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A microfluidics device for 3D switching of microparticles using dielectrophoresis

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Abstract: Here we describe the design, modeling, fabrication, and successful utilization of a microfluidic switching device that employs dielectrophoresis to effectively manipulate micro-scale entities in a microchannel. Two sets of opposing interdigitated transducer electrodes are micropatterned at the bottom of the device. The electrodes enter slightly from each side-wall into the channel. Finite Element Analysis and experimental results demonstrate that this design enables 3D switching of micro-objects at any location in the microchannel. Living cells are switched to one of the three downstream branches by varying the actuation voltages on the electrodes.