

# Supplementary Information for

## Dynamics of bacterial streamers induced clogging in microfluidic devices

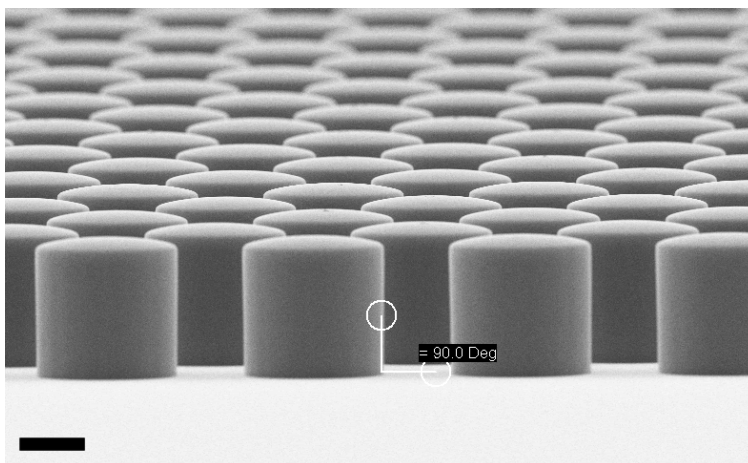
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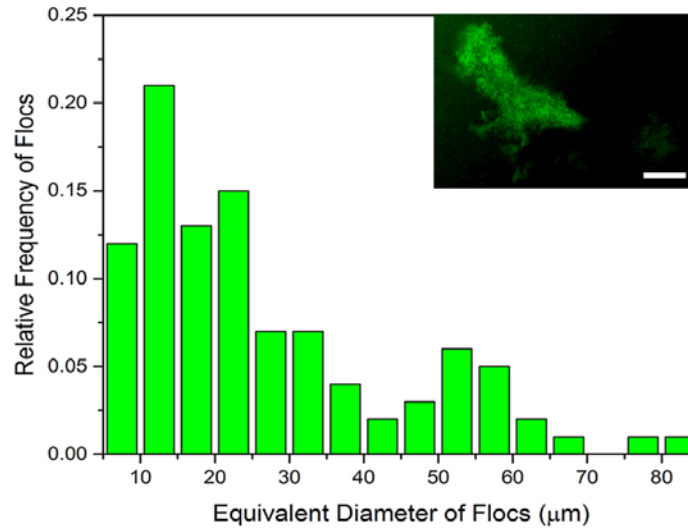
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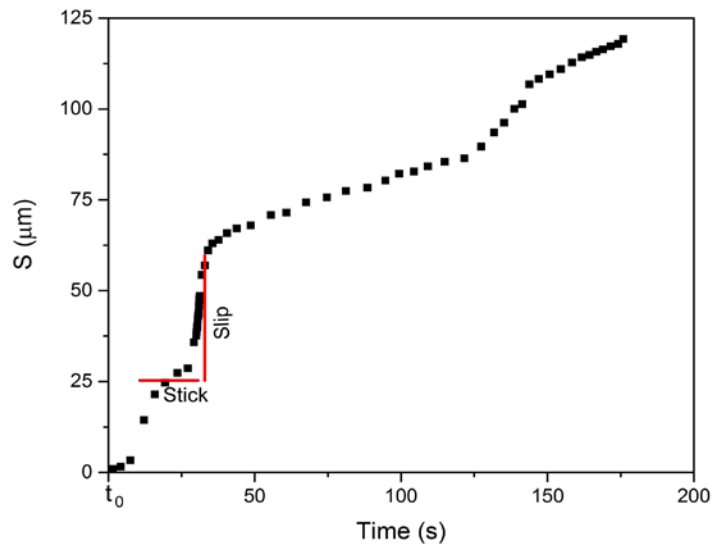
**Figure S1:** SEM image of PDMS pillars in the micro-channel. Scale bar is 25  $\mu\text{m}$ .



**Figure S2:** Relative frequency histogram of flocs of *P. fluorescens*. The mode and median for this relative frequency histogram are 21.48 and 20.68  $\mu\text{m}$  respectively. A total of 100 flocs were considered. See Hassanpourfard et al. <sup>1</sup> for details regarding image analysis. The inset shows two flocs of *P. fluorescens* that were obtained after incubation at 30  $^{\circ}\text{C}$  for 2 days. Scale bar is 25  $\mu\text{m}$ .

**Table S1:**  $t_0$  for different imposed flow speeds

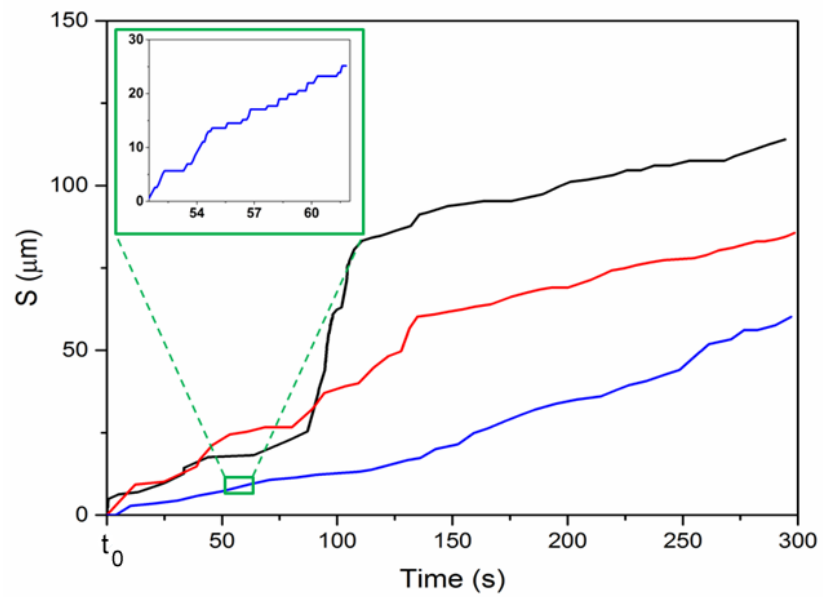
U (m/s)	$t_0$ (min)
$1.33 \times 10^{-4}$	80
$2.66 \times 10^{-4}$	48
$4.44 \times 10^{-4}$	23
$5.33 \times 10^{-4}$	20
$6.67 \times 10^{-4}$	11



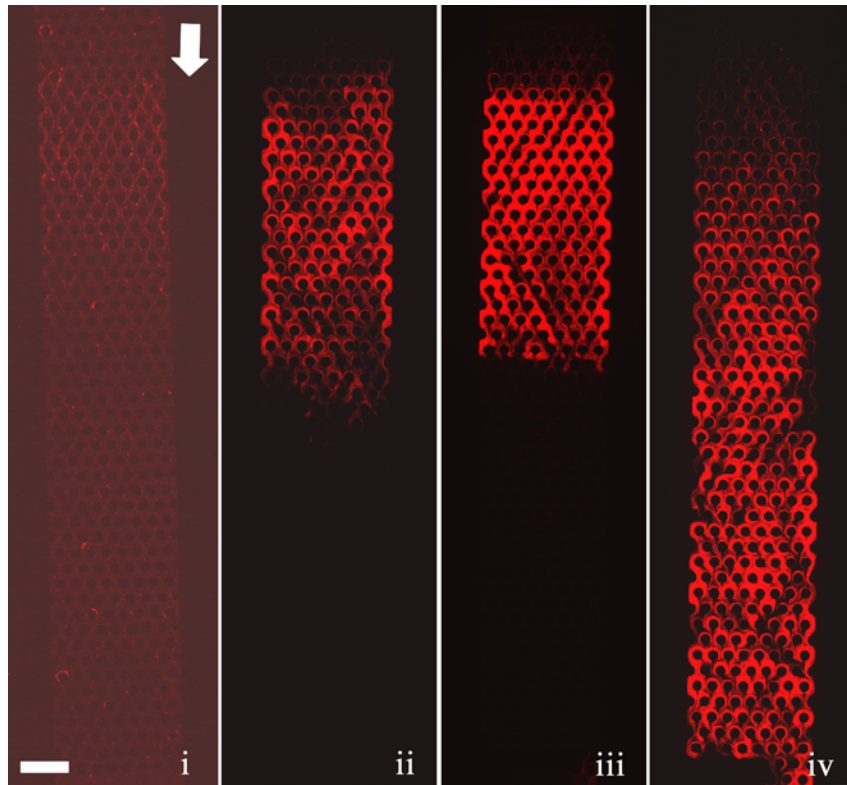
**Figure S3:** Stick-slip behavior of tracked particle in a mature streamer in a gravity-assisted pressure driven flow experiment due to the elevation of culture reservoir above the waste container. Here  $t_0$  is 11 min after the beginning of experiment.

**Table S2:** Repetitions per experiment

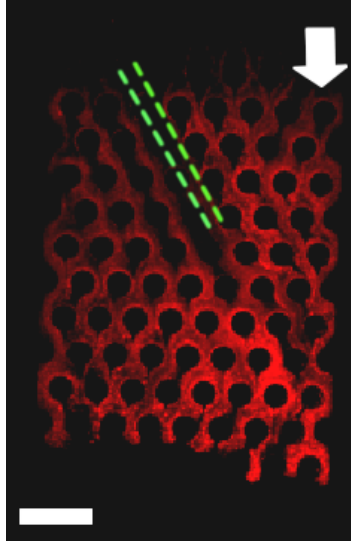
U (m/s)	Number of experiments
<i>P. fluorescens</i>	
$4.44 \times 10^{-5}$	3
$1.33 \times 10^{-4}$	4
$2.66 \times 10^{-4}$	3
$4.44 \times 10^{-4}$	3
$5.33 \times 10^{-4}$	3
$6.67 \times 10^{-4}$	3
<i>P. aeruginosa</i>	
$1.33 \times 10^{-4}$	3



**Figure S4:** Stick-slip behavior of *P. fluorescens* for imposed flow velocity of  $1.33 \times 10^{-4}$  m/s from 3 different repetitions. Here  $t_0$  is between 30 to 90 min from beginning of the experiment.



**Figure S5:** a) Water channel formation in the clogged part of the microfluidic device. Bacterial solutions (*P. fluorescens*) were injected for 3 hours into the channel and the experiments were performed for different imposed velocity scales of i)  $4.44 \times 10^{-5} \text{ m/s}$ , ii)  $1.33 \times 10^{-4} \text{ m/s}$ , iii)  $2.66 \times 10^{-4} \text{ m/s}$  and iv)  $5.33 \times 10^{-4} \text{ m/s}$ . Clogging didn't occur for  $U = 4.44 \times 10^{-5} \text{ m/s}$ . Scale bar is  $250 \text{ }\mu\text{m}$ . White arrow shows the flow direction that is from top to bottom in all the experiments.



**Figure S6:** Water channel formation in the clogged part of the microfluidic device. 2 parallel dash lines demonstrate the location of water channel. Bacterial solution (*P. aeruginosa*) was injected for 3 hours into the channel with  $U = 1.33 \times 10^{-4} \text{ m/s}$ . Scale bar is  $150 \mu\text{m}$ . White arrow shows the flow direction that is from top to bottom.

## Supplementary Videos

**Supplementary Video 1:** Video shows the stick-slip behavior of matured structures formed from streamer. Green arrow depicts the location that this phenomenon is happening. The bacterial solution here is *P. fluorescens*. The imposed flow speed ( $U$ ) was  $1.33 \times 10^{-4} \text{ m/s}$ . The video is fast forwarded 10X. Scale bar represents  $50 \mu\text{m}$ . White arrow shows the flow direction that is from top to bottom.

**Supplementary Video 2:** Video shows streamer failure in the clogged section of channel and consequently formation of water channel in it. Shadow demonstrates the location that this phenomenon is happening. The imposed flow speed ( $U$ ) was  $1.33 \times 10^{-4} \text{ m/s}$ . Scale bar is  $50 \mu\text{m}$ . White arrow shows the flow direction that is from top to bottom.

## References

1. M. Hassanpourfard, Z. Nikakhtari, R. Ghosh, S. Das, T. Thundat, Y. Liu and A. Kumar, *Scientific Reports*, 2015, **5**, 13070.