

# Direct Laser Writing of Photonic Devices on a SU-8 Platform

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Polymer photonic devices are of interest due to their potential use of high-volume manufacturing techniques and also the increasing availability of efficient functional materials leading to desirable functions, such as electro-optic effect, photo-detection and photo-emission. Often these are added through “doping” of a host polymer with chromophores, dyes, quantum-dots, to name a few additives. In order to optimize these devices, a direct-write platform of doped polymer for fast-prototyping is desirable.<sup>1</sup>

Previously we had developed such a direct write lithography process and demonstrated the performance for optical waveguiding at visible wavelengths around 632 nm for a bio-sensor application. More recently this platform enabled the prototyping of basic passive photonic devices for infrared wavelengths.<sup>2</sup>

We report on a direct laser write platform based on SU8 for rapid prototyping of photonic devices. H-nu 470 photoinitiator is used to enable writing with 405 nm wavelength of a standard Heidelberg DWL66FS system. Devices at the resolution limit of the system are presented. Prototypes are achieved in a very short cycle and can be characterized after deposition of a top-cladding layer by spin-coating followed by cleaving to expose the waveguide facets. The preparation of materials, the fabrication process and results for prototyped devices will be presented.

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<sup>1</sup> R. Panepucci et al. “Photonic Crystals in Polymers by Direct Electron-Beam Lithography Presenting a Photonic Bandgap,” *J.Vac. Sci. Technol. B*, 22, 3348-335, 2004.

<sup>2</sup> J.C. Ramirez et al. “SU-8 GPON Diplexer Based On H-Line Lithography by Direct Laser Writer”, *IEEE Phot. Technol. Let.*, 30, (2018)

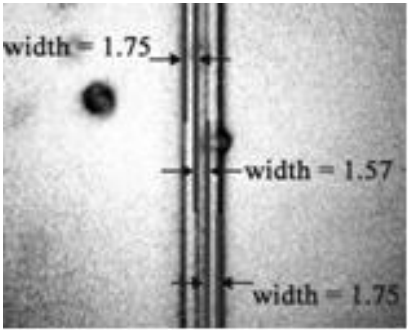


Figure 1: Fabricated directional coupler on SU-8 platform



Figure 2: Characterization of prototypes showing cleaved edge with waveguides and lensed optical fiber.

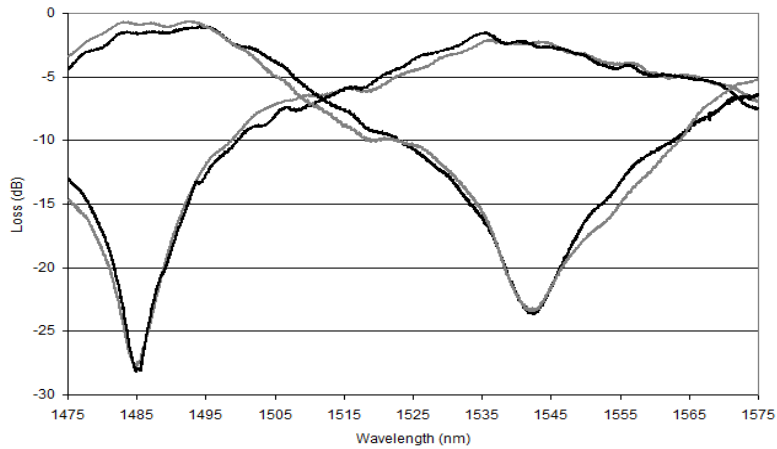


Figure 3: Transmission loss measurements of directional couplers fabricated by direct laser writing on SU8.