Supporting Information

Wide field-of-view on-chip Talbot fluorescence microscopy for longitudinal cell culture monitoring from within the incubator

Chao Han,[1][§]* Shuo Pang,[1][§] Danielle V. Bower,[2] Patrick Yiu,[1] and Changhuei Yang [1]

1 Electrical Engineering, California Institute of Technology, Pasadena, CA 91125, USA

2 Division of Biology and the Biological Imaging Center, California Institute of Technology, Pasadena, CA 91125, USA

§ These authors contributed equally to this work.

* Corresponding author. Email: chan@caltech.edu   Fax: (626) 395-3786

Supplementary figures:

Figure S-1	The fabrication process of the microfluidic component and its packaging with the image sensor
Figure S-2	The measurement of sensor surface temperature
Figure S-3	Cell segmentation and counting using the watershed algorithm

Supplementary movie:

Movie S-1. The wide FOV time-lapse imaging of the HeLa cells expressing H2B-eGFP at 33 min intervals over a total duration of 24.8 hours.
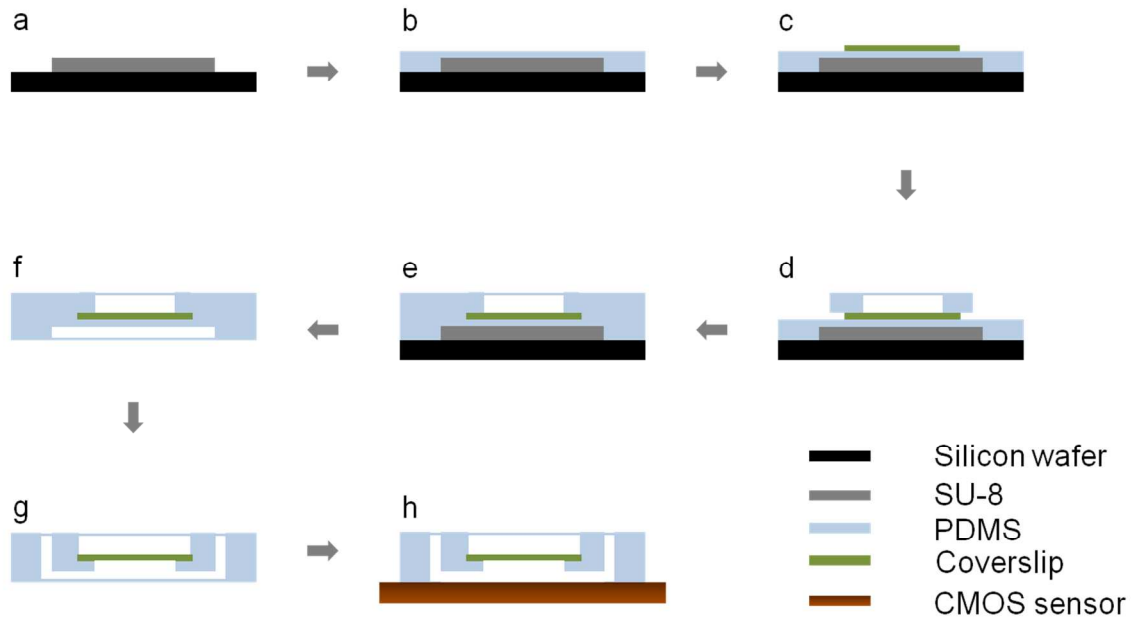
Figure S-1. The fabrication process of the microfluidic component and its packaging with the image sensor. (a) SU-8 photoresist with a thickness of 200 μm was patterned onto a 3-inch silicon wafer to form a master. (b) Liquid PDMS prepolymer solution was poured onto the master and cured at 80 °C for 1 h. (c) A 5 mm diameter coverslip was aligned and attached above the SU-8 culture chamber pattern. (d) Another PDMS block with a 4 mm diameter hole was aligned and attached to the coverslip. (e) The PDMS prepolymer was again poured onto the first PDMS layer, and cured at 80 °C for 1 h to fill the gap around the coverslip. (f) The whole PDMS structure was peeled off from the master. (g) The PDMS layer beneath the coverslip was removed and the 4 mm diameter hole above the coverslip was enlarged to 5 mm. A 1 mm hole was punched at the end of each channel to form the inlet and outlet. (h) The structure was attached to a filter-coated CMOS sensor with the edges sealed by PDMS.
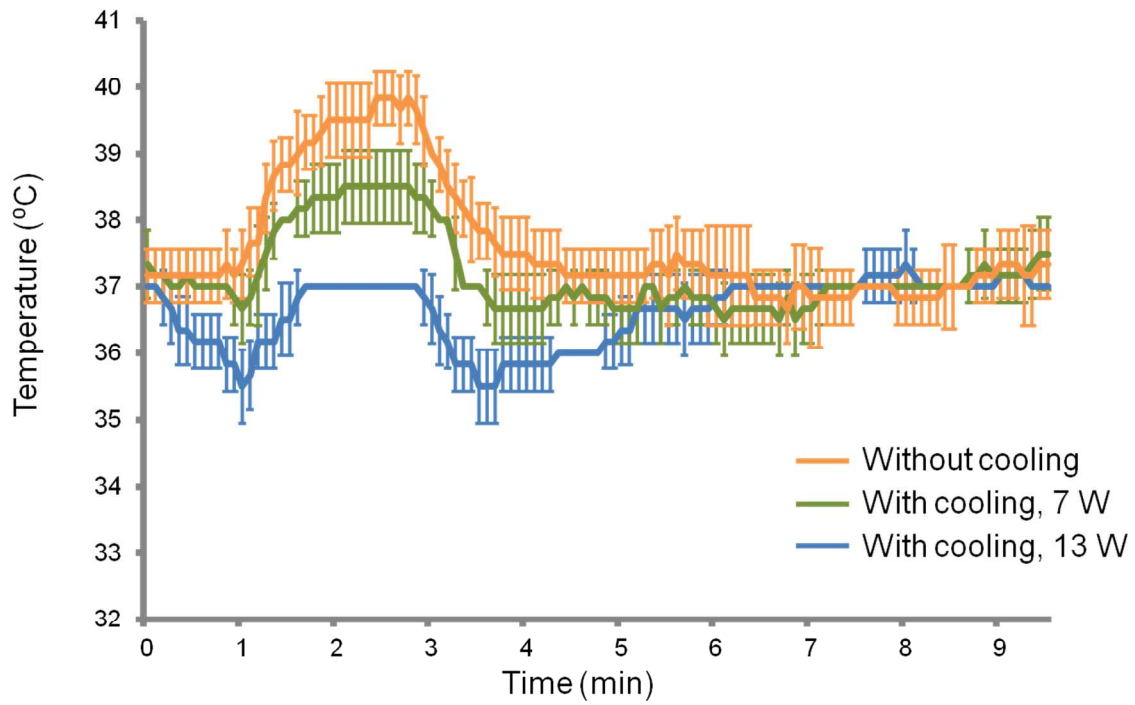
Figure S-2. The measurement of sensor surface temperature during the imaging of a 13 mm^2 area. Six measurements were repeated in total. The 0-1.0 min is for pre-cooling, 1.0-2.4 min for imaging, and 2.4-2.9 min for data storage.
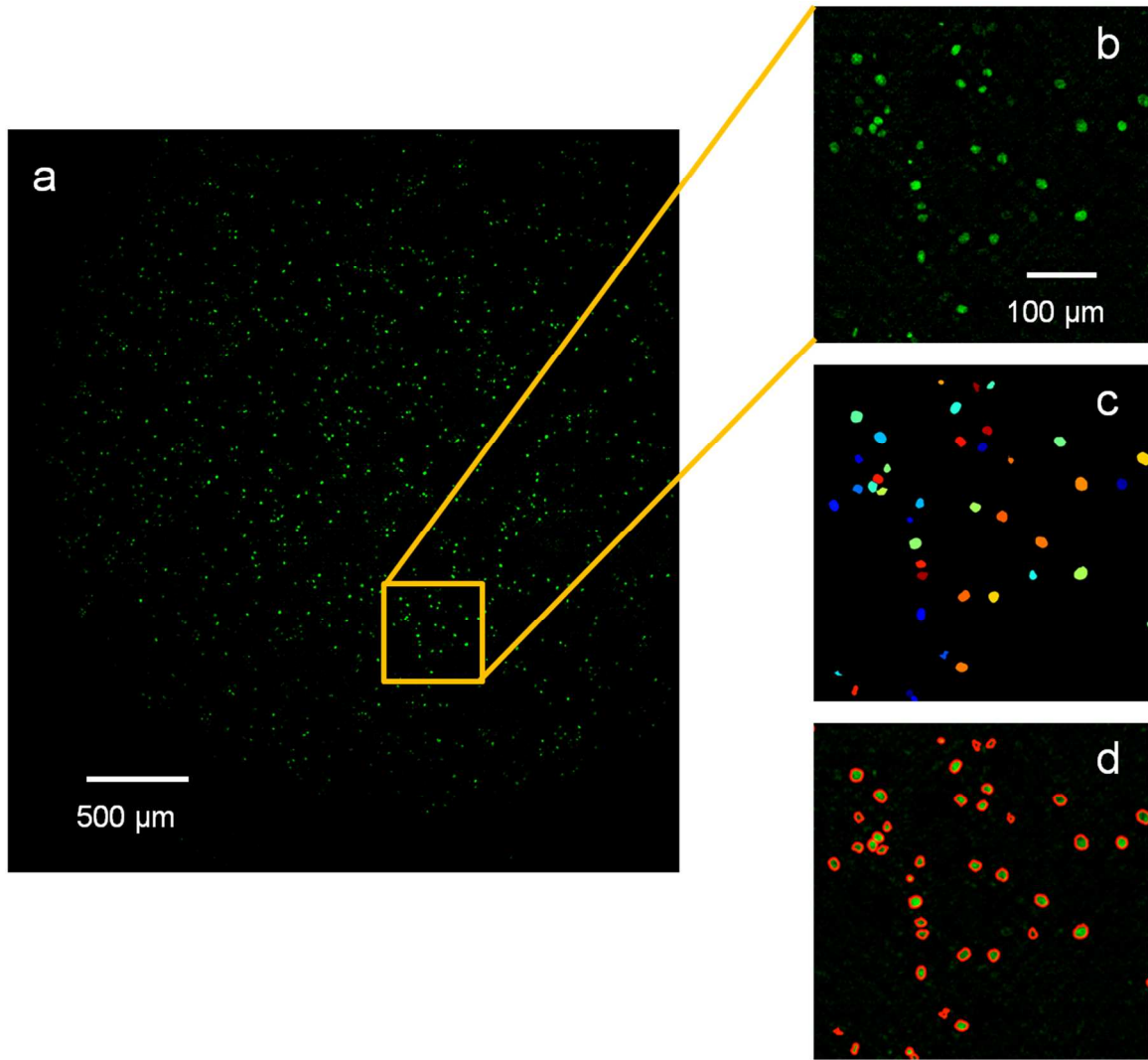
Figure S-3. Cell segmentation and counting using the watershed algorithm. (a) The reconstructed high resolution image. (b) A typical region from (a). (c) The result of the segmentation by the watershed algorithm. (d) The segmentation result overlaid with the original image.