Scientific Contributions: Micromachined Printer for Additive Manufacturing of High-Resolution Protein Arrays

Contact-mode protein deposition systems are incompatible with soft hydrogel surfaces. Electrospray offers the advantage of non-contact deposition at high resolution. We used micromachining tools to create a device with multiple electrospray tips casted from a single silicon wafer and used it to generate multiplexed protein arrays from nanoliter volumes. This approach is innovative because we used micromachining for precision alignment that circumvents the alignment issues in parallel electrospray tips where the current can follow the path of least resistance and render all but one tip non-functional. This is significant because this will lead to high-volume chip manufacturing for proteomics studies and enable a 3D printer for micrometer resolution.

References


(A) Schematic of the microfabrication process for generating electrospray printer heads. (B) Photomask design for the electrospray protein printer head. (Ref: Bhatnagar 2007).

(A) Electrospray multiplexed printer head mounted in operational configuration. (B) Line diagram for the multiplexed electrospray protein printer. (C) Multiplexed protein electrospray on pre-patterned micro-hydrogel surface. (Ref: Bhatnagar 2007).