



HIGH-PRECISION SURFACE STRUCTURING USING ULTRASHORT PULSED LASER RADIATION

Motivation

Generation of statistical, self-organizing structures with high-precision topography in the sub-micrometer range using ultrashort pulsed laser radiation.

Characteristics

The so-called Laser-Induced Periodic Surface Structures (LIPSS) have structure sizes between 400 nm and 1 μm depending on the material and the laser wavelength. Section by section, different structure patterns can be applied, which appear under a defined angle of view in a defined color, matt or deep black. By a specific arrangement of different structure sections arbitrary images with color effects can be generated. The process time for structuring a butterfly with a wingspan of 40 mm is less than five minutes.

Applications

The laser-induced periodic structures on polished steel surfaces reflect or absorb specific parts of the color spectrum resulting in intensive color effects for the human eye. In addition to decorative applications, the structures can functionalize surfaces for use in medical or biotechnical applications.

Technology

- Ultrashort pulsed laser radiation with pulse durations in the fs regime
- Beam control by using laser scanner system
- Application surface: Polished stainless steel

Advantages

- High topography accuracy
- Free arrangement of structural sections with different color effects
- Creation of matt black structures
- Long-term stable color effect (no fading of color pigments)

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1 Butterfly with wing filling surface structure and black wing contour.

2 Intense color effects in black wing contour.