

Maskless laser prototyping of glass microfluidic devices

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We report the use of a picosecond pulsed laser (Trumpf TruMicro 5x50) for the fabrication of various microfluidic devices from inexpensive borosilicate glass substrates. In this manufacturing method, the laser is used to: (a) generate microfluidic patterns directly on the surface of glass plates by ablation and (b) seal the laser-generated microfluidic patterns from the top with another glass plate by welding these two parts together. The laser-generated weld seams close any gaps formed during the so-called pre-bonding process and ensure strong, permanent bonding. This straightforward laser-based fabrication technique differs from the conventional time-consuming and expensive approach that involves photolithography, etching and thermal bonding, because it does not require the manufacture of projection masks and the use of multiple devices, clean room and hazardous chemicals (e.g. hydrofluoric acid). Therefore, this technique is particularly suited for prototyping and low quantity manufacturing of glass microfluidic devices.

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