TresClean

High **Th**Roughput las**Er** texturing of **S**elf-**CLEAN**ing and antibacterial surfaces

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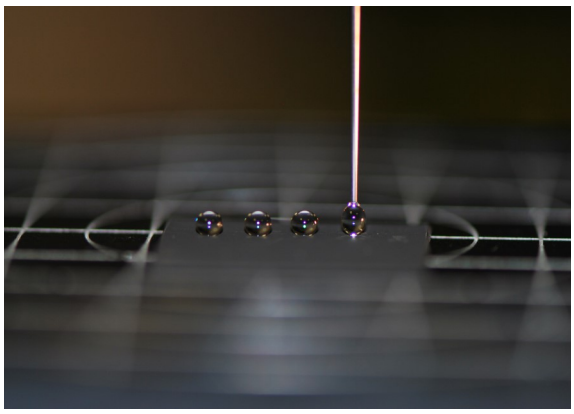
PHOTONICS21

TresClean Produces Promising Results

The TresClean project has recently achieved a major goal in successfully demonstrating ultrashort pulsed laser-textured antibacterial surfaces. After carefully designing ideal surfaces for reduced bacterial attachment, consortium members used ultrashort laser pulses with a duration less than 350 fs (0.00000000000035 s!) to produce extremely fine features on stainless steel surfaces. *Laser-induced period surface structures (LIPSS)*, or elongated ridges with a separation distance of about 0.0007 mm, and *laser-induced nano-pillars (LINP)*, or microscopic spikes separated by about 0.001 mm, were both created over areas of 250 mm^2. Textured samples were then immersed in solutions containing *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (S. aureus) bacteria for two hours, after which the number of residual bacteria on each surface was determined. Laser-textured samples were found to achieve **reductions of up to 99.8 % in *E. coli* retention and 84.7% in *S. aureus* retention** compared to control samples, which had been chosen to reflect current industry practises for food handling and packaging equipment. These results represent vast improvements over standard stainless steel surfaces and have huge implications for the future of food handling and other industries in which biofouling and bacterial contamination are problems, including domestic appliances and healthcare.



The project will now focus on the upscaling of laser technology based on results obtained so far, to achieve industrially relevant texturing rates and throughput. This will include testing a newly-acquired 350 W average power ultrashort pulsed laser source and development of a 1 kW average power ultrashort pulsed laser source, high-efficiency frequency conversion chains and high-speed scanning optics. Upscaling is expected to be completed by mid-2019, following which a productivity demonstrator will be produced to show the full potential of ultrashort pulsed laser.

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The Project

TresClean is a research project funded by European Commission. It is scheduled to last for 3.5 years and is implemented by a consortium of industrial and academic partners. The aim of TresClean is to demonstrate high-throughput laser-based manufacturing applied to the production of plastic and metal component parts of consumer white goods and liquid filling machines respectively through the development of a novel industrial use of high-average power pulsed lasers in combination with high-performance optical devices and beam delivery systems.

The Partners

- **Università degli Studi di Parma - Italy**
- Universitaet Stuttgart - Germany
- Centre Technologique Alphanov - France
- Ecor International - Italy
- BSH Electrodomesticos Espana SA - Spain
- Raylase - Germany
- MODUS Research and Innovation Limited - UK

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