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Fabrication of Out-of-Plane Electrodes for ACEO Pumps[1] YEHYA SENOUSY, CINDY HARNETT, University of Louisville — This abstract reports the fabrication process of a novel AC Electrosmosis (ACEO) pump with out of plane asymmetric interdigitated electrodes. A self-folding technique is used to fabricate the electrodes, that depends on the strain mismatch between the tensile stressed film (metal layer) and the compressive stress film (oxidized silicon layer). The electrodes roll up with a well-defined radius of curvature in the range of 100-200 microns. Two different electrical signals are connected to alternating electrodes using an insulating silicon nitride barrier that allows circuits to cross over each other without shorting. Electroosmotic micropumps are essential for low-cost, power-efficient microfluidic lab-on-chip devices used in diverse application such as analytical probes, drug delivery systems and surgical tools. ACEO pumps have been developed to address the drawbacks of the DCEO pumps such as the faradic reaction and gas bubbles. The original ACEO microfluidic pump was created with planar arrays of asymmetric interdigitated electrodes at the bottom of the channel. This rolled-up tube design improves on the planar design by including the channel walls and ceiling in the active pumping surface area of the device.

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Yehya Senousy
University of Louisville

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