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Laserové centrum HiLASE Vás zve na seminář

Nonlinear laser lithography for industrial applications

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Nanostructuring of surfaces is mostly performed with well-established techniques including lithography, ion beam processing and laser-induced periodic surface structuring (LIPSS). However, these techniques suffer either from the limited flexibility, high-cost, complex equipment, or from the low-speed, problems of material control, and lack of uniformity and repeatability over large areas. Recently, a technique called Nonlinear Laser Lithography (NLL) was introduced, which allows fabrication of extremely uniform nanostructures, with excellent long-range repeatability and at high-speeds. NLL can be applied to a variety of materials, including non-planar ones. While NLL generates essentially a LIPPS-type of nanostructures, it does so by utilizing nonlinear feedback mechanisms arising from the interaction of femtosecond laser pulses with the target surface, as well as from the laser-initiated chemical reactions. Key features, such as superior uniformity and ability to process non-flat surfaces are a direct consequence of the self-regulation provided by these feedback mechanisms. Applications of surface-treated nanostructures have been demonstrated in various fields including electronics, optoelectronics, photovoltaics, micro/nano fluidic, tribology, wettability. Although the outcomes are encouraging, the low production rate and complexity of the manufacturing system make these processes currently not suitable for transfer to industrial applications. It is appears that these problems can be overcome by NLL-induced nanostructures, thanks to their aforementioned superior features, with potential for substantial impact in these and related fields.

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