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


# Fracture Fabrication of a Multi-scale, Channel Device that Efficiently Captures and Linearizes DNA from Dilute Solutions

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Local DNA concentration in the closed ‘deep’ channel.

The applied strain was released when a single λ-DNA molecule was positioned inside the open ‘deep’ channel. The ‘deep’ channel volume in the absence of the applied strain ($V_{closed}$) was approximately 0.366 fl, as calculated below:

$$V_{closed} = channel\ cross-sectional\ area \times channel\ length = 0.00122\ \mu m^2 \times 300\ \mu m \times 10^{-15}\ l$$

The weight of the single λ-DNA molecule ($wt_{\lambda-DNA}$) is:

$$wt_{\lambda-DNA} \cong \frac{molecular\ weight\ of\ \lambda-DNA}{Avogadro's\ Number} = \frac{3.2 \times 10^7}{6.022 \times 10^{23}} = 5.31 \times 10^{-17} g$$

The local concentration of the single λ-DNA molecule in the closed ‘deep’ channel ($C_{closed}$) could, thus, be calculated as follows:

$$C_{closed} = \frac{wt_{\lambda-DNA}}{V_{closed}} = \frac{5.31 \times 10^{-17}\ g}{0.366 \times 10^{-15}\ l} \cong 145\ ng/\mu l$$

Consequently, the final DNA concentration present within the closed ‘deep’ channel was approximately 145,000 times higher relative to the concentration of the initial DNA stock solution ($C_{stock} \sim$ 1 pg/μl).

$$\frac{C_{closed}}{C_{stock}} = \frac{145\ ng/\mu l}{1\ pg/\mu l} = 145{,}000$$