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Electromagnetically-driven capillary switches and oscillators BERNARD MALOUIN, AMIR HIRSA, Rensselaer Polytechnic Institute, MICHAEL VOGEL — By designing pinned-contact, coupled droplet pairs at the appropriate length scale to promote surface tension as the dominant force, one can create bi-stable capillary switches and natural oscillators. These systems have been triggered by pressure pulses, electrochemistry, and electroosmosis. These methods are typically accompanied by bulky setups or slow response times. An alternate approach exploits electromagnetic activation. Our device consists of a millimeter scale orifice, overfilled with an aqueous ferrofluid, in proximity to a wire coil that generates a magnetic field. Experimental evidence of such capillary switches and energy efficient oscillators is presented here. Comparisons to a simplified model are also presented. This activation method is shown to have relatively fast response times, low driving voltages, and individual addressability. Electromagnetically activated capillary switches and oscillators offer many applications ranging from high-speed adaptive optics to micro-actuators, with possible circuit board integration.

Amir Hirsa
Rensselaer Polytechnic Institute

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