

Online Supporting Information:

Microfluidic Device for Analyzing Preferential Chemotaxis and Chemoreceptor Sensitivity of Bacterial Cells Toward Carbon Sources

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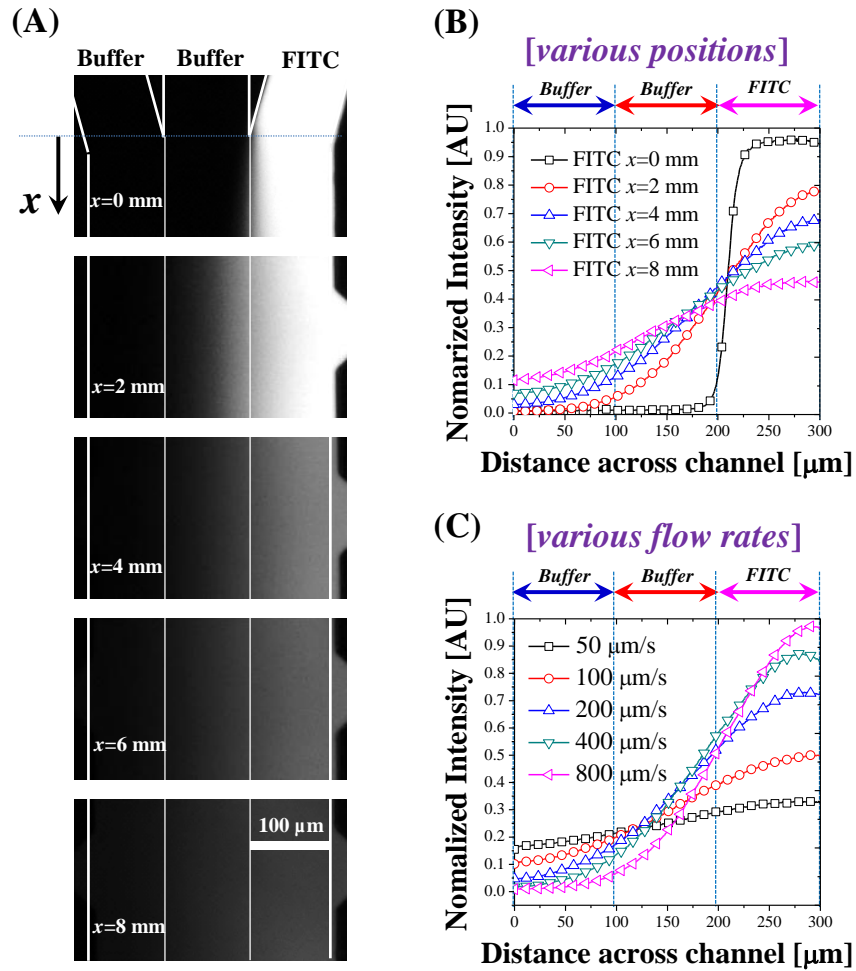


Fig. S1 (A) Characterization of concentration gradients across and along the main channel by quantifying the fluorescent intensities of 50 μM of fluorescein isothiocyanate (FITC). The diffusivity of FITC (D_{FITC}) was assumed to be $D_{\text{FITC}}=0.49\times 10^{-9}$ m^2/s . [1] (B) and (C) are the same as Fig. 2 (B) and (C) in the main text.

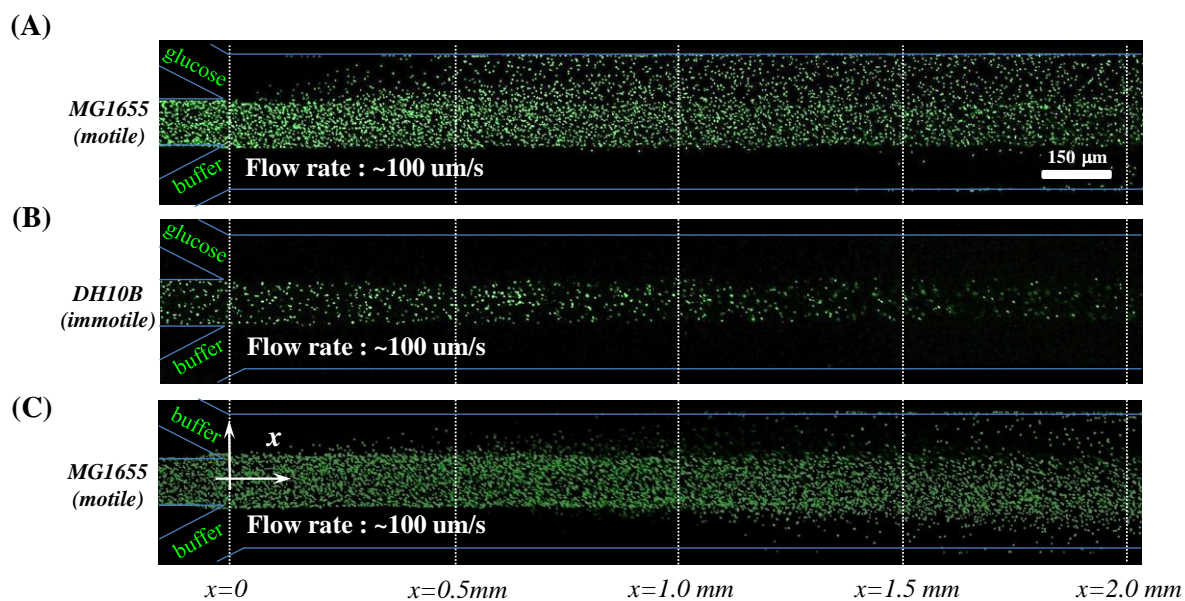


Fig. S2 (A) Motile strain, MG1655, shows strong chemotactic migration to the glucose gradient in flow rates of $\sim 100 \mu\text{m/s}$. (B) On the contrary to the motile cells, immotile strain, DH10B, shows no migration to the both attractant and buffer side. (C) Motile strain, MG1655, in the absence of the gradient of chemoeffectors, no significant migration is observed except random motion.

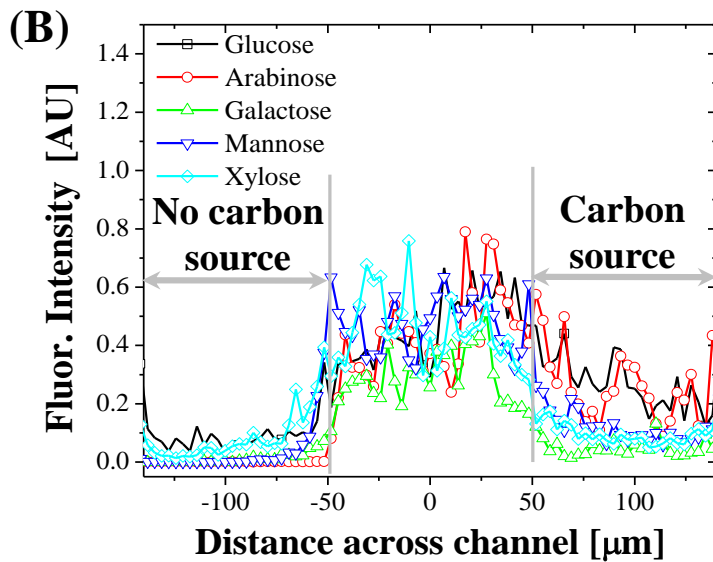
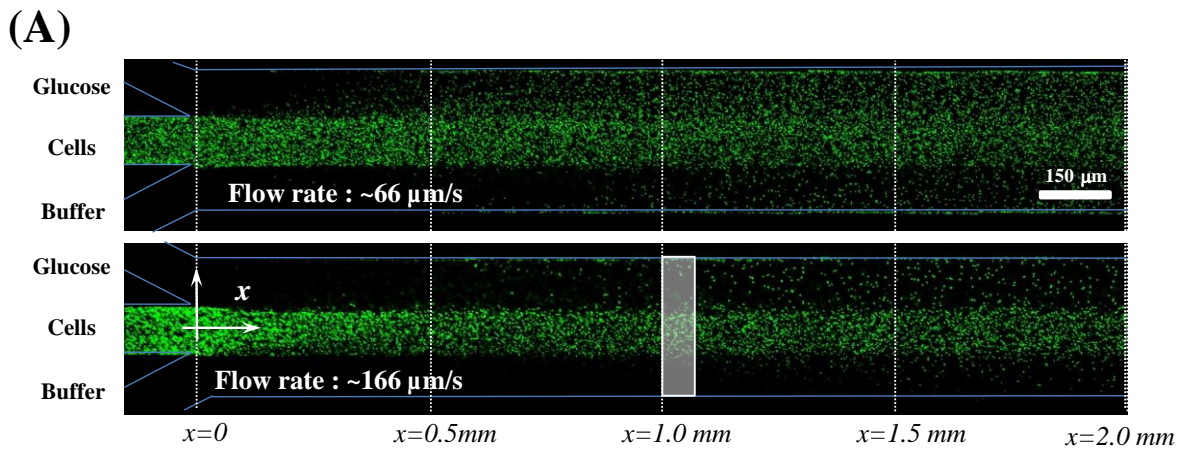


Fig. S3 (A) Chemotactic responses of wild type cells in the presence of glucose concentration gradients (1 mM) at $66 \mu\text{m/s}$ and $166 \mu\text{m/s}$ flow velocity. (B) Under the flow rate of $166 \mu\text{m/s}$, cell distribution across the channel was characterized by ensemble averaging the fluorescent intensities of a $300 \mu\text{m}$ by $150 \mu\text{m}$ rectangle at $x=1\text{mm}$ along the microchannel to compare relative preferential chemotaxis toward five carbon sources but the resolution appears too low.

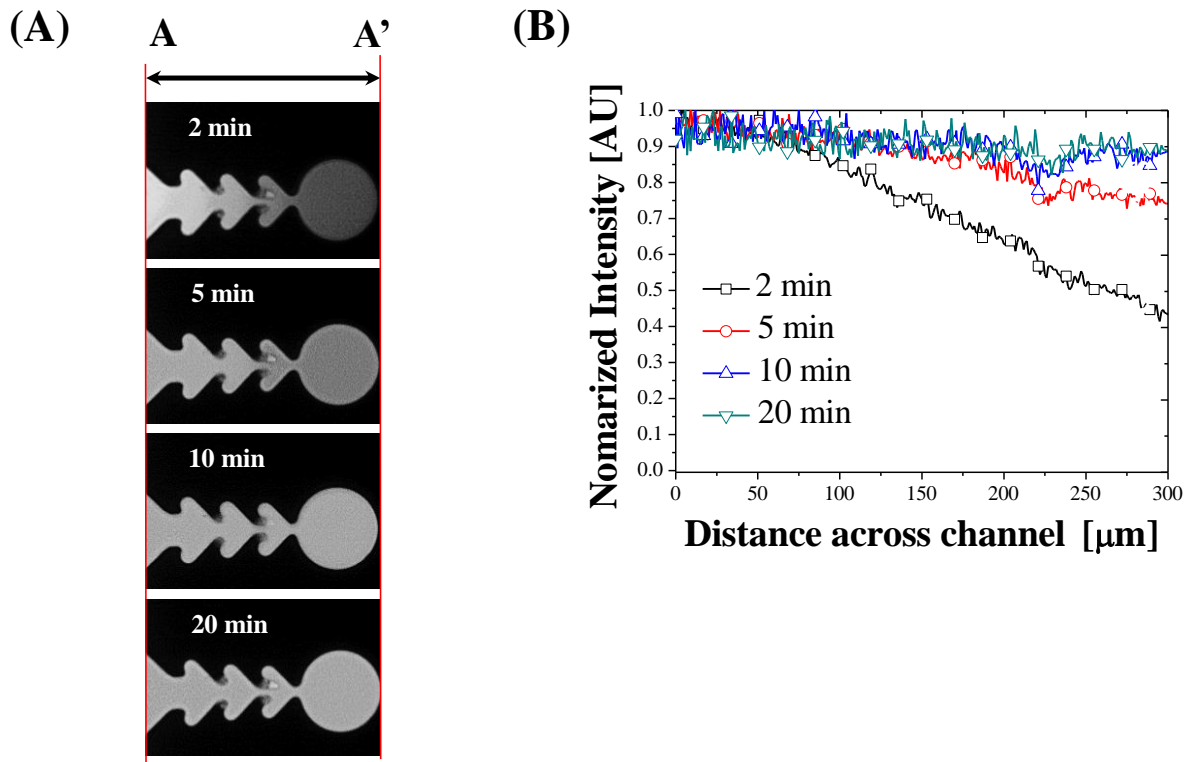


Fig. S4 (A) Image sequence showing transient concentration gradients along the A-A' line in Fig. 1(B) in the main text. (B) Since the concentration gradients reach a plateau within 20 min via the diffusion from the main channel cells seem not to be affected by opposite concentration gradients from the entrance of to the center of the concentrator (chemotaxis) when being trapped and guided into the concentrator.

References

1. Rani, S.A., B. Pitts, and P.S. Stewart, *Rapid diffusion of fluorescent tracers into Staphylococcus epidermidis biofilms visualized by time lapse microscopy*. *Antimicrobial Agents and Chemotherapy*, 2005. **49**(2): p. 728-732.