Supplemental Material

Rapid inoculation of single bacteria into parallel picoliter fermentation chambers

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S1. Capillary force calculation

The pressure (p_c) generated by the capillary force can be expressed by Equation S 1:

$$p_c = -\gamma_{lg}\left(\cos\theta \frac{dA_{sl}}{dV_1} - \frac{dA_{lg}}{dV_1}\right) \qquad \text{Equation S 1}$$

where γ_{lg} refers to the surface tension of the liquid, θ to the contact angle, A_{sl} to the solid/liquid interfacial area, A_{lg} to the liquid/gas interface interfacial area and V_1 to the liquid volume of the channel.

For a rectangular channel with constant cross-section and w >> h, the Young-Laplace equation can be obtained (Equation S 2).

$$p_c = -\gamma_{lg}\cos\theta\left(\frac{2}{h}\right) \qquad \text{Equation S 2}$$

The pressure of one subchannel (p_c) with a height of 10 µm, a surface tension γ = 0.07 Nm^{-1} and a contact angle θ = 111° induced by capillary force was found to be approximately 120 mbar using Equation S 2. Thus the fivefold capillary pressure of 600 mbar pushes the injected air bubble into its operational position.

S2. Fitting of experimental data

Fitting of the experimentally obtained data for the air bubble removal was done accordingly to Kang et *al.*[31] Based on the gas permeation, Equation S3 was derived for the shrinkage of the bubble cross-sectional area *A* over time.

$$A(t) = c_1 exp\left(\frac{aP(p_1 - p_2)}{hb} \frac{T * 76}{273P_{atm}} t\right) + c_2 \qquad \text{Equation S 3}$$

Appropriate values for the permeability *P*, channel height *h*, membrane thickness *b* and temperature *T* were chosen based on the material and geometry. The constants c_1, c_2 and *a* were obtained from fitting Equation S 3 to the experimental values.

The values derived for c_1, c_2 and *a* by Equation S 3 are depicted in Table S 1 for P = 1.92×10^{-15} m^2 s^{-1} Pa^{-1}, h = 1×10^{-3} cm, b = 0.3 cm, P_{atm} = 76 cm Hg, and T = 298 K.

Table S 1: Values of c_1, c_2 and *a* derived from experimental data at 300 mbar, 400 mbar and 500 mbar with P = 1.92×10^{-15} m^2 s^{-1} Pa^{-1}, h = 1×10^{-3} cm, b = 0.3 cm, P_{atm} = 76 cmHg, and T = 298 K.

p [mbar]	c_1	c_2	*a*
300	9.92e+03	5.73e+07	-1.49e+03
400	5.74e+03	5.29e+07	-1.80e+03
500	3.80e+03	9.09e+07	-8.15e+02