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

Electronic Supporting Information

DYNAMIC CONTROL OF CAPILLARY FLOW IN POROUS MEDIA BY ELECTROOSMOTIC PUMPING

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Penetration distance and filling time in porous media – high ionic strength

Figure 3 in the main text presented the experimental measurements of the penetrated distance (squared, L^2) vs time, for various EO-pump voltages (0, 100, 150 and 200 V), for a 10 mM ionic strength buffer. Figure S1 presents similar measurements performed using a 100 mM Tris-HCl buffer. The results in both experimental conditions are very similar, though with a slightly lower fitting quality for the high ionic strength data, which may be attributed to accumulation of electrolysis bubbles near the electrodes at the higher electric currents.

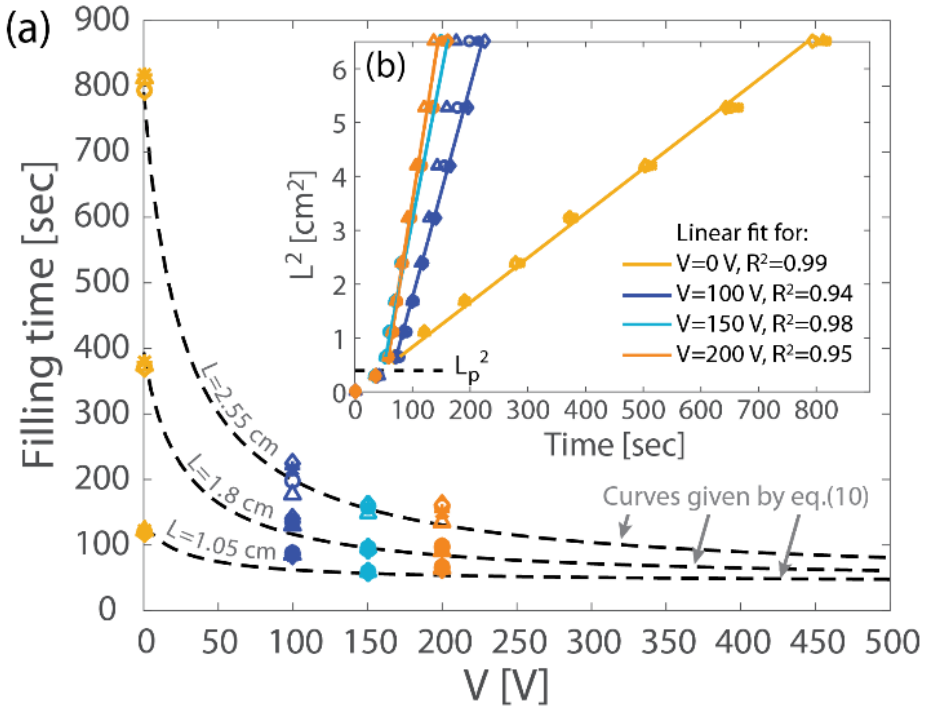

Figure S1. *Experimental results and their fitting to the analytical model for capillary filling in porous media with and without EO pumping. (a) Experimental results (four repeats) showing the filling time vs. applied EO-pump voltage for three different penetration distances (L=1.05, 1.8 and 2.55 cm). Each marker shape represents an individual experiment, and the dashed lines represent the theoretical times obtained by eq.(10). (b) The same experimental results showing penetration distance squared, L^2, vs. time. The EO-pump zone length is indicated as L_p^2. Each marker shape represents an individual experiment, and the solid lines represent the linear least squares fit to L^2, expressed by eq.(9), with $\cos\theta/\tau$ and ζ/τ serving as the free fitting parameters. Results show that the EO-pump can significantly shorten the filling time to a given distance, with greater gain for longer filling distances. The buffer solution is 100 mM Tris-HCl, pH 8.*