Supplementary Material (ESI) for Lab on a Chip

Rapid Thermal Lysis of Cells using Silicon-Diamond Microcantilever Heaters

Natalya Privorotskaya[1*], Yi-Shao Liu[2*], Jungchul Lee[1], Hongjun Zeng[5], John A. Carlisle[5], Adarsh Radadia[2,4], Larry Millet[2,4], Rashid Bashir[2,3,4], and William P. King[1,4]

[1]*Department of Mechanical Science and Engineering, University of Illinois Urbana-Champaign*
[2]*Department of Electrical and Computer Engineering, University of Illinois Urbana-Champaign*
[3]*Department of Bioengineering, University of Illinois Urbana-Champaign*
[4]*Micro and Nanotechnology Laboratory, University of Illinois Urbana-Champaign*
[5]*Advanced Diamond Technologies, Inc., Romeoville IL*

List of Figure Captions – Supplemental Material

Figure 1. a) Simulation showing heating of 20 μl of solution containing suspended NIH 3T3 fibroblast cells or *L. monocytogenes* V7 upon electrical heating of Si-UNCD cantilever free end to 93 °C. Cross-section is taken 50 μm from the cantilever free end, where cantilever temperature is maximum; b) a close-up view of the cantilever free end and surrounding solution for the same conditions as in a). The monolayer of cells on the cantilever surface is within 9% of the targeted temperature value.

Figure 2. Overlaid images of the cells with various fluorescent stains showing co-localisation of cell membranes and nucleuses before and after cell lysis.

Figure 3. a) SEM image of *Listeria monocytogenes* V7 on Si-UNCD cantilever, b) close up view of bacteria on UNCD surface.

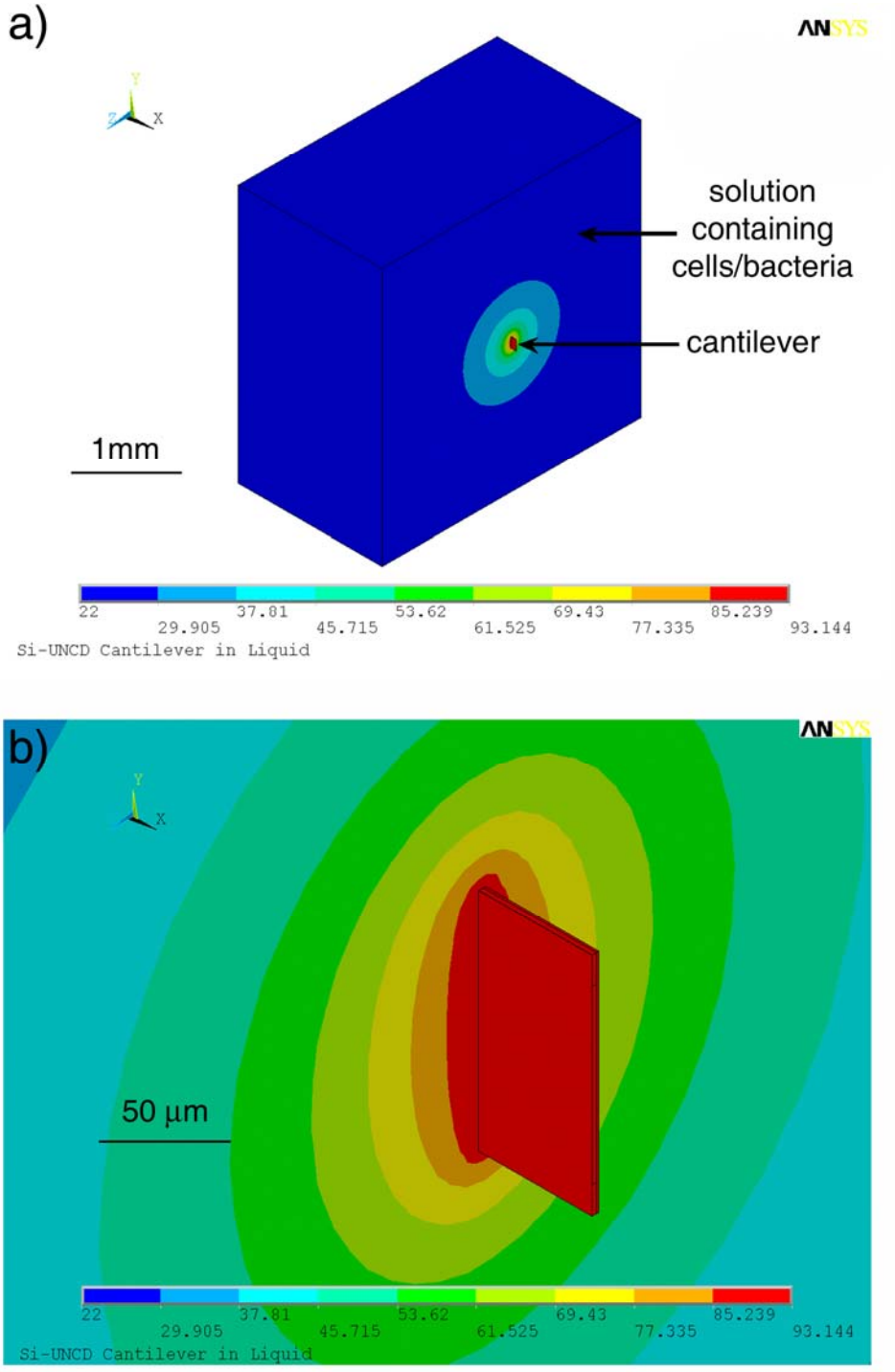
a)
ANSYS
solution
containing
cells/bacteria
cantilever
1mm
22
29.905
37.81
45.715
53.62
61.525
69.43
77.335
85.239
93.144
Si-UNCD Cantilever in Liquid
b)
ANSYS
50 µm
22
29.905
37.81
45.715
53.62
61.525
69.43
77.335
85.239
93.144
Si-UNCD Cantilever in Liquid

Figure 1.

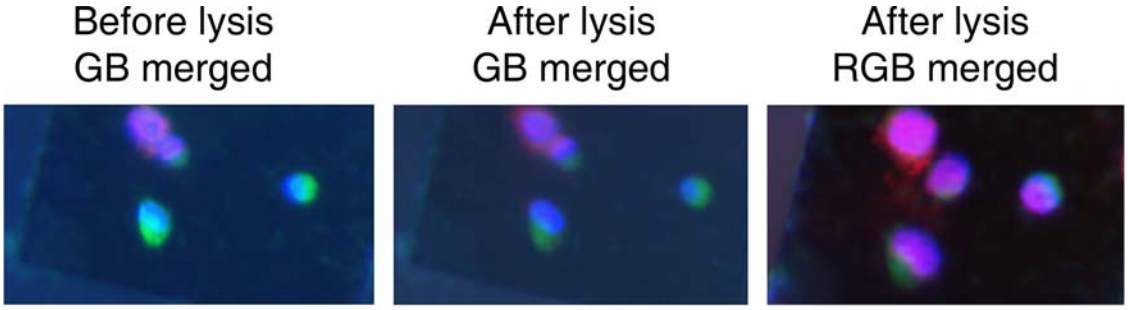
Before lysis
GB merged
After lysis
GB merged
After lysis
RGB merged

Figure 2.

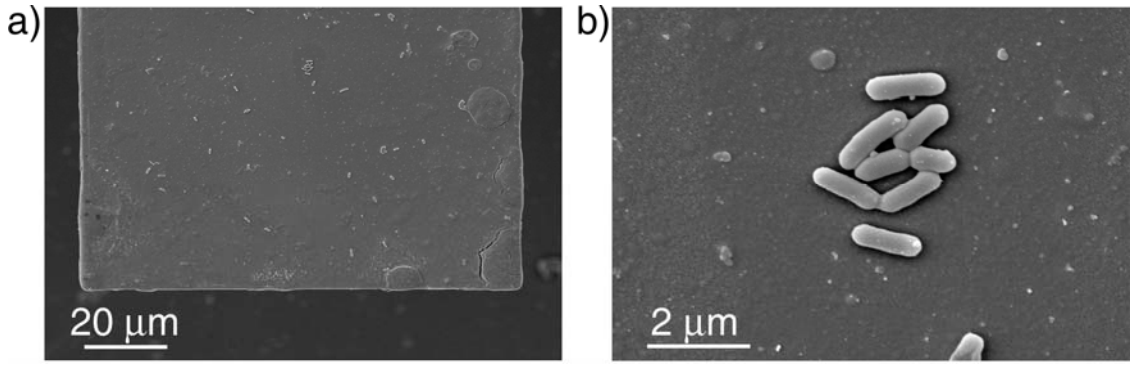

Figure 3.