FABULOUS

FABrication of 3D metasurfaces to enable the next generation of high efficiency optical products

Beam parallelization for increased productivity Two-Photon Polymerization by means of Spatial Light Modulators.

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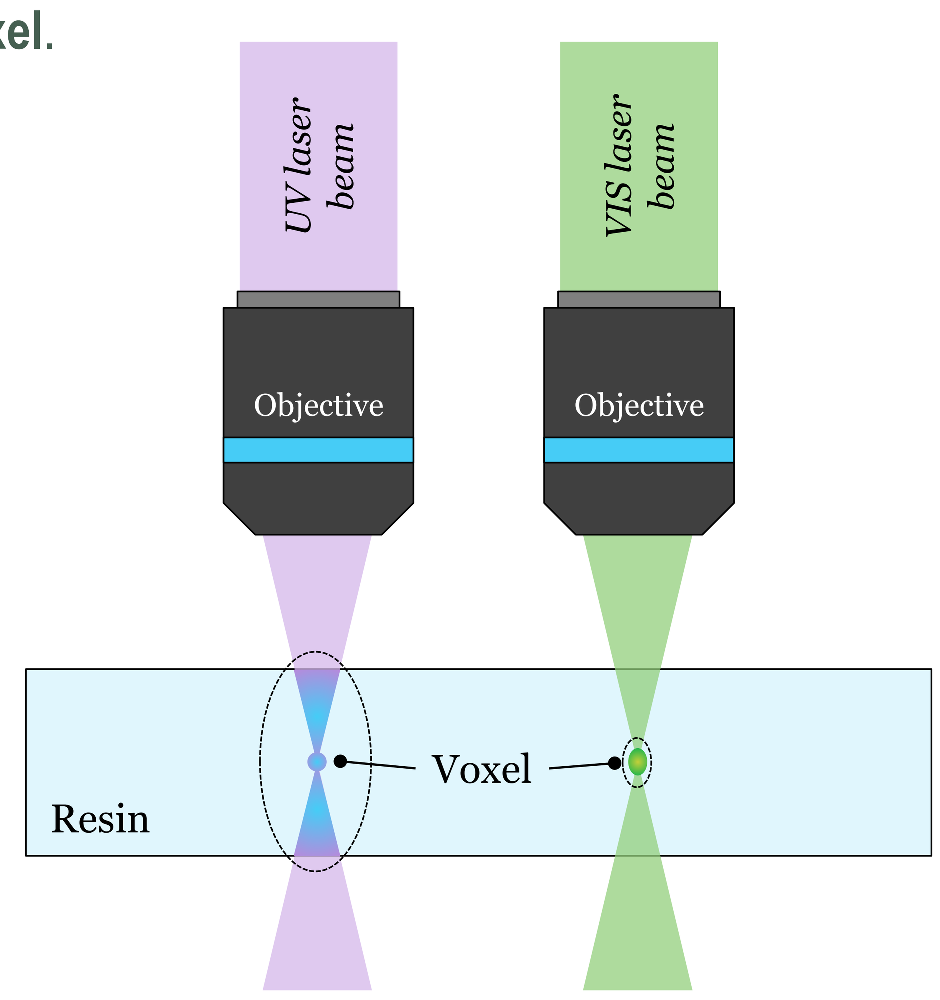
FABULOUS PROJECT

FABulous is an European-funded project focused on the development of the technology required for the **industrialization of multiphoton lithography** to manufacture **high-resolution 3D metasurfaces**.

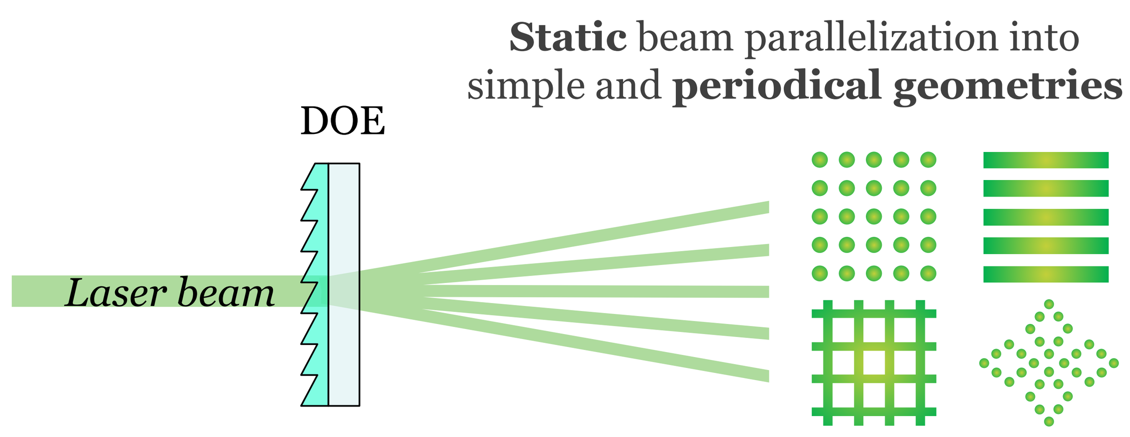
MPP OVERVIEW

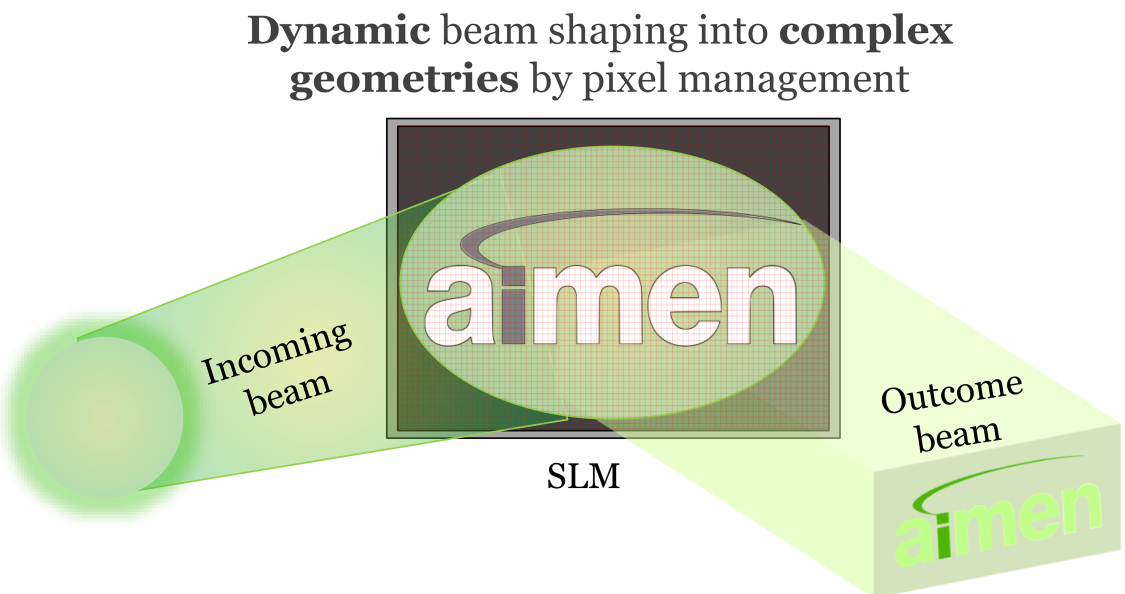
Multi-Photon Polymerization (MPP) is an additive manufacturing technique based on the **absorption** of light by a **photoresist** within a small region know as **voxel**.



Conventional MPP provides structures with **high accuracy and resolution**. However, it implies long manufacturing times and thus, very **low productivity**.

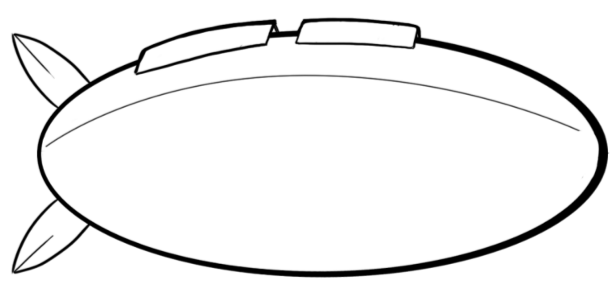
This issue is addressed in FABulous by **beam parallelization strategies**, either using Diffractive Optical Elements (**DOEs**) or Spatial Light Modulators (**SLM**).



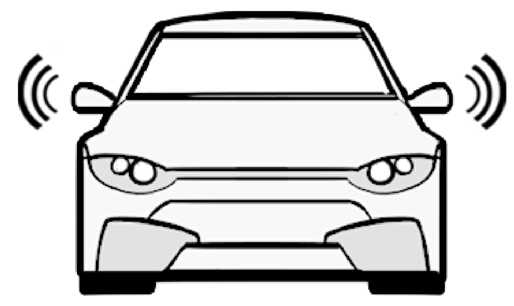


FABULOUS DEMO CASES

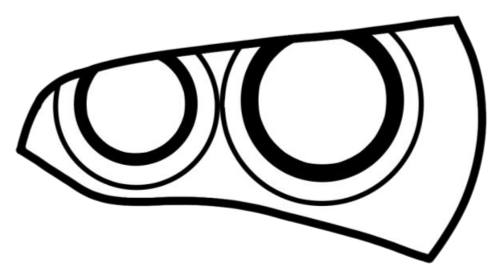
FABulous will provide a **new solution for the fabrication of optoelectronic devices** for different applications. The developed technology will be demonstrated through three **use cases**:



Manufacturing **high efficiency solar cells for high altitude** platforms



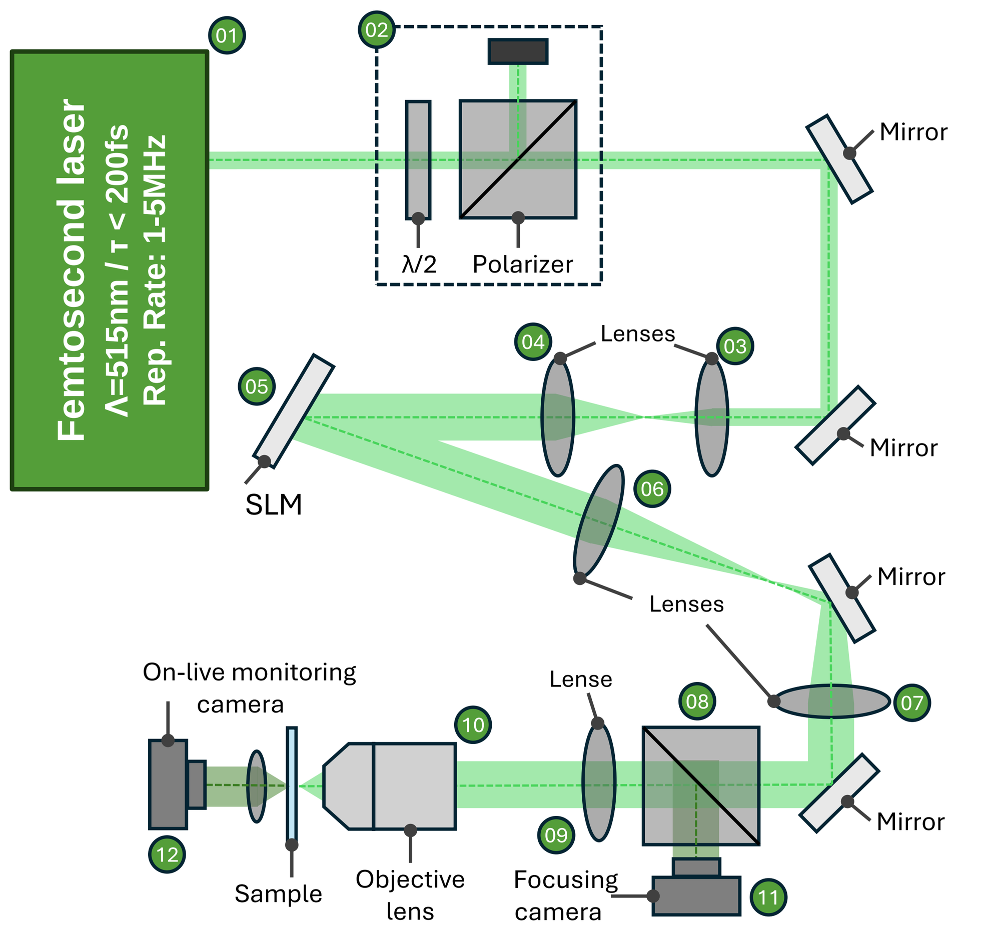
Reducing the size and weight of **automotive camera lenses**

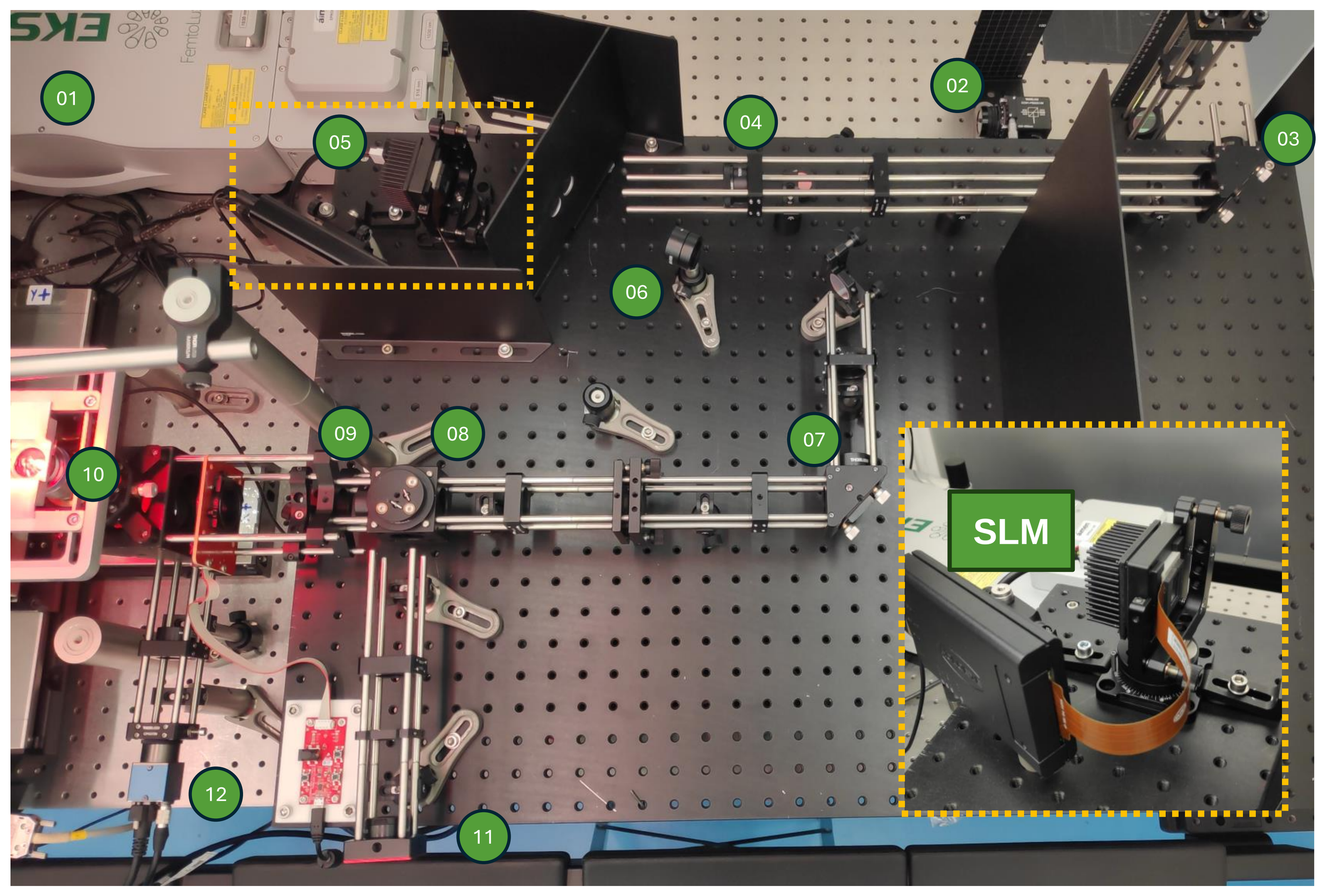


Manufacturing **high efficiency light pipes** used in **automotive lighting systems**

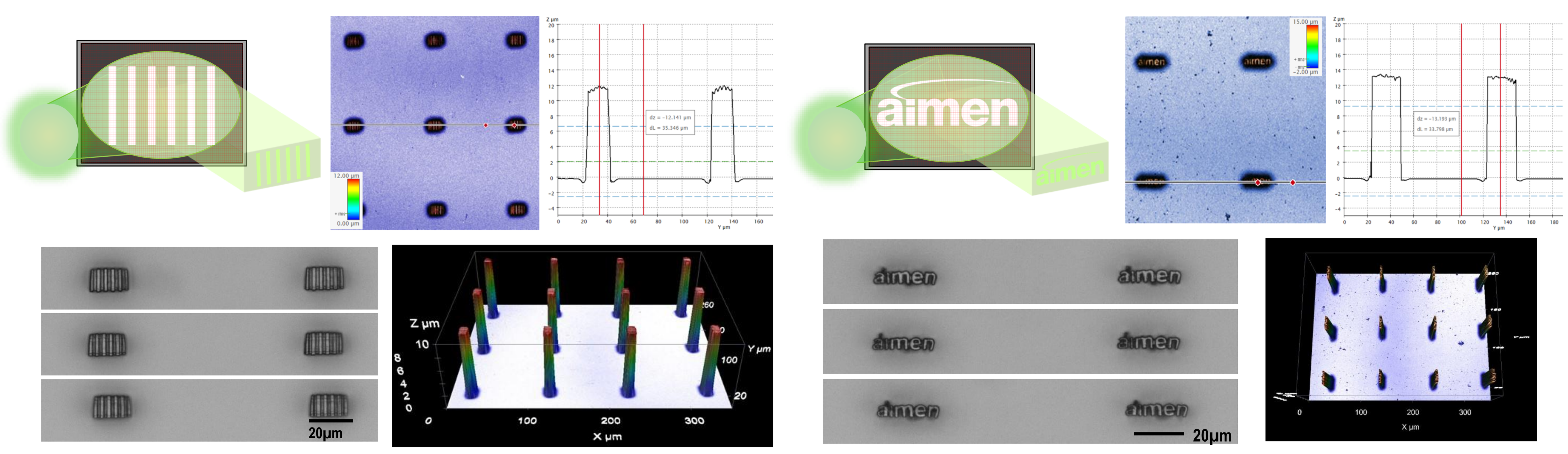
HIGH THROUGHPUT AND RESOLUTION 3D METASURFACES FABRICATION BY MPP

Within FABulous, AIMEN has developed a MPP setup including a **femtosecond laser (515nm)** and a **SLM** for the manufacturing of 3D metasurfaces with high resolution and increased productivity. This can be achieved by using the SLM as a dynamic beam splitter (**MPP parallelized process**) or beam shaper (**complex structures in a single shot**).





Using a commercial photoresist, initial trials have been performed achieving promising results in terms of resolution (<1 µm in the images projected on the SLM screen and ~1 µm in the printed structures) and throughput .



CONCLUSIONS AND NEXT STEPS

Results obtained so far are promising and **validate the feasibility of the proposed technique**. AIMEN is currently working on **improving** these results. Different approaches to obtain a better **Z resolution** are being explored and will provide a more controlled photocuring process. Additionally, the **cleaning** of the uncured resin is also a key point that will be upgrade soon.

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