

# Industrial upscaling of ultrafast laser-enabled surface functionalization: high-resolution meets high throughputs

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Laser-enabled surface functionalization is currently becoming the method of choice for an increasing number of industrial applications where specific surface properties are required on final products, such as for instance antibacterial and antifouling effect, super-hydrophobicity or super-hydrophilicity, drag reduction effect and antifriction behavior, and tailored optical properties. Thanks to the present availability of industrial high average-power ultra-short pulse (USP) laser sources and the development of high-speed beam deflection systems and high-precision positioning machines, laser-based surface treatment can nowadays reach throughputs up to several hundreds of cm<sup>2</sup>/min depending on the type of implemented process and technique while providing surface structures with a resolution down to only a few hundreds of nm [1,2]. A review on the latest innovation around USP laser-enabled surface functionalization is presented which highlights the future steps needed toward the full industrial exploitation of such techniques.

[1] G. Mincuzzi, A. Bourtereau, A. Sikora, M. Faucon, and R. Kling, *Proceeding of SPIE, Laser-based Micro- and Nanoprocessing XVI*, volume 11989, (2022) 11989OP.