

### Continuous Fabrication of Multi-layered Complex Film in Microfluidic Device

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We present a microfluidic device generating multi-layered complex laminar flow to fabricate polymeric film. Conventional flow lithography has been conducted in polydimethylsiloxane (PDMS) microfluidic device due to its oxygen inhibition layer at channel walls. However this layer gets gradually inactivated as PDMS channel gets continuously exposed by UV light. This aforementioned phenomenon causes the fabrication limit of product length scale. Thus, in order to fabricate lengthy film via flow lithography we applied vertical laminar flows which mainly consist of three stacks, two stacks are non-photopolymerizable lubrication flows which run close to channel walls and the one in the middle stack is photopolymerizable core flow. The crucial role of lubrication flow is to prevent photopolymerizable core flow from clogging under continuous UV illumination. Here, we used PDMS microfluidic device built up through photolithography and soft-lithographic techniques. The thickness of product was simply controlled by manipulating the flow rate ratio of lubrication and core flows. Moreover we made microfluidic device with multi-core channel to form complex film which is controlled by off-chip valve for on-demand actuation.