

## Ultrashort pulsed laser cutting of polymer intraocular lens implants

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Ophthalmic intraocular lenses are conventionally machined by diamond tools which exhibit wear and thus deteriorating machining quality as well as long processing times. A promising alternative approach is contour cutting by ultrashort pulsed laser micromachining. To improve process knowledge, a parametric study of picosecond and femtosecond laser machining of medical grade hydrophilic copolymers and PMMA is presented. Based on this, material removal rates and machining quality with respect to main process parameters are determined. Reasons for chipping and formation of heat affected zones are identified by high-speed process monitoring and an optimized process strategy is derived. By choosing a defined pulse overlap, heat accumulation is kept minimal while increasing absorptivity through incubation, which is proven by non-linear absorption measurements, avoids chipping. Following this approach, a 20 times faster processing speed can be achieved compared to the conventional manufacturing method.

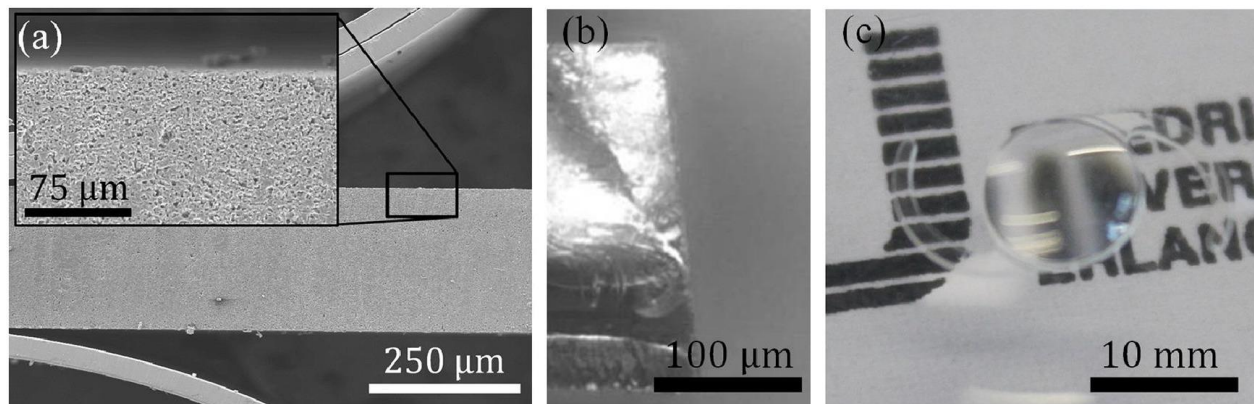


Fig. 1. Results of ultrashort pulsed laser manufacturing of intraocular lenses.