

Supplementary Materials

PCR based-detection in a micro-fabricated platform

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Description of the Control Apparatus and the Optical Detection Setup

The input to the PC board was provided by a twenty-six pin edge connector, soldered to external wiring connected to several electronic modules including a programmable power supply (Sorensen, Qnobatron QRB30-1) and a digital multimeter (Agilent Technologies, HP 3478A) operated in the four wire mode and connected to the on-chip RTD. Another identical digital multi-meter was used to read the commercial four wire thermocouple (Omega). All external electronic modules possess a GPIB interface and were controlled using two flexible LabView programs capable of calibration and thermal control. The code read a matrix of time temperature data from an EXCEL file and translated this to the power supply which supplied the power differential. The microscope was further mounted with a photomultiplier tube module (Hamamatsu, H5784-02) which received a ± 15 V input from a dual pole power supply (Leader LPS 152 – DC Tracking Power Supply) and another input of 0-1 V gain voltage for an input amplifier through a Agilent- E3648A (Dual O/P DC Power Supply). The output of the PMT was connected to another Digital Multimeter having a GPIB interface which was used to read voltages (proportional to the sensed fluorescence response). All imaging was done using a FITC

filter (Model # C13908) with the following specifications: Excitation Filter Wavelengths: 465-495 nm (bandpass, 480 CWL), Dichromatic Mirror Cut-off Wavelength: 505 nm (longpass, LP), Emission Filter Wavelengths: 515-555 nm (bandpass, 535 CWL). The circuit details of the PMT are shown in Figure S1 of the supplementary section. Two signal generators (Agilent technologies, 33220A Function/ Arbitrary Waveform Generator, 20 MHz and 33250A Function / Arbitrary Waveform Generator, 80 MHz) were used to trigger the diversion of bacterial cells in the bigger chamber as well as the DEP inside the smaller chamber.

Supplementary Figure Captions

Figure S1: Circuitry associated with the photo multiplier tube.

Figure S2: (a) Two regions around the DEP diversion electrodes showing distribution of GFP expressed bacterial cells at concentration of 10^5 cells/ml without any active trapping for after 20mins at a flow rate of $0.5\mu\text{l}/\text{min}$, (b) Two regions around the DEP diversion electrodes showing distribution of GFP expressed bacterial cells at concentration of 10^5 cells/ml with active trapping for after 20mins at a flow rate of $0.5\mu\text{l}/\text{min}$.

Figure S3: Thermal cycling profile of the PCR module.

Figure S4: Raw data for 10^8 cells/ml of pre and post-PCR fluorescence signal. The solid lines represent the fluorescence data from different areas of the microchip from Post PCR solution and the broken lines represent the same from pre PCR solution.

Table S1: Summary of fluorescence data.

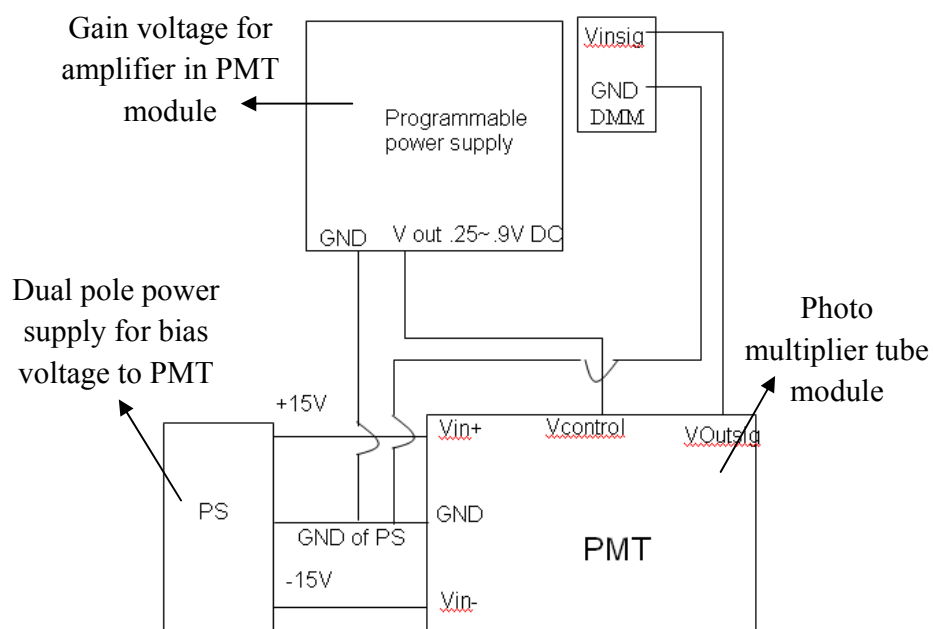


Figure S1

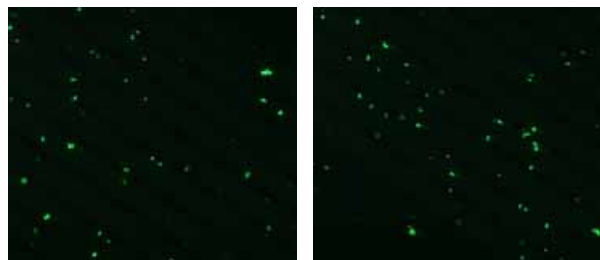


Figure S2(a)

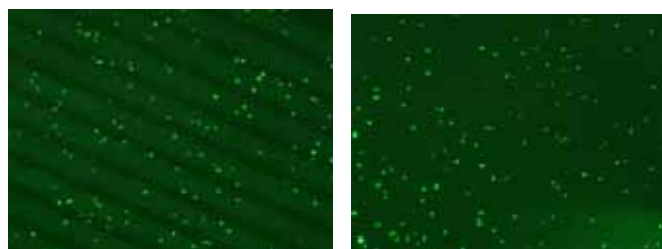


Figure S2(b)

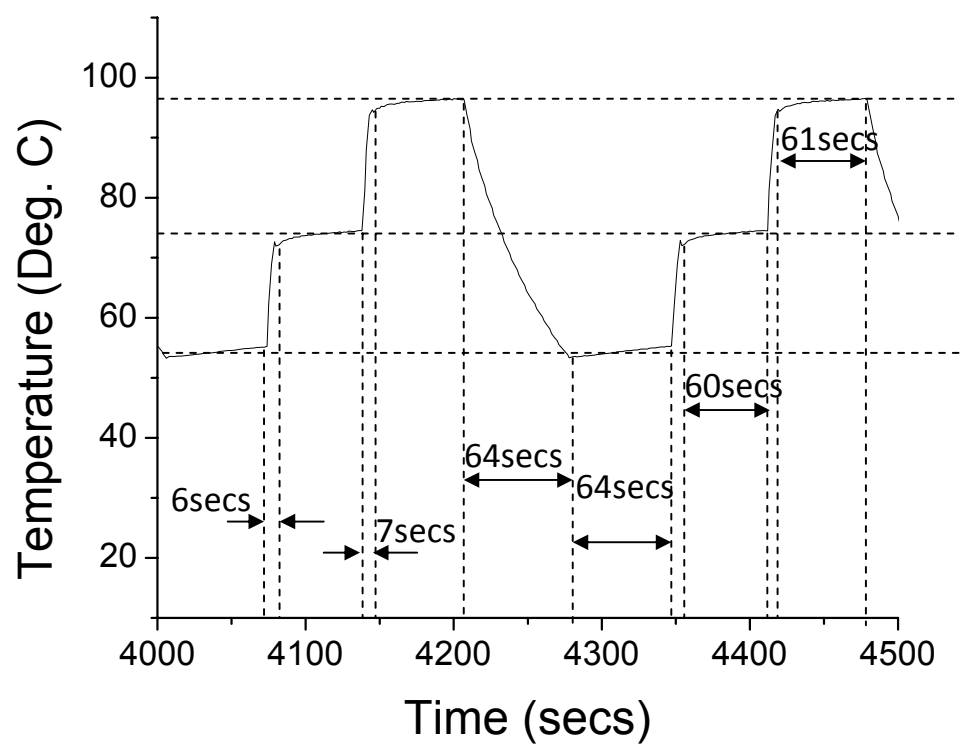


Figure S3

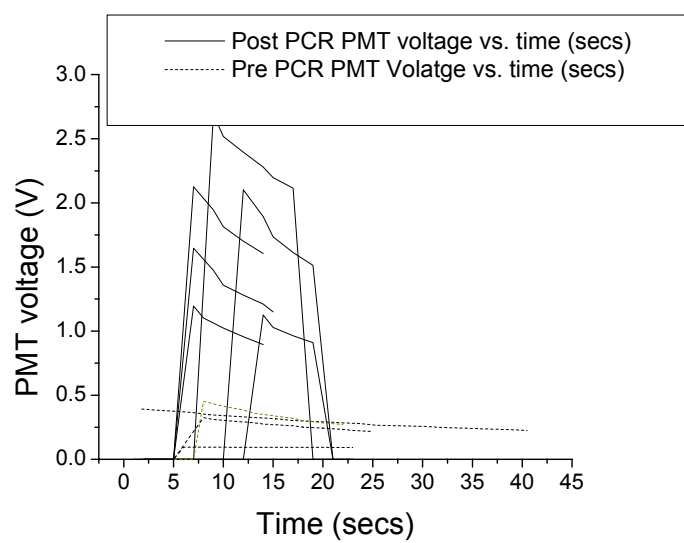


Figure S4

Supplementary Table S1: Summary of Fluorescence Data

Trial type	Sample details	Pre PCR Normalized Fluorescence	Post PCR Normalized Fluorescence	% increase In fluorescence
Without DEP	No Template Control	1	1.4	40
	10 ⁸ cells/ml	1	6.03	503
	10 ⁷ cells/ml	1	5.48	448
	10 ⁶ cells/ml	1	2.77	177
	10 ⁵ cells/ml	1	2.09	109
With DEP	10 ⁵ cells/ml	1	4.39	339
	10 ⁴ cells/ml	1	3.20	220
Specificity Trials Without DEP	<i>Listeria Innocua</i> + <i>E. coli</i> (control)	1	1.16	16
	10 ⁸ cells/ml (<i>Listeria Innocua</i> + <i>E. coli</i> + <i>Listeria Monocytogenes</i> V7)	1	2.67	167
	10 ⁷ cells/ml (<i>Listeria Innocua</i> + <i>E. coli</i> + <i>Listeria Monocytogenes</i> V7)	1	1.63	63
	10 ⁶ cells/ml (<i>Listeria Innocua</i> + <i>E. coli</i> + <i>Listeria Monocytogenes</i> V7)	1	1.47	47