# SURFACE FUNCTIONALIZATION USING INTERFERENCE-BASED LASER TEXTURING

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LMO Large Area Based Surface Structuring
TECHNISCHE UNIVERSITÄT DRESDEN
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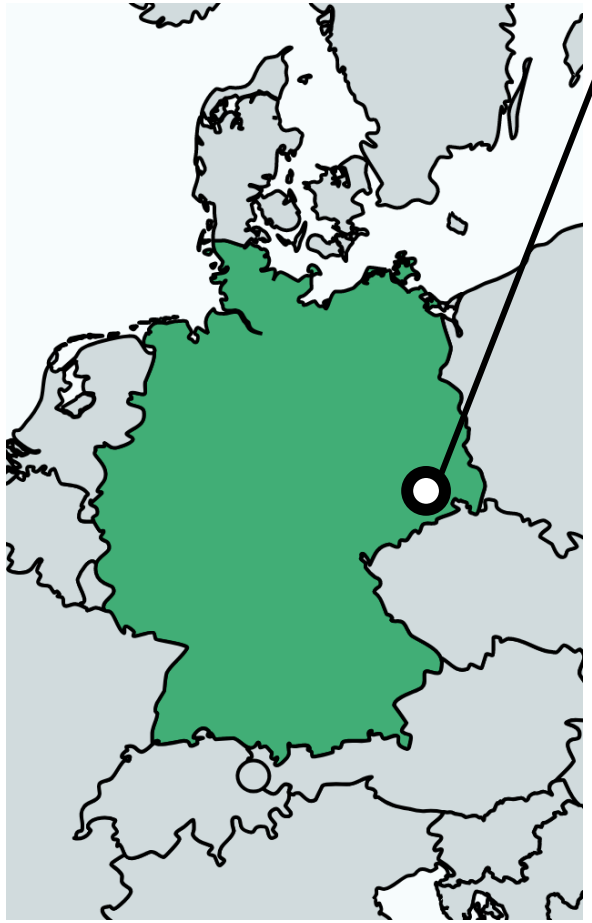
# CAMP - Center for Advanced Micro-Photonics



## Dresden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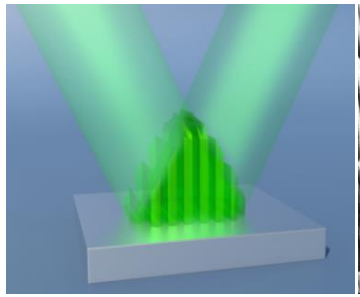
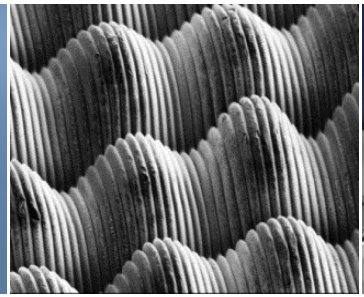
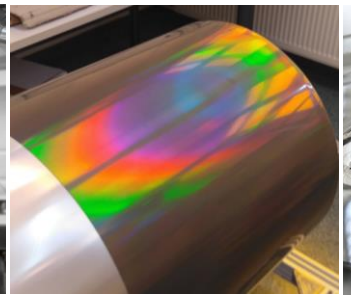
## From basic research to industrial applications

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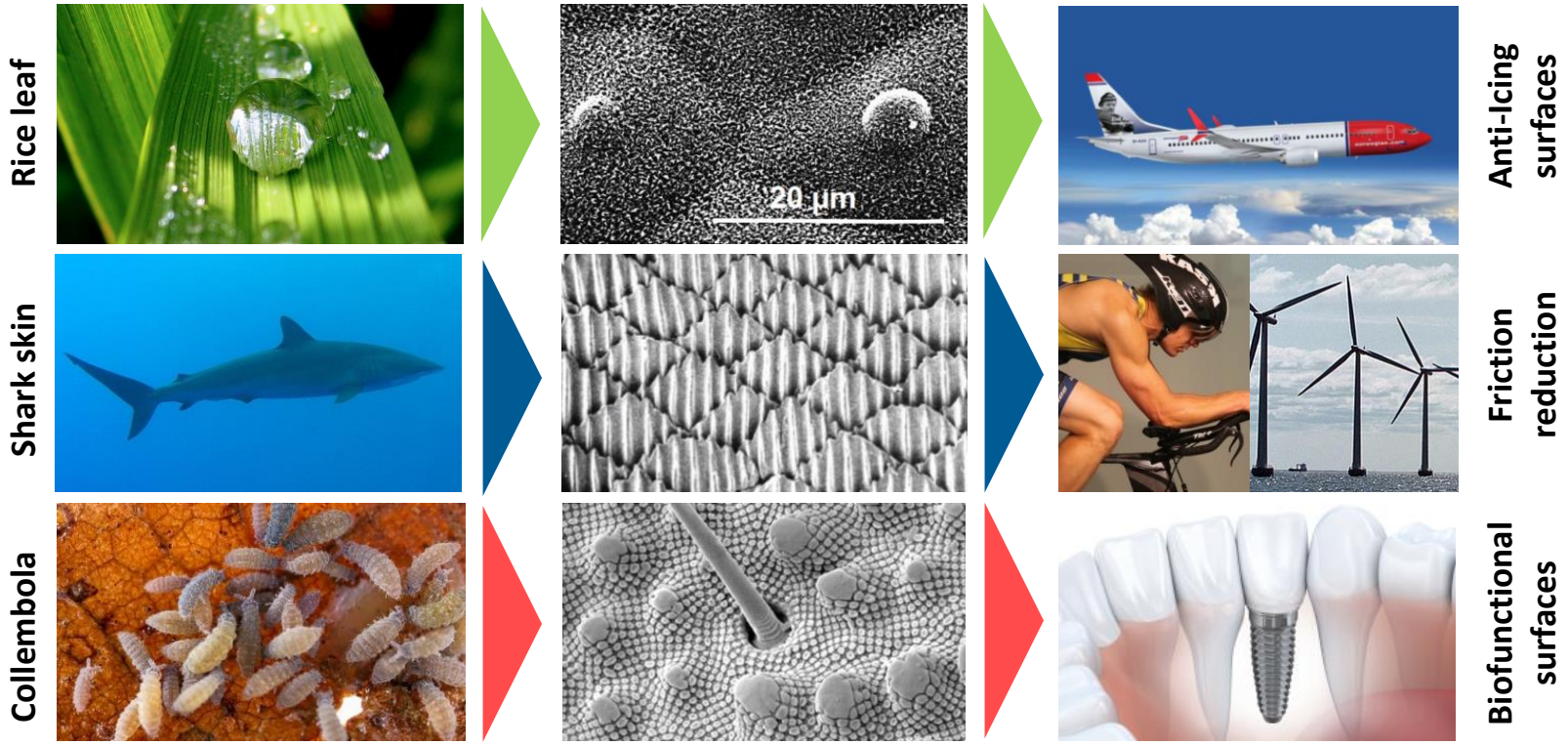
# Naturally-inspired surfaces




- Facilitate surfaces inspired by nature
- Distinct surface patterns lead to different surface functionalities (e.g. tailored wettability, …)
- Example of collaborations:

LASER 4 FUN

SHARK
INDUSTRIALISING LASER FUNCTIONAL TEXTURING

PROMETHEUS
RAPID ULTRA-SHORT PULSE LASER SURFACE TEXTURING TECHNOLOGY

# Laser texturing using Direct Laser Interference Patterning

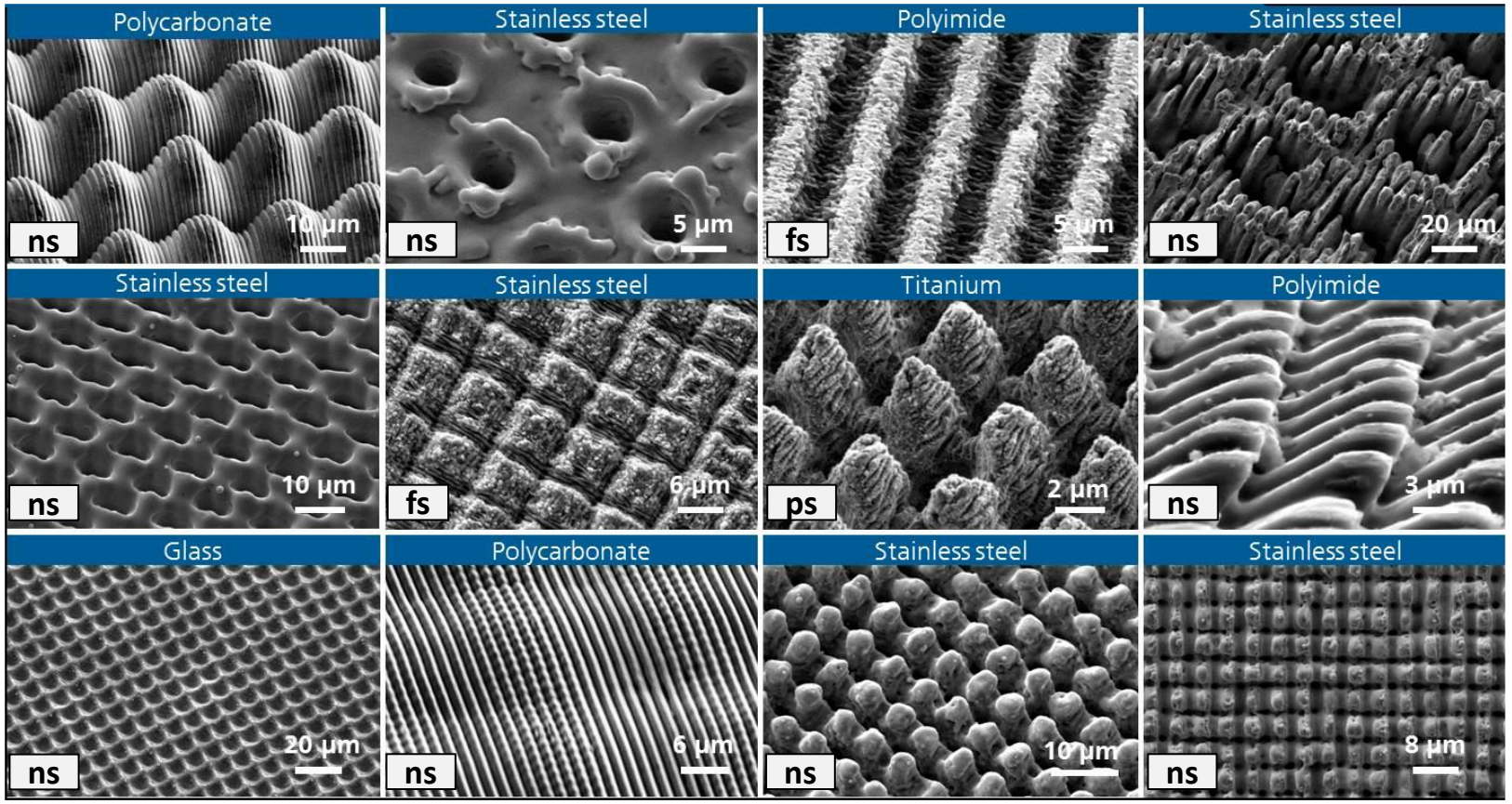
*Industrial-scalable surface patterning for large-area functionalization!*

## Pattern development

### *DLIP Technology*

- Structuring of metals, polymers, glass, ceramics and coatings
- Pattern dimensions: 180 nm – 30 µm
- Different pulse durations can be facilitated: **from nanosecond to femtosecond**
- Single scale & Hierachical surface patterns achievable by advanced processing approaches
- Target process speeds: 2 - 5 m²/min

## A new world of possibilities in surface architecture …



# Application examples

## Example: Anti-Icing

In cooperation with AIRBUS

**AIM**

**Reduce potential ice attachment on airplane surfaces through developed surface textures**

**APPLICATION TESTS**

Structured wing profiles tested in wind tunnel with respect to ice-phobic and de-icing properties

**RESULT**

- Self-limited ice aggregation
- Enhanced ice-removal upon local heating

# Application examples

## Example: Contact performance

**AIM**

**Development of next generation of electrical connectors**

**INDUSTRY TRANSFER**

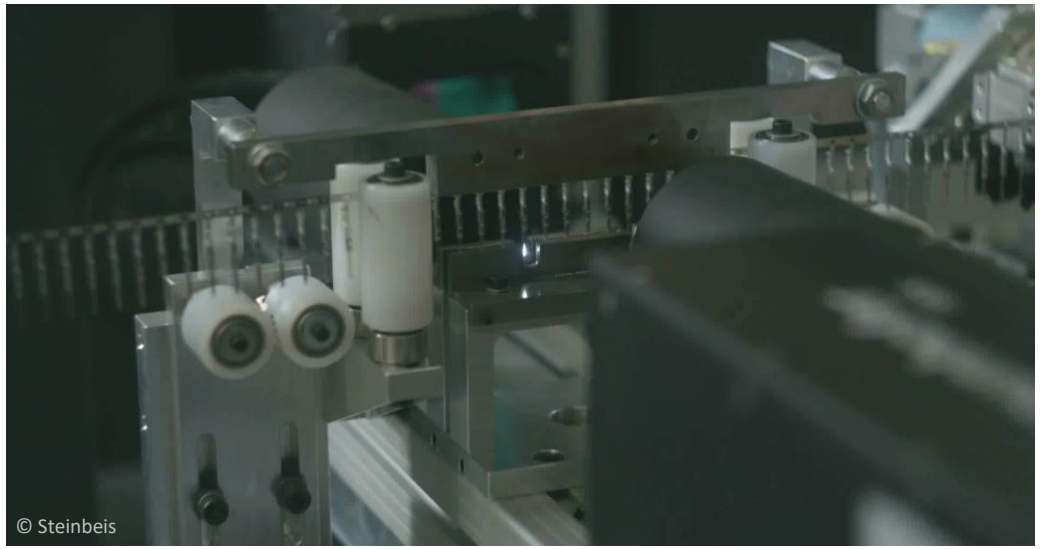
Development of prototypical system for high-speed structuring of electrical connectors

**RESULT**

- Oil-film encapsulation
- Reduced plug force: up to 40 %
- Reduction of electrical resistance up to 80 %


**Partners**

Material Engineering Center Saarland (MECS)
Steinbeis-Forschungszentrum

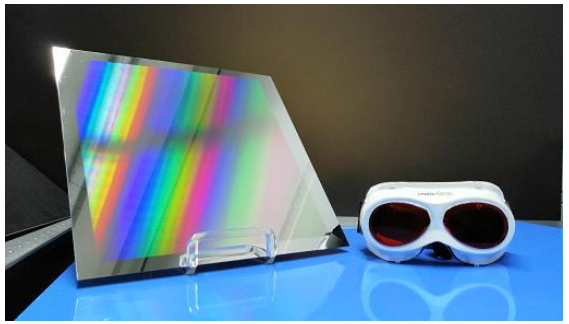



https://industrieanzeiger.industrie.de/technik/fertigung/high-speed-laserstrukturierung-fuer-funktionale-oberflaechen/

# Be EPIC – Connect & Conquer

## What **we** can do for **you**!

- Functional laser surface engineering through large-area & high-speed laser texturing
- Development of surface properties with benefits in the field:
  - Wettability, anti-icing, anti-contamination
  - Tribology (friction, wear, lubrication)
  - Biocompatibility, adhesion, and many more!



## What **you** can do for **us**!

- CAD/CAM process chain + 2D/3D surface capture
- DUV laser source development for processing of polymer materials with nanosized surface textures

- Contact us for new exciting collaborations on:
  - …industrial projects
  - …R&D projects
  - …scientific collaboration

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# Questions?

LASER FUN

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SHARK INDUSTRIALISING LASER FUNCTIONAL TEXTURING

**Funding:** Horizon 2020 Framework Programme for research and innovation (grant no 768701)

PROMETHEUS RAPID ULTRA-SHORT PULSE LASER SURFACE TEXTURING TECHNOLOGY

**Funding:** Horizon 2020 Framework Programme for research and innovation (grant no 825503)



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