

Photo-Patternable Materials for Low Temperature Bonding and Thick Microfluidic Channel Fabrication

低温接着および厚膜マイクロ流路チャネル形成用感光性材料

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Abstract

Photo-patternable materials for Low Temperature Bonding (LTB) between a glass cover and a polymer channel and for Low Temperature Channel (LTC) to fabricate thicker microfluidic channel on Si wafer has been developed. The bonding temperature below 40°C has the big advantage that biomolecules can survive the bonding step which happens by means of UV curing. The deeper channels are required in larger molecules such as DNA and proteins. We here report materials feasibility for bio-MEMS applications.

LTB and LTC process for microfluidics fabrication

- 1) LTB: After spin coating LTB on cover glass, the cover glass is aligned to Si wafer (substrate). Then, bond each other by UV cure (i-line, 500mW/cm²). LTB is biocompatibility material which passed cytotoxicity tests based on ISO 10993. LTB also shows high transparent and lower autofluorescence.
- 2) LTC: To make thick microfluidics channel, LTC needs UV exposure (i-line aligner, 1,500mJ/cm² dosage) using lithography mask. The development is done using a solvent-type developer.

Summary

We have introduced photo-patternable materials for low temperature polymer microfluidics both bonding and thick microfluidics channel fabrication. Both materials are applicable to wafer-scale process and promising solutions to microfluidics in bio-MEMS applications.

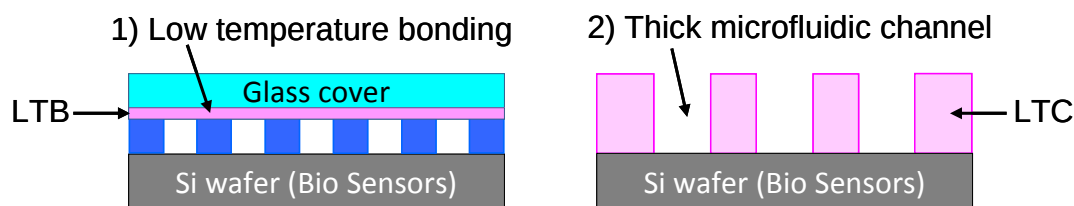


Figure 1 Device structure. 1) Low temperature bonding between polymer channel and glass cover, 2) Thick microfluidic channel fabrication (50μm- 80μm) on Si wafer (e.g. Bio Sensors).

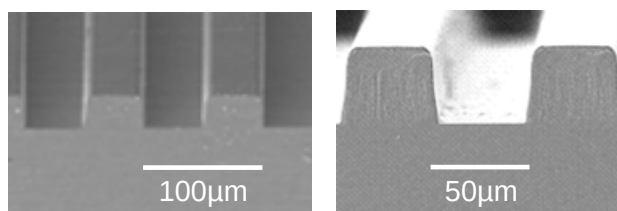


Figure 2 Patterning property of LTC after development. The thickness of LTC film is 50μm.