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Microfabricated Devices for Control of Electric and Magnetic Fields on Cellular Length Scales[1] DANIEL STARK, LAURA TIMMERMAN, LISA BISWAL, ROBERT RAPHAEL, THOMAS KILLIAN, Rice University —
Microfabrication techniques, such as photolithography and electroplating, are increasingly being used to create tools that, in combination with biological imaging, probe the physics of biological systems. With these devices one can exert control over electric and magnetic fields at the cellular length scale. We present here the design and development of two microscale devices. These devices can be used as magnetic micromanipulators that apply piconewtons of force to cells or as stimulators that apply electrical fields up kV/cm. Additionally, these devices can be utilized to probe cell membrane mechanics or to deliver genetic material to individual cells by electroporation.

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