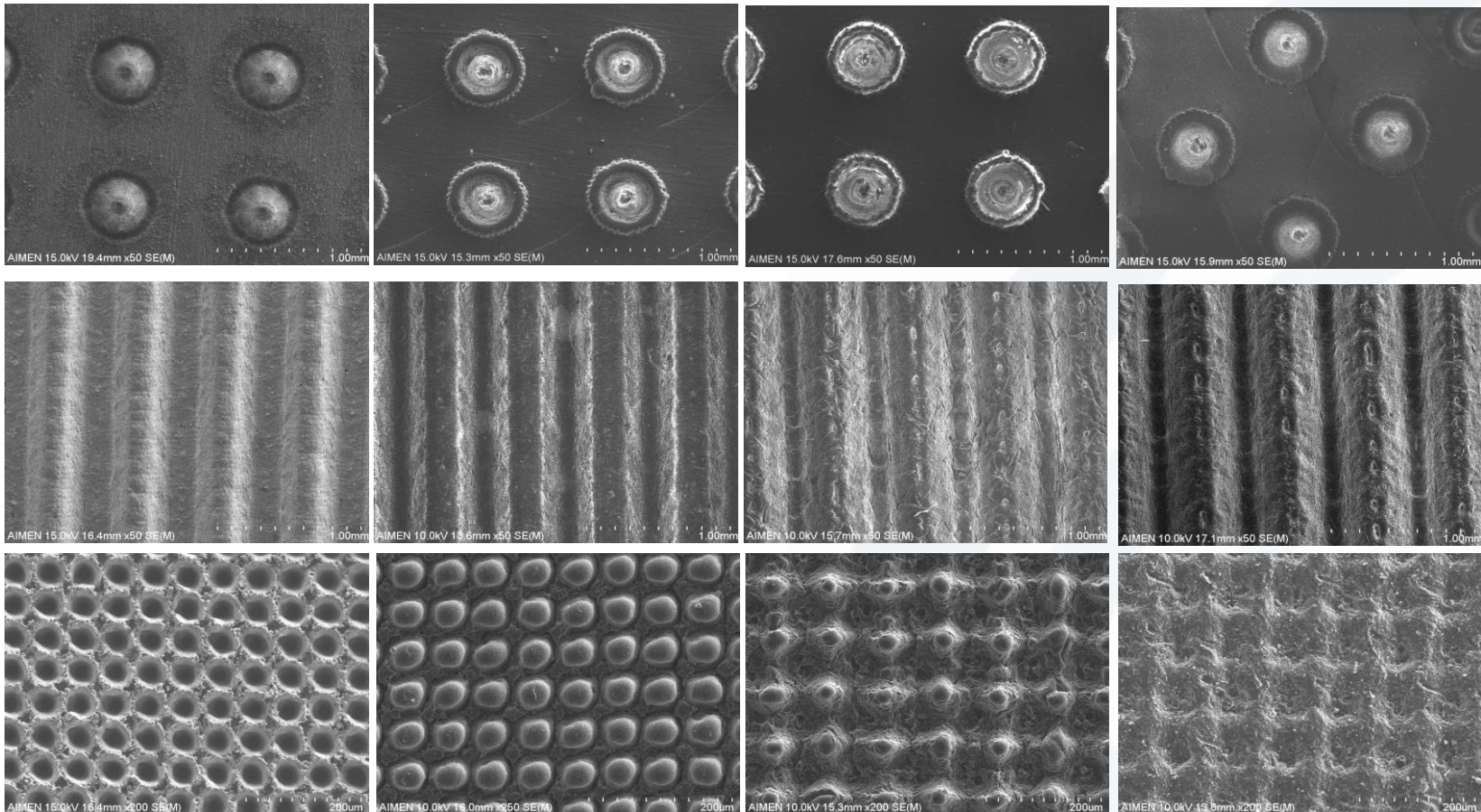


Al insert

PP moulding

PE +GF

Recycled PE



Summarise your services offer



- Fabrication of textures with controlled wettability
- Fabrication of textures for improved heat exchange
- Fabrication of textures for reduced friction applications
- Modification of optical properties of surfaces through laser texturing/additive manufacturing
- Master fabrication by laser texturing for replication (R2R/IM) processes



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Thank you!

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