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Liquid manipulation via morphological transitions[1] RALF SEEMANN, MARTIN BRINKMANN, EVGENY GUREVICH, STEPHAN HERMINGHAUS, MPI for Dynamics and Self-Organization, D-37073 Goettingen, JEAN-CHRISTOPHE BARET, MICHEL DECRE, Philips Research Laboratories, NL-5656AA Eindhoven — Liquid deposited on rectangular grooves, has a variety of possible liquid morphologies determined by the contact angle, θ, and the exact channel geometry. In our experiments, electrowetting is used to tune θ reversibly from 100 to 50 °, leading to a reversible transition between a drop- like morphology at large θ and extended liquid filaments for small θ. The transition is capillarity-driven but the behavior of the liquid above the transition is influenced by the electrical properties of the liquid. The static length of the liquid filament is a function of the applied Voltage and is in perfect agreement with a simple transmission-line model. Emphasis is put on the dynamic aspects of the filling and the draining behavior that follow a modified Washburn law. In case of thin and elastic ridges separating two grooves the cross talk of the liquid morphologies with the elastic substrate has an ordering effect on the position of the droplets.

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