Captions to Supplementary Figures:

Figure S1: Fluorescence response of (**A**) transmitters and (**B**) receiver cells in response to IPTG and C6-HSL respectively. Threshold concentration of IPTG for transmitter cells is 38 μM, with an n value of 2.1. Threshold concentration of C6-HSL for receiver cells is 4.7 nM with an n value of 2.5.

Figure S2: Diffusion response of a hydrogel spot to fluorescein. At t=0, a 10 μM solution of fluorescein is flowed in to a microfluidic containing the hydrogel spot. Fluorescein then diffuses into the spot(**A**), allowing us to determine the diffusion coefficient by plotting intensity of the center versus time(**B**).

Figure S3: (Top) Fluorescence response of a 3x3 microarray of receiver bacteria fixed in hydrogel. At t=0, 10 nM of C6-HSL in M9 is broadcast into the array in nearly stagnant flow (0.03 μl/min) using the micro fluidic, causing the cells to produce GFP-LVA. At 420 min, the concentration and flow condition is changed to 0 nM C6-HSL at a flow of 0.8μl/min and the green fluorescence diminishes. At 640 min the original concentration (10 nM of C6-HSL) and flow condition 0.03 μl/min is re-established and the fluorescence returns. **(Bottom)** Plots of the different array elements with the data (blue) fit with simulation(red). The different parameters for each element are stated on the graph. β_g and ν are allowed to vary between elements, with the other parameters fit to the array as a whole.

Figure S4: Plot of Péclet number (Pe) under different flow conditions. The high flow condition(red; 0.8 μL/min) has maximum Pe~15, and the plot indicates that the majority of the microfluidic has Pe>1. This indicates that convective mass transport is the dominant form of transport in the fluid, giving way to diffusion inside the hydrogel. On the other hand, the low flow condition (green; 0.03 μL/min) has a max Pe~0.5, and the entire microfluidic has Pe<1. So, under the slow flow condition, diffusion is the dominant mechanism of transport, allowing C6-HSL to build up in the surroundings without being effectively cleared.

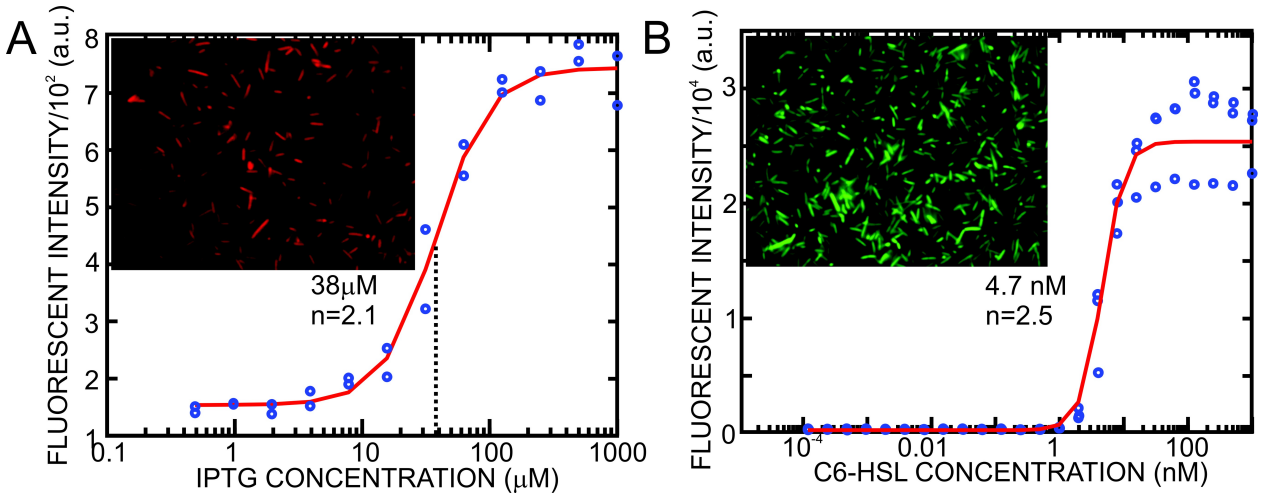

Figure S1

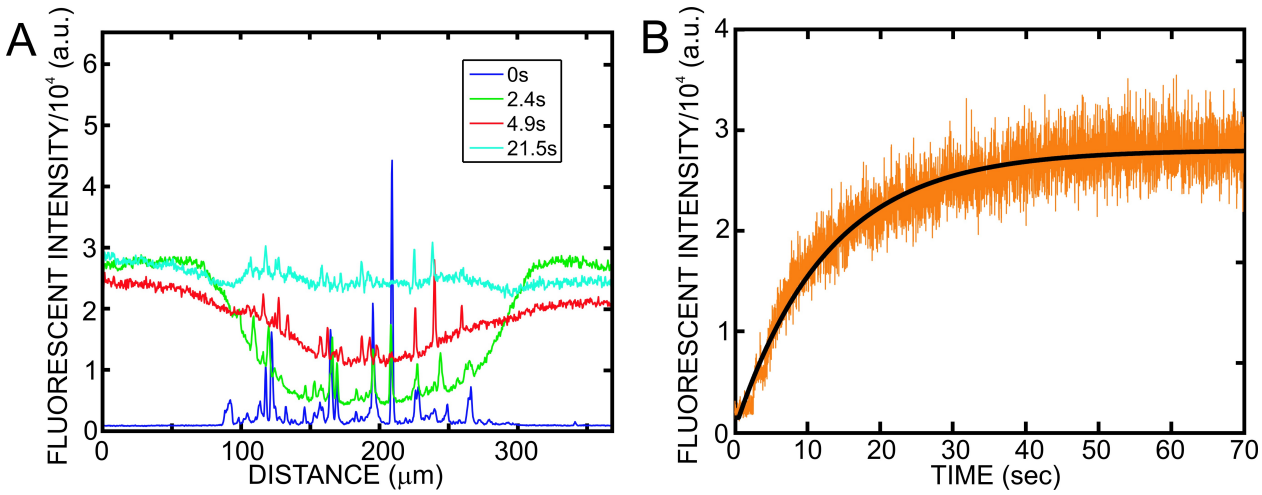

Figure S2

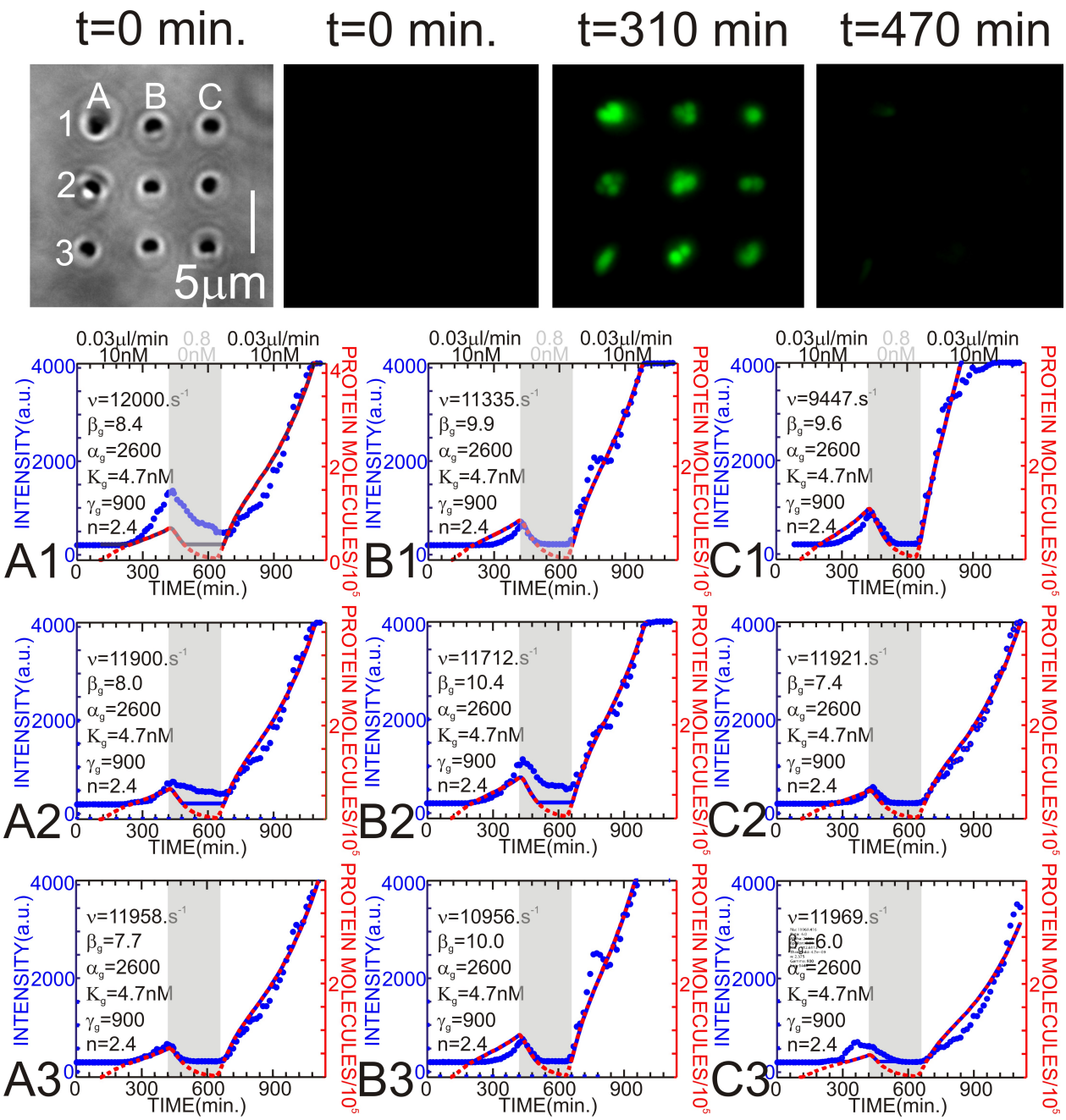
t=0 min.
t=0 min.
t=310 min
t=470 min
A B C
1
2
3
5μm
0.03μl/min 10nM
0.8 0nM
0.03μl/min 10nM
INTENSITY(a.u.)
PROTEIN MOLECULES/10^5
TIME(min.)
A1 ν=12000.s^-1 βg=8.4 αg=2600 Kg=4.7nM γg=900 n=2.4
B1 ν=11335.s^-1 βg=9.9 αg=2600 Kg=4.7nM γg=900 n=2.4
C1 ν=9447.s^-1 βg=9.6 αg=2600 Kg=4.7nM γg=900 n=2.4
A2 ν=11900.s^-1 βg=8.0 αg=2600 Kg=4.7nM γg=900 n=2.4
B2 ν=11712.s^-1 βg=10.4 αg=2600 Kg=4.7nM γg=900 n=2.4
C2 ν=11921.s^-1 βg=7.4 αg=2600 Kg=4.7nM γg=900 n=2.4
A3 ν=11958.s^-1 βg=7.7 αg=2600 Kg=4.7nM γg=900 n=2.4
B3 ν=10956.s^-1 βg=10.0 αg=2600 Kg=4.7nM γg=900 n=2.4
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Figure S3

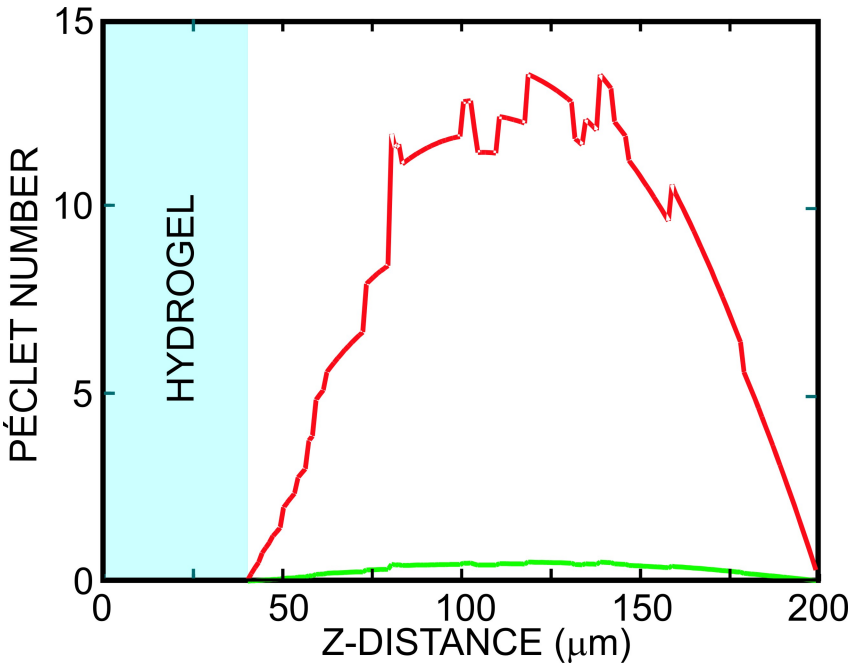

Figure S4