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## High-rate laser machining for large-area and high-throughput surface profiling and functionalization

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### Abstract

High-rate laser machining will be introduced as key technology for large-area surface texturing and bio-inspired functionalization. In fact, the polygon-mirror based scan technique allowing high-precision laser beam raster-scanning at hundreds meters per second is the core feature to bring high optical powers from kilowatt class lasers to industrial production. This is favorable for power scaling in micro machining as processing rate and throughput scale-up with higher pulse repetition frequency and laser powers. The great advantage of ultrafast beam movements is that unfavorable effects can easily be avoided, such as high thermal loads to the substrates and subsequent material melting as well as laser beam shielding by interactions with the previously induced plasma/particle plume. Inspired by sharks' skin, this will be demonstrated by the example of riblet-like surface profiles and their replications in plastic materials thus providing a high potential for drag reduction in turbulent flows in technical applications.

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