Electronic Supplementary Material (ESI) for Lab on a Chip.


**Supplementary Figures and Videos for**

# A fast, reconfigurable flow switch for paper microfluidics based on selective wetting of folded paper actuator strips

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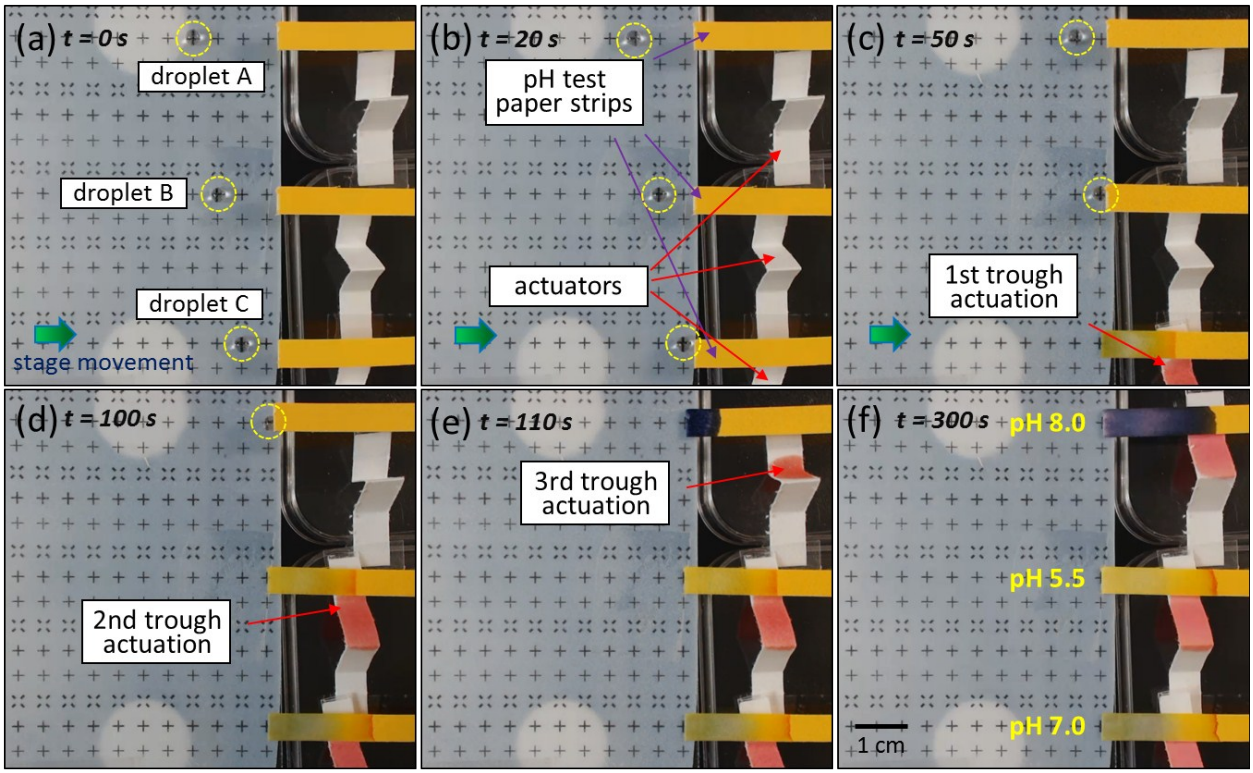


**Figure S1** SPST normally OFF switches used to actuate pH test paper strips where the pH levels of discrete droplets are detected with user-defined delays. (a, b) Three discrete droplets (pH = 8.0, pH = 5.5, and pH = 7.0 (control)) are dispensed on hydrophilic 'plus (+)' symbols printed on a super-hydrophobic plastic sheet. The sheet is taped to a Plexiglas stage whose three-dimensional movement is controlled by a motorized actuation system as described previously.[64] The volume of each droplet is 15 µL. Three pH test paper strips are placed next to the actuation system and supported by SPST (normally OFF) switches. The actuation system is rapidly tilted in the right direction (denoted by the block green arrow) causing the droplets to move to the neighboring hydrophilic symbols. (c-e) Each trough is actuated when the droplet reaches the symbol underneath the respective pH test paper strip. The droplets are absorbed into the pH test paper strips, producing distinct color changes. The time delays in droplet movement and absorption in the pH test paper strip are controlled by the motorized actuation system and paper-based switches, respectively. Representative time delays for each operation are mentioned in the above figure. (f) By comparing the produced color changes of the pH test paper strips with manufacturer's reference table, the pH levels of the three droplets are obtained. Scale bar = 1 cm.

***Additional Video files:***

**Supplemental video 1.** Operations of the paper actuator: Single-Pole Single-Throw (normally OFF), Single-Pole Single-Throw (normally ON), Single-Pole Double-Throw (single break, crest actuation), and Single-Pole Double-Throw (single break, crest and trough actuation).

**Supplemental video 2.** Parallel operations of multiple actuators are demonstrated during the simultaneous detection of glucose, nitrite, and protein in artificial saliva.