Multiphoton Lithography: Principles, Materials and Applications

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Multiphoton Lithography is a technique that allows the fabrication of three-dimensional structures with sub-100 nm resolution. It is based on multi-photon absorption; when the beam of an ultra-fast laser is tightly focused into the volume of a transparent, photosensitive material, polymerization can be initiated by non-linear absorption within the focal volume. By moving the laser focus three-dimensionally through the material, 3D structures can be fabricated. The technique has been implemented with a variety of materials and several components and devices have been fabricated such as micro-optics, biomedical devices, and scaffolds for cell growth

The unique capability of Multiphoton Lithography lies in that it allows the fabrication of computer-designed, fully functional 3D devices. Here, I summarize the principles of microfabrication, and present recent research in materials processing and functionalization of 3D structures. Finally, I discuss the future applications and prospects for the technology.

Dr. Maria Farsari. She is a Research Director at FORTH/IESL and the leader of the NLL group. Her research activities focus on laser-matter interactions and ultra-fast laser materials processing. She is particularly active in the field of multiphoton polymerization, where she is one of the world leaders in the fabrication and characterization of 3D micro-and nanostructures for applications in photonics, metamaterials and biomedicine. Dr. Farsari has participated in many FP6, FP7 & H2020 European research projects, and national projects also. Her group consists of three post-doctoral research scientist, three PhD students, one MSc student and one undergraduate. She has published over 100 papers in refereed journals; she has received over 5900 citations. Her *h*-index is 44.