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Regulating flow with substrate shape in capillary micropumps MATTHEW HANCOCK, Brigham & Women's Hospital, JOHN BUSH, MIT — Capillarity offers a passive mechanism to pump fluid through portable lab-on-a-chip systems, making them ideal for rapid in situ analysis of medical samples in the developing world. A common capillary micropump design is powered by the difference in curvature pressures between drops at the inlet and outlet of a microchannel. The resulting flow rate is transient, depending on the geometry of the inlet cavity and the instantaneous droplet volumes. We here present a class of microcavity shapes that maintain constant pressure within droplets regardless of their volumes. This special class of microcavities may prove useful for regulating pressure in microfluidic devices. We suggest the design of a passive capillary micropump fitted with a special pressure regulating inlet cavity that forces a constant flux through a microchannel. The influence of gravity on this class of microcavities is considered.

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