Press release XIV / 2015:
World record for laser surface patterning:
0.7 m^2/min with micrometer resolution!

By creating artificial patterns on component surfaces on a micrometer and submicrometer scale, it is possible to improve the mechanical, biological and/or optical properties of components in a way that benefits specific applications. In recent years, we have seen a major boost in efforts to find the best ways of applying these kinds of patterns. The Fraunhofer IWS Dresden, which develops modular laser systems for high-speed laser patterning, has now set a new world record in this field. For the first time, scientists succeeded in achieving an effective patterning speed of 0.7 m^2/min while micropatterning a polymer surface.

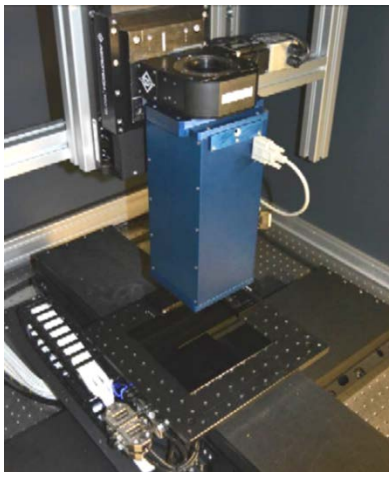
Researchers are investigating various technologies that aim to modify the texture of surfaces on a micrometer and submicrometer scale. Current methods are problematic in various ways, either because they are very costly, cannot be applied to 3D part geometries, or cannot achieve the structure sizes and patterning speeds required for industrial use. One way of making the process significantly faster while maintaining high resolutions and reducing equipment and production costs is to use direct laser interference patterning, or DLIP. In this technique, a laser beam is split into two or more beams that are then superimposed on the workpiece surface. This causes periodic modulation of the laser intensity, enabling the surface of the component to be patterned.

One of the key goals of current research at Fraunhofer IWS Dresden is to implement DLIP technology in the form of high-speed processing optics and equipment suitable for industrial use. By tailoring this method to favor optimum process speeds, the researchers have now achieved rates of 0.7 m^2/min on polycarbonate and 0.36 m^2/min on metal substrates. These process speeds have already been demonstrated for line structures with periods between 5 µm and 22 µm. It is conceivable that this could be increased to multiple m^2/min by using more powerful laser systems. That would make new applications in the automotive, medical technique and other industries both feasible and affordable.

As well as developing the required technology, Fraunhofer IWS Dresden produces application-specific processing optics and complete DLIP processing systems including appropriate laser beam sources. These machines offer a high degree of automation combined with user-friendly, intuitive operation and a modular design that makes them suitable for a wide range of applications. Fraunhofer IWS can implement a number of different laser sources as well as various CNC axis systems and high-precision granite constructions. This makes it possible to produce even the most com-

plex high-resolution patterns < 500 nm at processing speeds of 1 m^2/min. Researchers are also preparing to adapt the DLIP components to a roll-to-roll processing system. This will make it financially viable to perform patterning in a continuous process for surfaces larger than 1 m^2.

Our experts would be delighted to talk with you in person at Fraunhofer IWS Dresden or at the LASER World of PHOTONICS, Hall A3, Booth 121 (joint Fraunhofer booth).



2nd generation DLIP processing head
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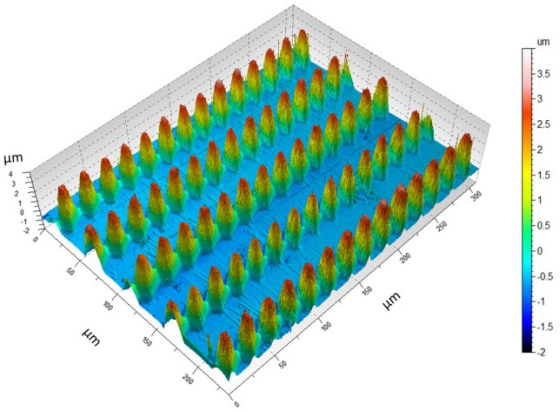

Patterned polycarbonate substrate
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