Electronic Supplementary Material (ESI) for Lab on a Chip

Supplementary material

An integrated PCR microfluidic chip incorporating aseptic electrochemical cell lysis and capillary electrophoresis amperometric DNA detection for rapid and quantitative genetic analysis

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Figure S1: Schematics for fabrication of integrated microchip on glass substrate using photolithographic technique.

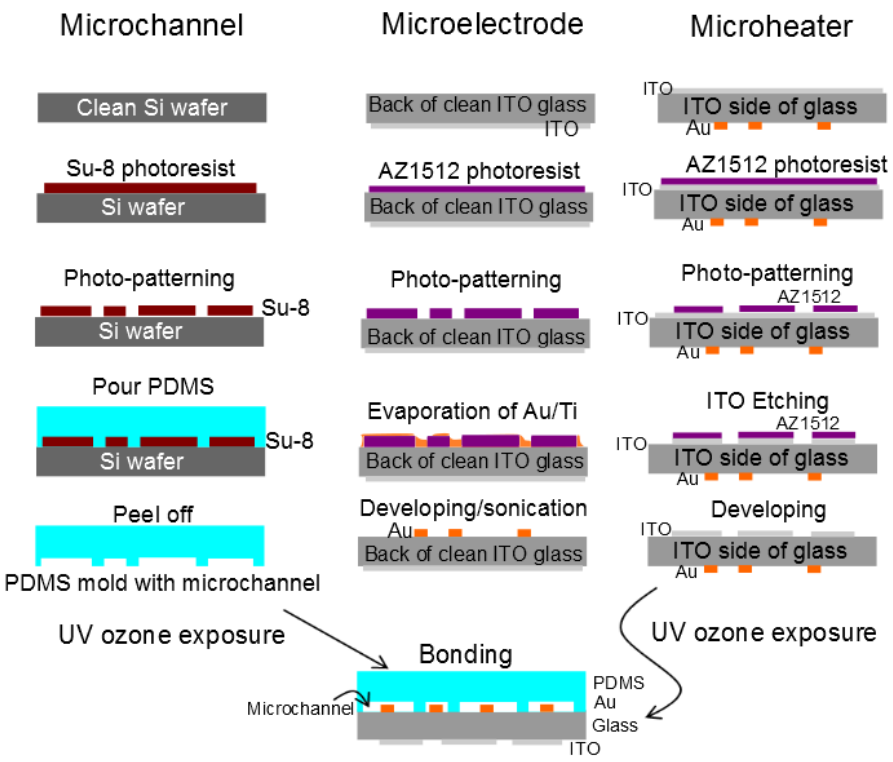
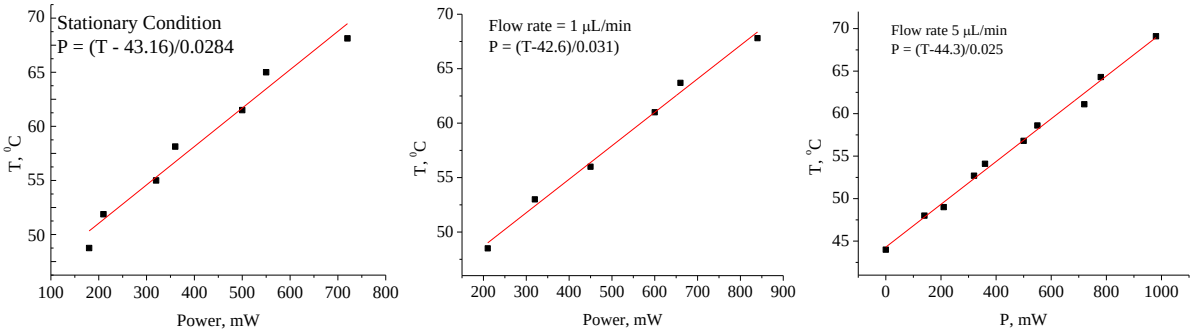


Figure S2: Temperature calibration of ITO microheater with flow of deionized water: Upon flowing DI water into the microchannel, the temperature of glass plate containing ITO microheater was recorded at extension zone (using thermocouples inserted in the path) with different flow conditions: (a) no water flow, (b) at 1 µl/min flow rate and (c) at a flow rate of 5 µl/min.

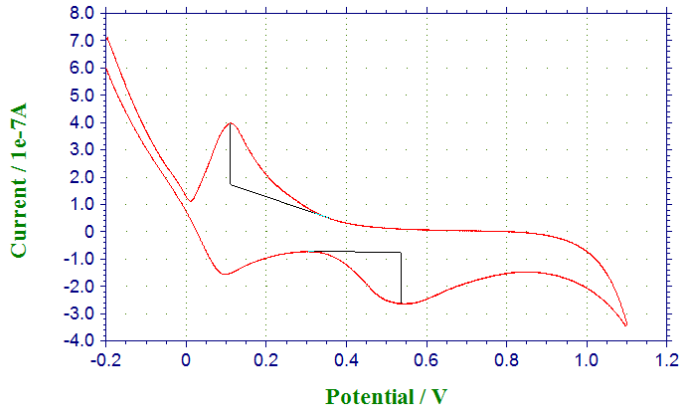


(a) (b) (c)

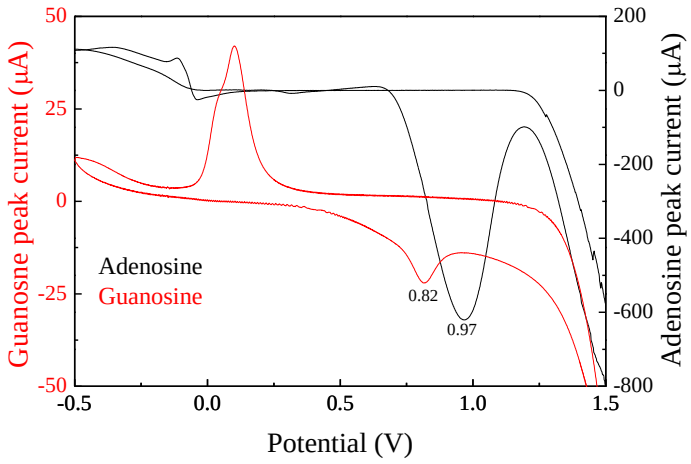
Table S1

Flow rate (µL/min)	Equation [**P = 35.8×(T-43.4)**]	Av. Power for 92 ^{0}C (**17-18V**)	Av. Power for 72 ^{0}C (**9-10 V**)
0	P = 35.2 × (T - 43.2)	18V (99mA) = 1782 mW	10V (121mA) = 1210 mW
1	P = 32.3 × (T - 42.6)	17V (95mA) = 1615 mW	9V (120mA) = 1100 mW
5	P = 40.0 × (T - 44.3)	17V (95mA) = 1615 mW	9V (120mA) = 1100 mW

Figure S3: Conventional cyclic voltammetric (CV) studies of (a) gold electrode and (b) 100 mM adenosine and guanosine in 100 mM NaOH solution. Adenosine and guanosine showed well defined oxidation peak at 0.82 V corresponding to guanosine and 1.1 V for adenosine



(a)



(b)

Figure S4: CE-AD of Bst-EII digest of lambda phage genomic DNA (5 µl sample used, 350 ng DNA/peak): electropherogram obtained without FFT filter (a) and with FFT filtering (b); DNA mobility calculated from data obtained after FFT filtering (c) and reproducibility of CE-AD experiment as shown with DNA mobility data (with FFT filtering) (d).

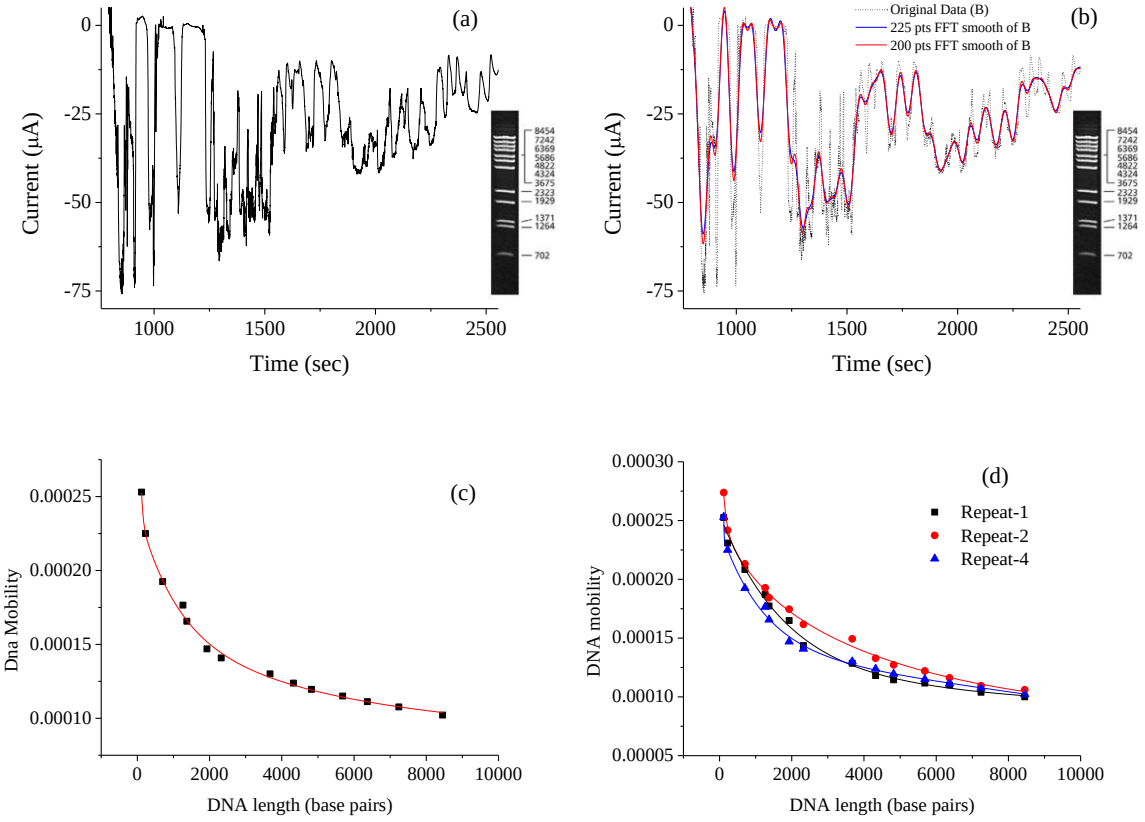
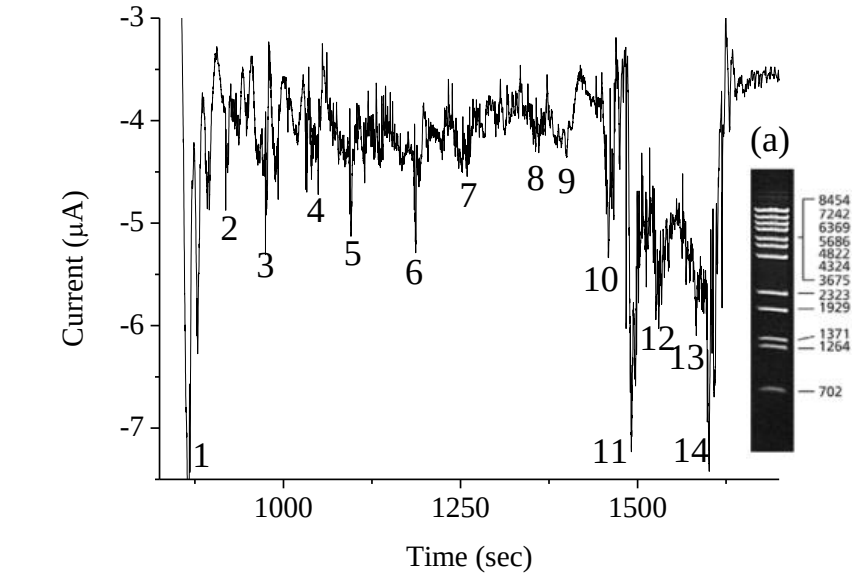


Figure S5: (a) CE-AD of lower concentrations of DNA (0.25 µl sample used, 17.85 ng/peak). No FFT filtering was performed in this case as there was less noise, (b) DNA mobility data calculated for this set of results and was similar to higher concentrations of DNA



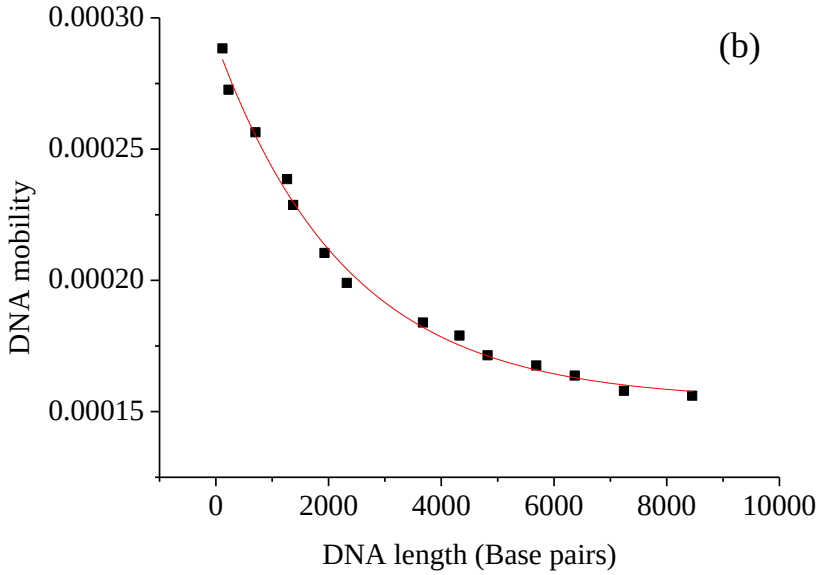


Figure S6: CE-AD limit calculation: noise in separation medium (~1 ng)

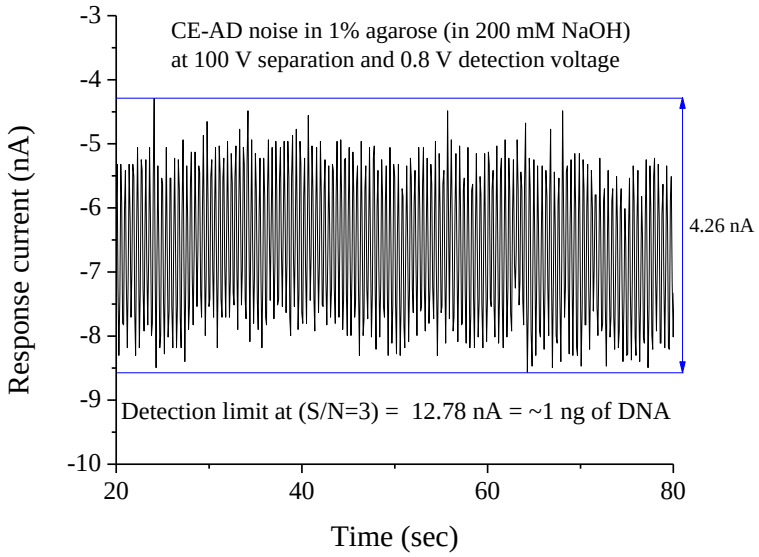


Table S2: Equations used for curve fitting in Origin Version 8.5

ExpDec3 Equation (for calculating DNA mobility):

$$y = A_1 e^{-x/t1} + A_2 e^{-x/t2} + A_3 e^{-x/t3} + y_0$$

HyperbolaGen Equation (for calculating DNA Migration time):

$$y = a - \frac{b}{(1 + cx)^{1/d}}$$

Hill1 Equation (for calculating DNA concentration):

$$y = start + (End + Start)\frac{x^n}{k^n + x^n}$$