

Hybrid diamond turning technologies for the generation of diffractive masks for 3D-lithography and multiple wavelength diffractive optical elements - 3D Multicolor -

Initiative: Herstellung funktionaler Oberflächen (beendet)

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The goal of this project is the development of two hybrid production processes for generating multifunctional identification features against plagiarism. Both developments are based on an ultraprecision diamond turning process utilizing a nanometerstroke Fast Tool Servo (nFTS). The nFTS enables the modulation of the depth of cut in a flat turning process with an accuracy in the nanometer range. Consequently, microstructures are created, which can be used as a diffractive optical element (DOE). Based on this technology, two new processes shall be developed. Initially, a hybrid 3D-lithography process shall be developed, which enables the structuring of curved surfaces. The produced DOEs serve herein as UV-resistant phase mask. Simultaneously a new process will be developed that combines diamond turning with nFTS with an in-situ coating process. This enables the generation of DOEs consisting of multiple layers. By combining different layer structures, elements are created that feature different functionalities for different wavelengths of light. In both processes, the unique features of the produced structures and the high technological effort for their production ensure a high security against forgery and their usability as identification feature.

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