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CDA GmbH
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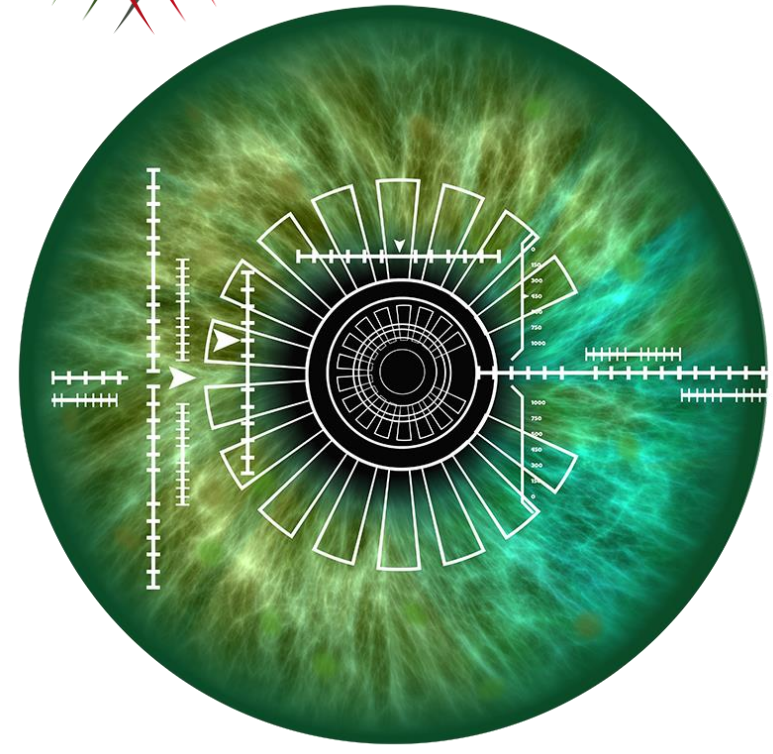
PHENOmenon

LASER MANUFACTURING OF 3D NANOSTRUCTURED OPTICS USING ADVANCED PHOTOCHEMISTRY



www.phenomenonproject.eu

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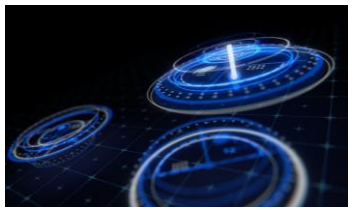
PHENOmenon

LASER MANUFACTURING OF 3D NANOSTRUCTURED OPTICS USING ADVANCED PHOTOCHEMISTRY

PHENOmenon will develop and validate an integral manufacturing approach (material, process and technology) for large area direct laser writing of 2&3D optical structures, targeting high speed production of optical surfaces with subwavelength resolution, using NonLinear Absorption.

Developments in photochemistry and laser beam forming will allow producing structures at different scales (100 nm to 10 microns). An unedited productivity in freeform fabrication of 3D structures will trigger the manufacturing of new and powerful optostructures with applications in lighting, displays, sensing, etc.



The novelty focuses on the combination of ultrasensitive nonlinear photocurable materials, and the laser projection of up to 1 million simultaneous laser spots.

The photochemistry relies on new types of ultrasensitive photoinitiators and groundbreaking nonlinear sensitized resins for CW [Continuous Wave] laser writing. The developments in beam forming are based in modulation with SLMs [Spatial Light Modulators] and hybrid diffractive optics for massive 3D parallelization by imaging and holographic projection.

Project duration:
3 years

Starting project date:
1st of January 2018

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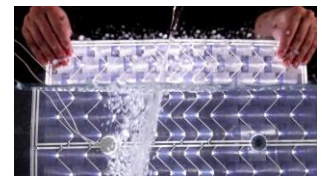
OBJECTIVES AND ADVANTAGES

PHENOmenon will pursue the following **technical goals:**

- Robust, flexible 3D nanofabrication using nonlinear photochemistry
- Super-resolution on large areas
- High Productivity mass-customization
- New Optostructures
- Disruptive Applications

The enabled optical structures (hybrid microlenses, waveguides, polarizers, metasurfaces and holograms) will be modelled at the micro and macroscale, to develop application oriented simulation and design methodologies.



Selected demonstrators will show the capability to produce 3D optical micro-nanostructured components with unique optical characteristics, offering differential **advantages in many products:** advanced security holograms, efficient lighting, high performance optics, backlighting units for displays, holographic HMIs [Human Machine Interface] and planar concentrator microlenses.

These components will contribute to address societal challenges like energy efficiency or security while reinforcing EU industry competitiveness.

MAIN INNOVATIONS

The application of the project results towards the marketable services and products, is expected to deliver a number of disruptive breakthroughs, which can be classified in two categories:

1. PHENOmenon Technological platform comprised by:

- Materials for MPA-based nanomanufacturing, with high sensitivity, speed and resolution.
- Manufacturing equipment with advanced laser beam handling for high productivity on large areas.
- Optimized 3D optical nanostructures, models and software for its computation: SWS, metamaterials, diffractive, dielectric and plasmonic nano-optostructures.

2. Novel services and products, in particular:

- Production of 2½D moulds and tools for microreplication of optical surfaces.
- Holograms with improved efficiency and new optical effects.
- Ultraflat light management structured films, to be used for backlighting, image formation, polarization, spectral splitting, high sensitivity sensing, etc.
- Production of nanostructured surfaces on glass and flexible surfaces.
- Large area mix&match free form microlens arrays with SWS.