Direct 3D Laser Writing by Two-Photon Illumination

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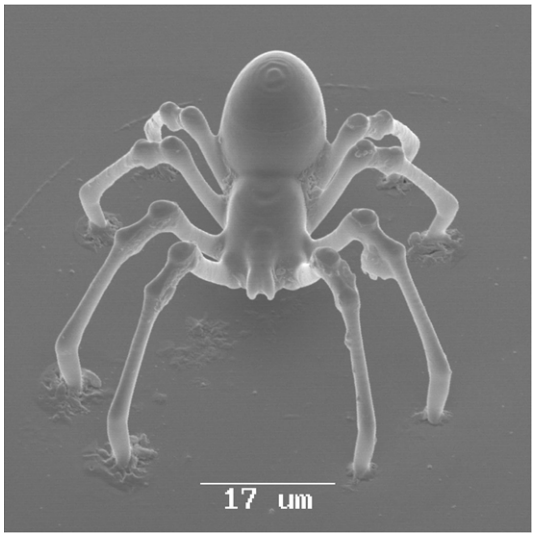
Multi-photon direct laser writing was demonstrated by several groups as flexible, fast, high-resolution technology for true 3D microstructuring. The number of applications employing this fast emerging technology is rapidly increasing. Related research extends from fabrication of 3D photonic crystals to structuring of biological materials. Ability to achieve subdiffractional resolution rests on the nonlinear nature of two-photon absorption. The flexibility of two-photon illumination allows to easily scale the resolution from 100nm to μm and mm range by selecting appropriate focusing optics and laser power parameters.



In this contribution we will present our recent progress in the direct-write femtosecond laser material processing. We have successfully fabricated micro- and nanostructures in various photosensitive materials. Using appropriate positioning software one can directly transfer CAD 3D models into photosensitive resins. Figure 1 shows a microspider fabricated by two-photon polymerization of commercial photoresist SU8. Recent studies of microstructures in hybrid polymers for applications in drug delivery and tissue engineering will be presented. Discussion on future prospects will conclude the presentation.

Author Biography

Aleksandr Ovsianikov received the Bachelor of Science degree from Vilnius University, Vilnius Lithuania, in 2000, the Diploma degree in physics from Hannover University, Hannover, Germany, in 2003, and is currently working toward the Ph.D. degree at Laser Zentrum Hannover e.V., Hannover, Germany.