Design, Simulation and Technological Realization of Polymer Based 3D 1x4 Splitter

Lenka Gajdosova[1, a)], Dana Seyringer[1], Peter Gašo[2], Daniel Jandura[2], and Dušan Pudiš[2]

[1]*Research Centre for Microtechnology, Vorarlberg University of Applied Sciences, Hochschulstr. 1, 6850 Dornbirn, Austria*
[2]*Faculty of Electrical Engineering, University of Žilina, Univerzitná 8215/1, 010 26 Žilina, Slovakia*

[a)]Corresponding author: lenka.gajdosova@fhv.at

Abstract. We demonstrate possibilities of three-dimensional printing technology based on two-photon polymerization applying polymer polydimethylsiloxane (PDMS). This silicone compound is meant for fabrication of photonic integrated circuits using 3D dip-in direct laser writing (DLW). First, a 3D Y-branch splitter was designed for TM-polarized light, working in the telecom operating wavelength region of 1550 nm. For the splitter design, a channel type 3D waveguide structure was applied. The simulations were performed in BeamPROP simulation engine of RSoft photonic tool. The splitter was optimized according to the optical properties and the manufacturable dimensions of the structure. Consequently, based on the design results, the 3D Y-branch splitter was fabricated using the 3D dip-in DLW optical lithography.