Single cell trapping by capillary pumping using NOA81 replica moulded stencils

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Abstract

In this contribution, we demonstrate that the optical adhesive NOA81 (Norland Products Inc.) can be used to replicate optically transparent single cell microsieve structures with exquisite resolution, enabling the fabrication of cheap stencils for single cell trapping applications by the combination of replica moulding and laser micromachining. In addition, we demonstrate an interesting capillary pumping mechanism for gently loading single neuronal cells which eliminates the need for equipment such as pumps and syringes. We demonstrate that capillary pumping through a microsieve generates gentle cell trapping velocities (< 13.3µm/s), enabling reproducible cell trapping efficiencies of 80% with high cell survival rates (90% over 1 week of culture) and facilitating the formation of spatially standardized neuronal networks.