Use of Spatial Light Modulators as a tool for boosting Two Photon Polymerization productivity

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Two-photon Polymerization (2PP) is very well known for providing the possibility of fabricating complex 3D structures with resolutions in the range of a few hundreds of nm by flashing point by point the targeted design. This extremely high resolution, together with the serial character of the fabrication process, implies that the throughput of 2PP is too low for its industrialization. The two main ways of increasing the productivity of 2PP are clearly the use of faster scanning systems, enabling higher printing rates, and using advanced optics to parallelize the writing process. Among the optical solutions that can improve productivity of 2PP, we can find static approaches, such as Diffractive Optical Elements or interference optical setups, which provide fixed, tailored light distributions, and dynamic strategies, like using Spatial Light Modulators (SLMs) or Digital Micromirror Devices (DMDs), which also allow the use of tailored light distribution that can be updated continuously during the fabrication process.
The work presented here shows our latest results for the fabrication of 3D features with 2PP using an SLM in imaging and Fourier configurations. The optimization of the projected light pattern for the fabrication of the targeted 3D features with the highest fidelity possible will be introduced, demonstrating how, by using the adequate corrected image, both productivity and resolution of 2PP can be tackled at the same time.

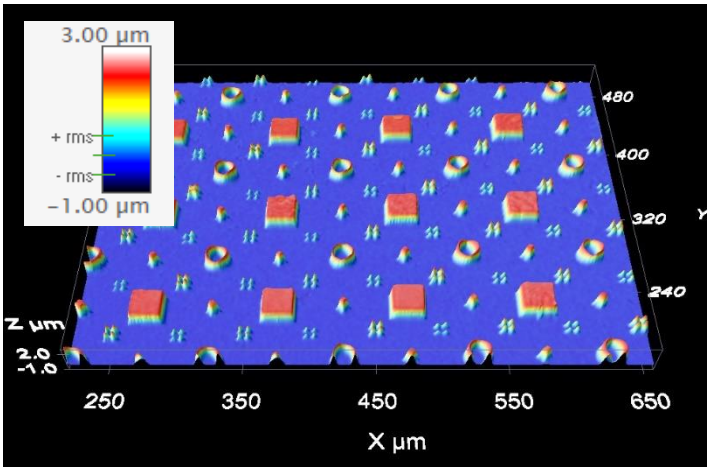

Figure: Different features fabricated by imaging different patterns on the SLM

Acknowledgements:
This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement number 101091644