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PHOTONICS21

HIgh ThRoughput lasEr texturing of Self-CLEANing and anti-bacterial surfaces

TresClean is a research project funded by European Commission's Horizon 2020 Research and Innovation Programme. It is scheduled to last for 42 months 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.

Main objectives

- Develop surfaces' topographies with fluid repellent and antibacterial properties over large areas (>500cm² for food industry, >5000cm² home appliance)
- High throughput processing technologies for functional surfaces (DLIP and LIPPS) with USP laser sources with an overall structuring rate of up to 40mm²/s.
- High average power ultra-short pulsed laser systems at 1030 nm wavelength integrated with fast synchronisation to scanner technology.
- High efficiency frequency conversion (Second Harmonic Generation and Third Harmonic Generation) for shorter wavelengths (515nm, 343nm) with average output power of 500W @515nm and 100W@343nm
- Fast scanning technology for beam movement (200 m/s) and high throughput production to support lasers up to 20 MHz with high average power up to 1kW.
- Master and control the upscaling of productivity for anti-microbial surfaces obtained by laser processing.

Concept & Technology

The technical field in which the objectives defined in ICT 27 will be applied and turned into a feasible industrial application is the development of fluid repellent and antibacterial surfaces. The motivation for the project is to go far beyond the state of the art in laser surface texturation and to gain industrial relevance by applying such a technique over large areas of machine parts or tools. As a consequence, the gap between the lab-tested feasibility of these laser-treated surfaces and the production for real applications will be bridged. Among the numerous industrial applications which can gain from functionalized surfaces the project is focused on the cleanliness and the asepticity of machine parts for the food industry and home appliances to deliver easier maintenance and longer service life of the laser treated components by making them superhydrophobic and thus enabling other highly desirable functionalities, such as anti-corrosion, antibiofouling, anti-microbial, and low friction resistance.

The project is strongly user driven by the participation of ECOR Research and BSH Home Appliances Group (BSH) to define the requirements in their respective applications (food industry and home appliances) against which the design of textured surfaces offering the properties described above will be undertaken. Considering the needed surface morphology features in the range of 1-10 µm, two different laser processing technologies (LIPSS and DLIP) are proposed, both making use of state-of the-art ultrashort pulsed (USP) lasers. These laser processing techniques are known to generate surfaces patterns on metals of different geometries and periodicities according to the polarization orientation on the work piece and to the modality of laser light deployment.

Get In Touch:

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