Online Supporting Information for
A Microfluidic Concentrator Array for Quantitative Predation Assays of Predatory Microbes

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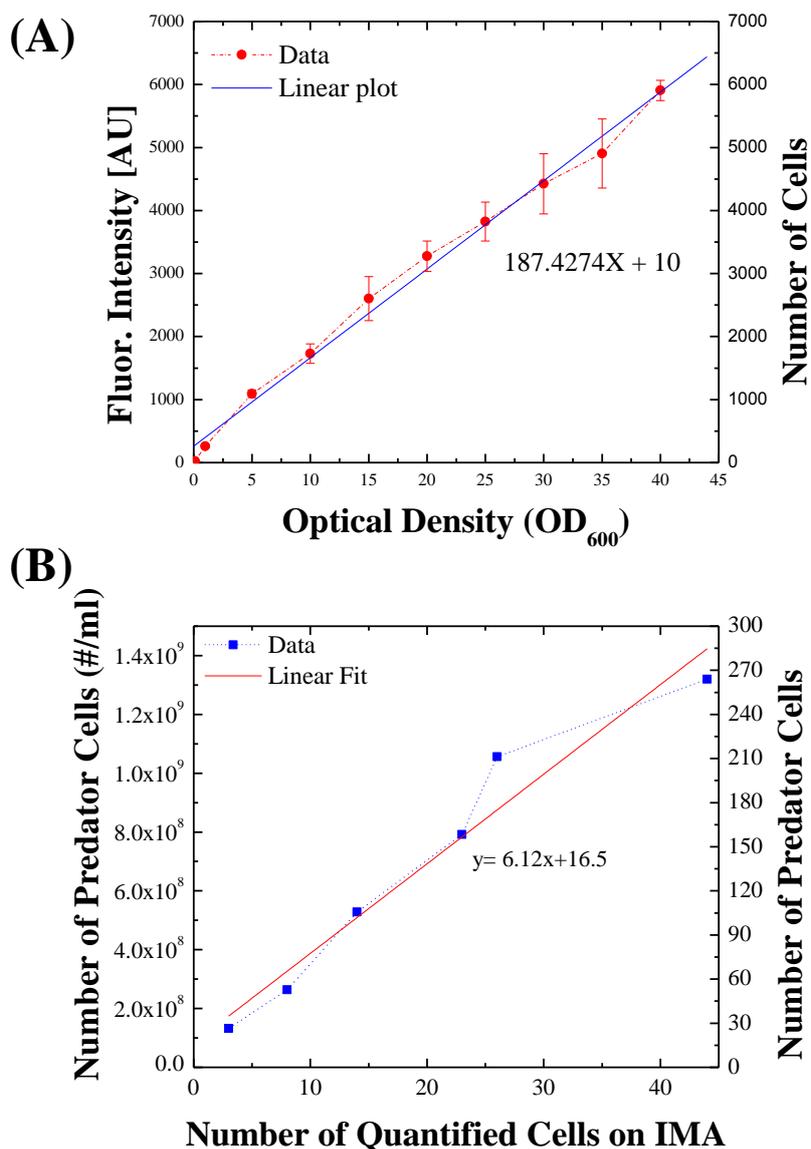
Figure S1 (A) The calibration curve between the prey cell density and its corresponding fluorescent intensity. The right *y*-axis indicates the number of the prey cells in the concentrator in 100 μm diameter. (B) The calibration curve between the predator cell density from the Plaque Forming Unit (PFU) data and its corresponding Image Morphometry Analysis (IMA) values that are obtained from Metamorph software used in this work. The prey and predator cells of which densities/numbers are known were used to fill 25 μm deep microchannels and then fluorescent and phase contrast signals were measured to relate the number/density of cells with the measured signals for the calibration.
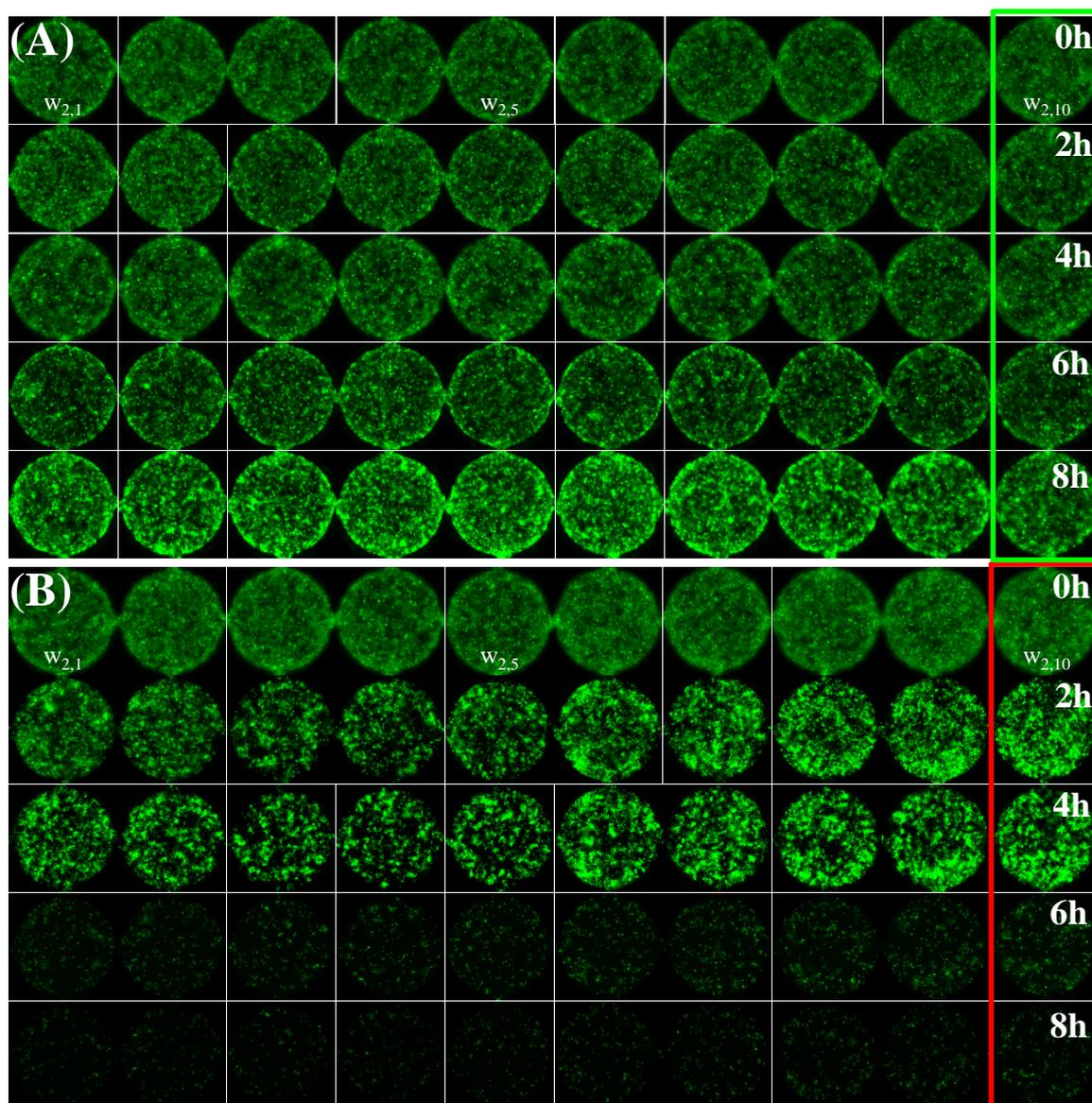
Figure S2 (A) The prey cells are concentrated in the concentrator array for 1 hour, amounting to about 1800 cells in the absence of the predator cells as control. (B) For the predation experiment, the prey cells are concentrated in another device and then predator cells are additionally loaded and concentrated, amounting 2000 and 5500 cells (R_{pp}=0.36), respectively. The green and red rectangles indicate the reproduced images shown Figure 5(A) and (B) in the main text.
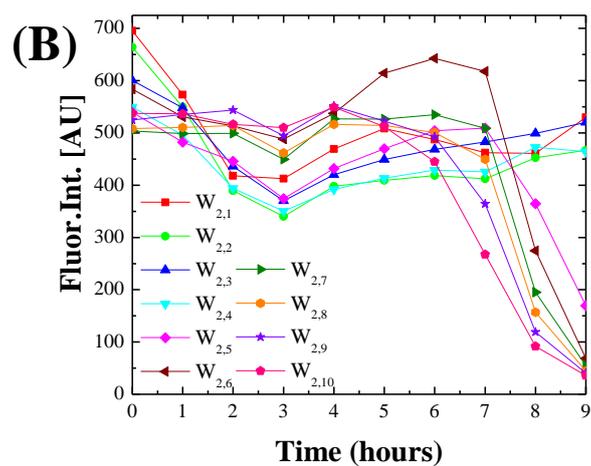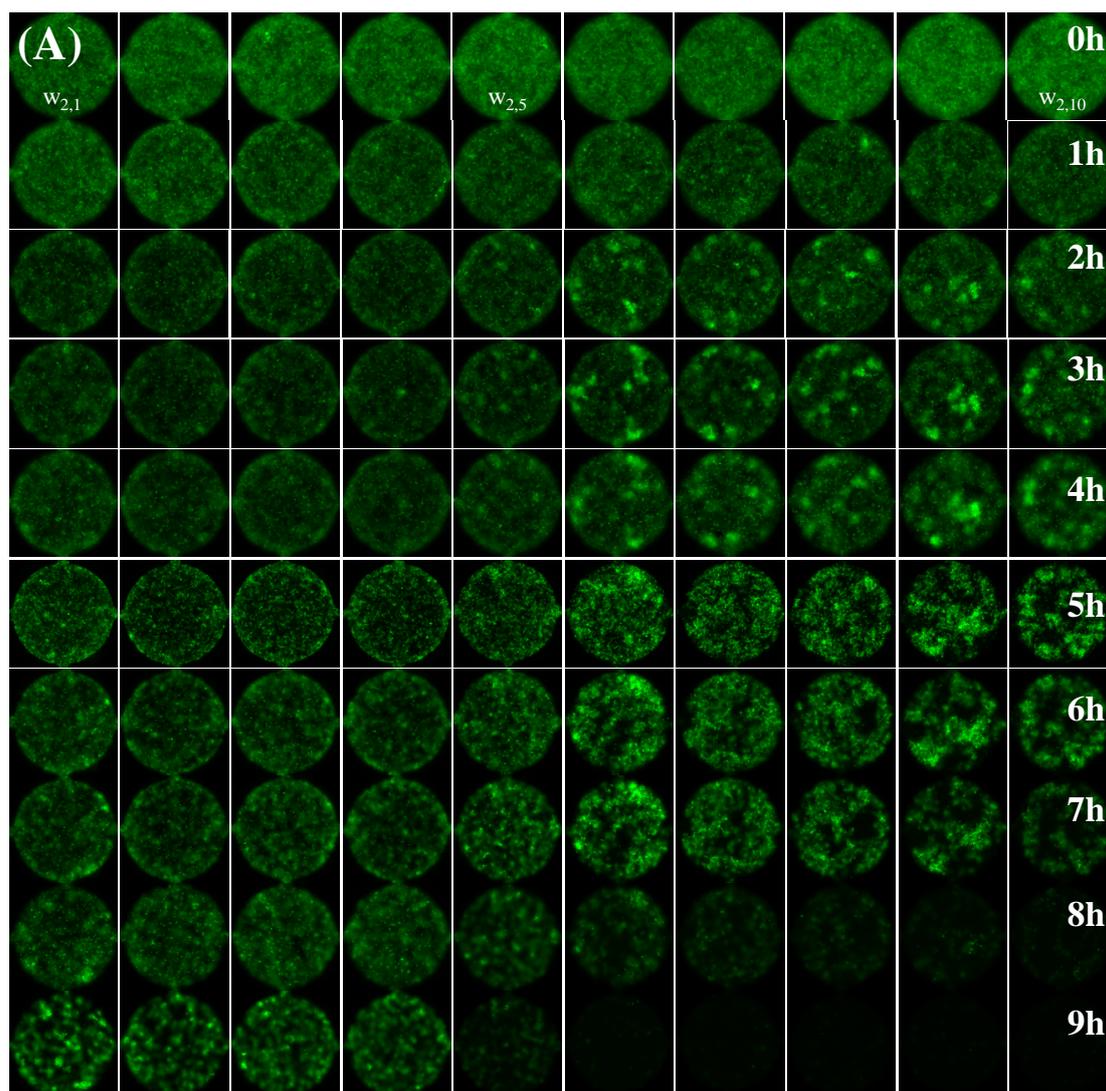
Figure S3 Over uniformly concentrated prey cells (550 cells) for each concentrator, half of the concentrator array was loaded with predator cells (300 cells) and the other half was loaded with TB buffer solution without predator cells, providing both a control and experimental sample on a single chip.
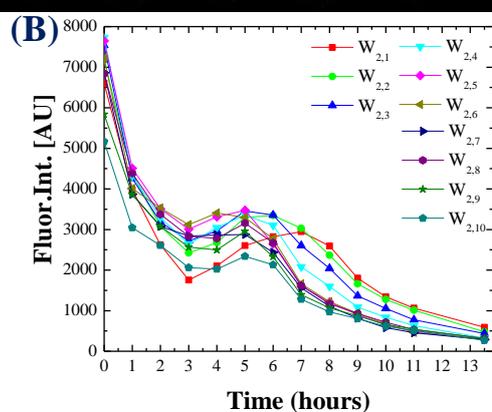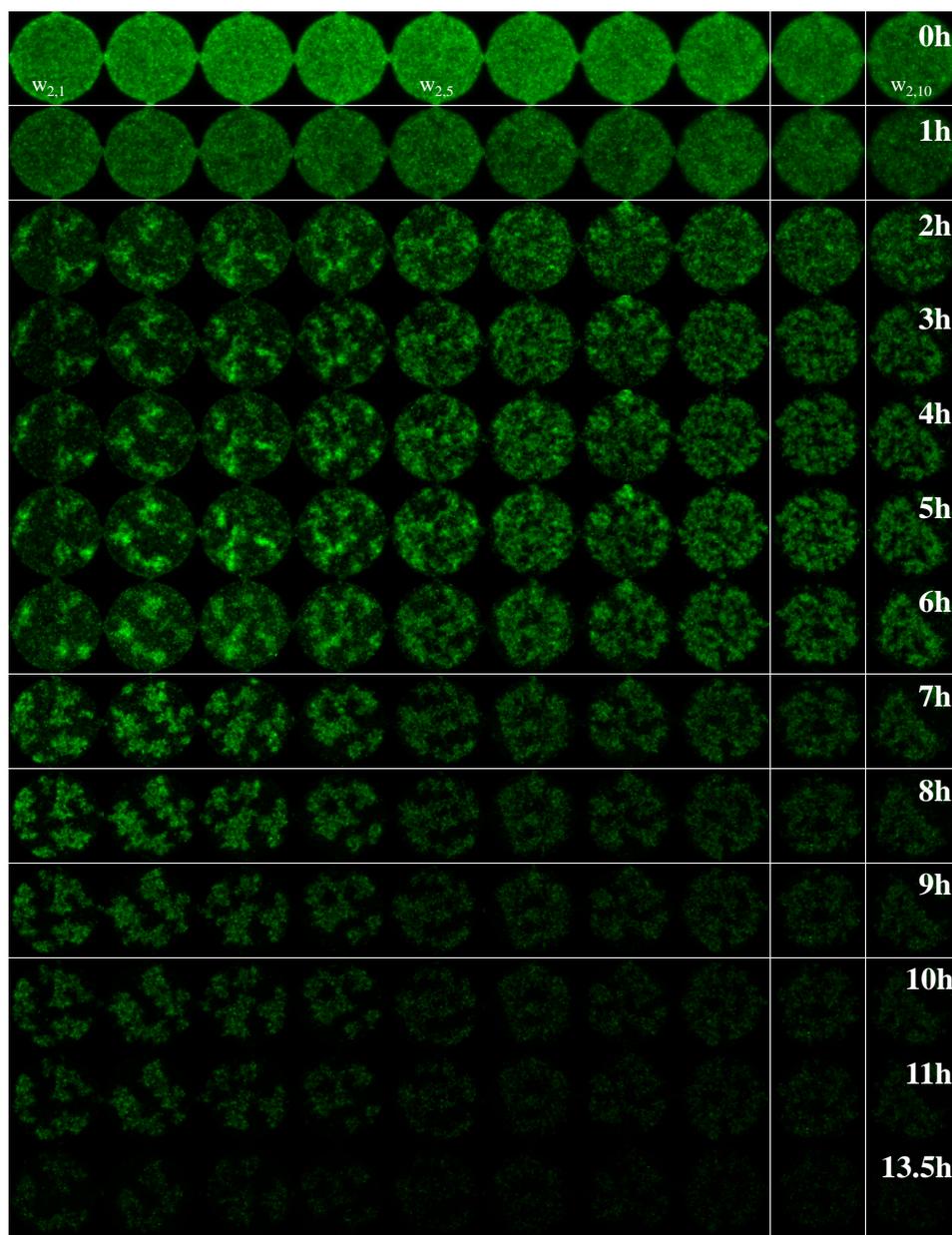
Figure S4 Qualitative experimental results of UP_1LP_2. (B) Quantification of the qualitative fluorescence intensities in (A). ($N_{prey}(w_{i,j})$=7000 where i=1,2,3 and 1≤j≤10) while the predator cells are concentrated with a linear density gradient; $N_{pred}(w_{i,j+1})$=k$N_{pred}(w_{i,j})$ and $N_{pred}(w_{i,1})$=1600 where k=1.2, i=1,2,3 and 1≤j≤9.
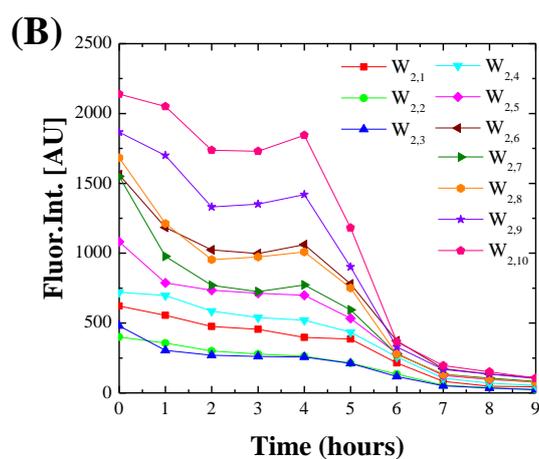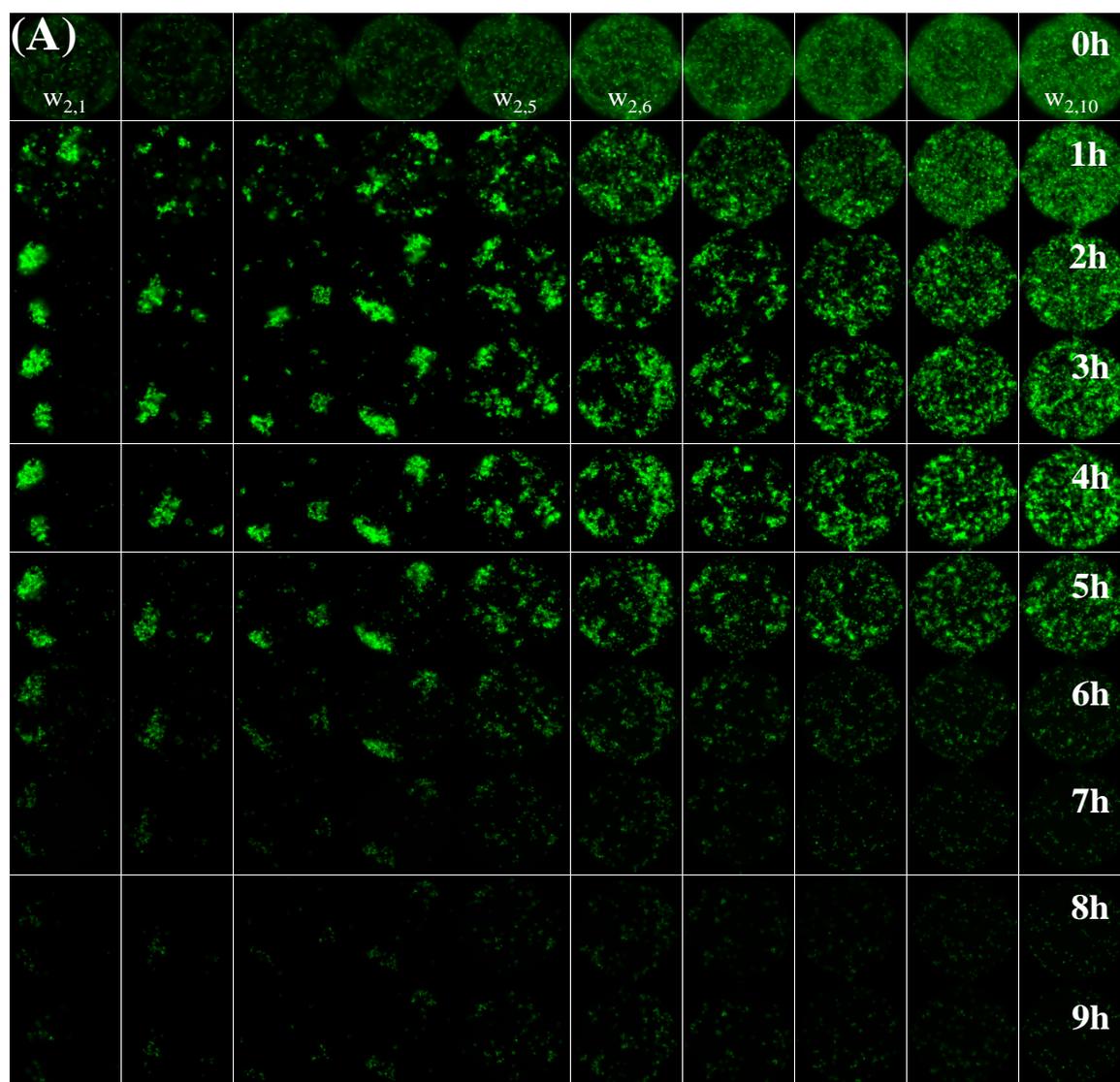
Figure S5 (A) Qualitative experimental results of LP_1UP_2. (B) Quantification of the qualitative fluorescence intensities in (A) (i.e., $N_{prey}(w_{i,1})=200$ and $N_{prey}(w_{i,j+1})=kN_{prey}(w_{i,j})$ where $k=1.3$, $i=1,2,3$ and $1\leq j\leq 10$ while $N_{pred}(w_{i,j})=5000$ where $i=1,2,3$ and $1\leq j\leq 10$). The R_{pp} is 0.05 for $w_{2,1}$ and 0.25 for $w_{2,10}$, respectively.
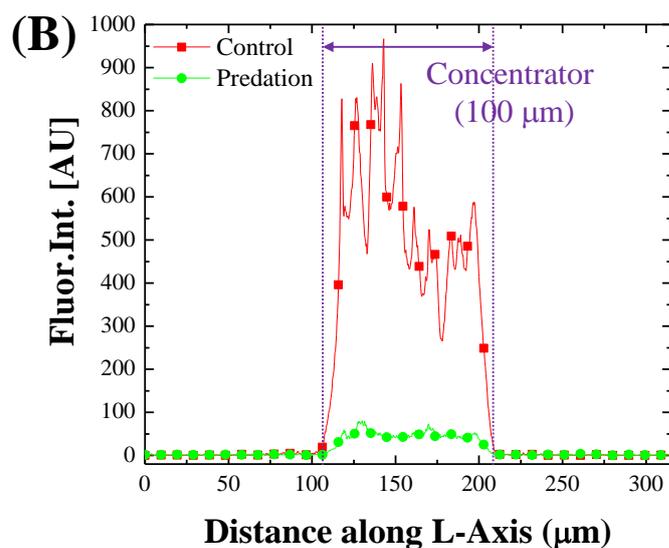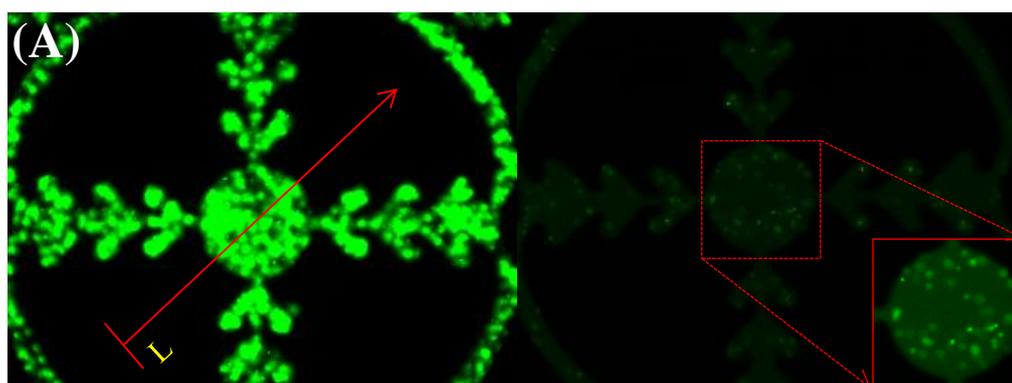
Figure S6 The prey cells are concentrated in the concentrator array for 30 min, amounting to about 500 cells. (A) In the absence of the predator cells, GFP seem to remain within the prey cells longer than 9 hours (left). On the other hand, in the presence of the predator cells, no prey cells are observed in 9 hours. However, the channels appear to be filled with GFP that come out of the prey cells, diffuse away from the concentrator and degrade with time. (B) Comparison of the fluorescent intensities from the inside of the prey cells with those from the result of the prey cell lysis. This comparison supports that our approach to use fluorescent reporter genes in the prey works well for the predation study on a chip.