

Electronic Supplementary Information for:

Preventing Bacterial Colonization Using Colloidal Crystals

Mehdi Kargar¹, Amy Pruden², and William A. Ducker^{3*}

¹Department of Mechanical Engineering

²Via Department of Civil and Environmental Engineering

³Department of Chemical Engineering

Virginia Tech, Blacksburg VA 24061

Email address: mehdik@vt.edu, apruden@vt.edu, wducker@vt.edu.

Table S1: Percentage of element on the surface of each sample surface measured by XPS.

Sample Set 1				
Topography	C_{1s}*	O_{1s}	Si_{2p}	S_{2p}
Flat	94.9	4.6	0.5	0.0
220 nm	95.4	4.5	0.1	0.1
450 nm	95.2	4.6	0.0	0.2
630 nm	95.3	4.6	0.1	0.1
830 nm	95.3	4.5	0.1	0.1
925 nm	95.2	4.7	0.0	0.1
1550 nm	95.0	4.8	0.0	0.2
Sample Set 2				
Topography	C_{1s}	O_{1s}	Si_{2p}	S_{2p}
Flat	98.1	1.5	0.4	0.0
220 nm	99.2	0.7	0.1	0.0
450 nm	98.8	1.1	0.0	0.1
830 nm	98.7	1.2	0.0	0.1

*Columns titles describe the electron orbital used to determine the element.

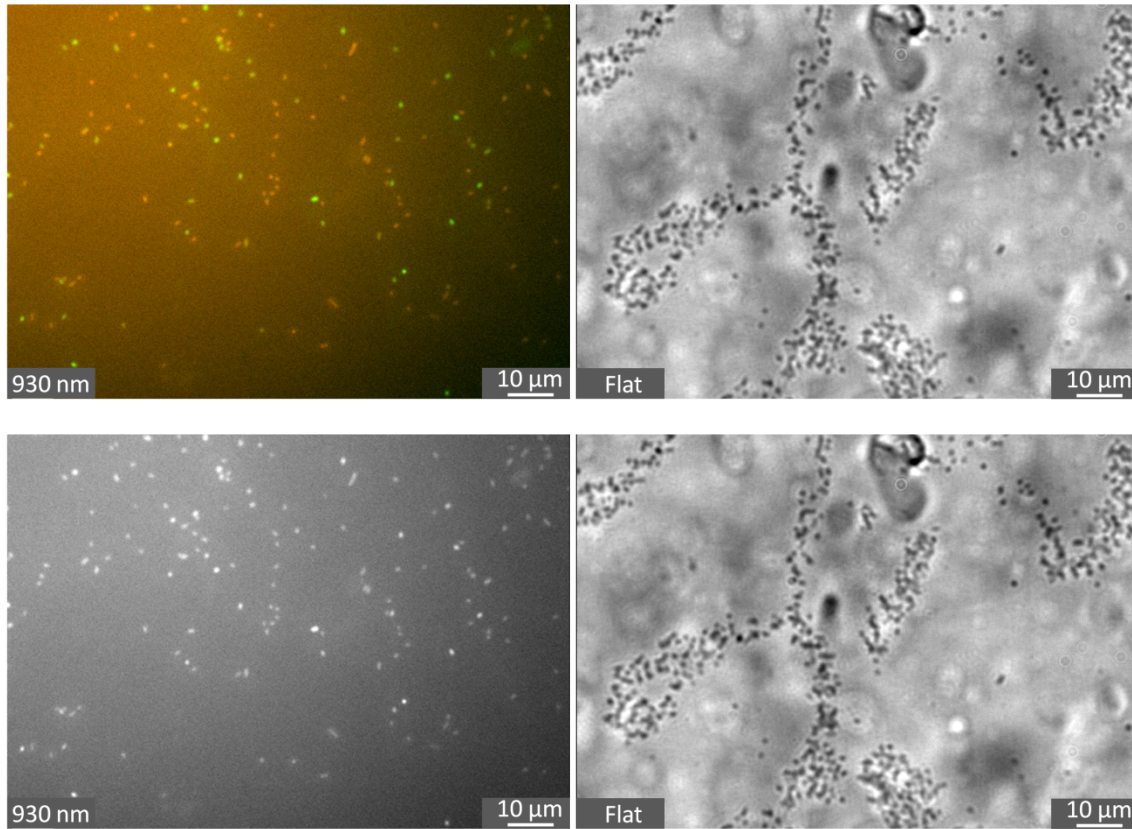


Figure S1: Original (top) and processed (bottom) images of *Pseudomonas aeruginosa* adhered to a Polystyrene surface coated with 930nm particles (left) and flat Polystyrene (right). The images were captured in a hydrated state. These images show that the colloidal crystal prevents formation of bacterial colonies: the images of the colloidal crystal show only individual bacteria whereas the images on the flat substrate are mainly in colonies.

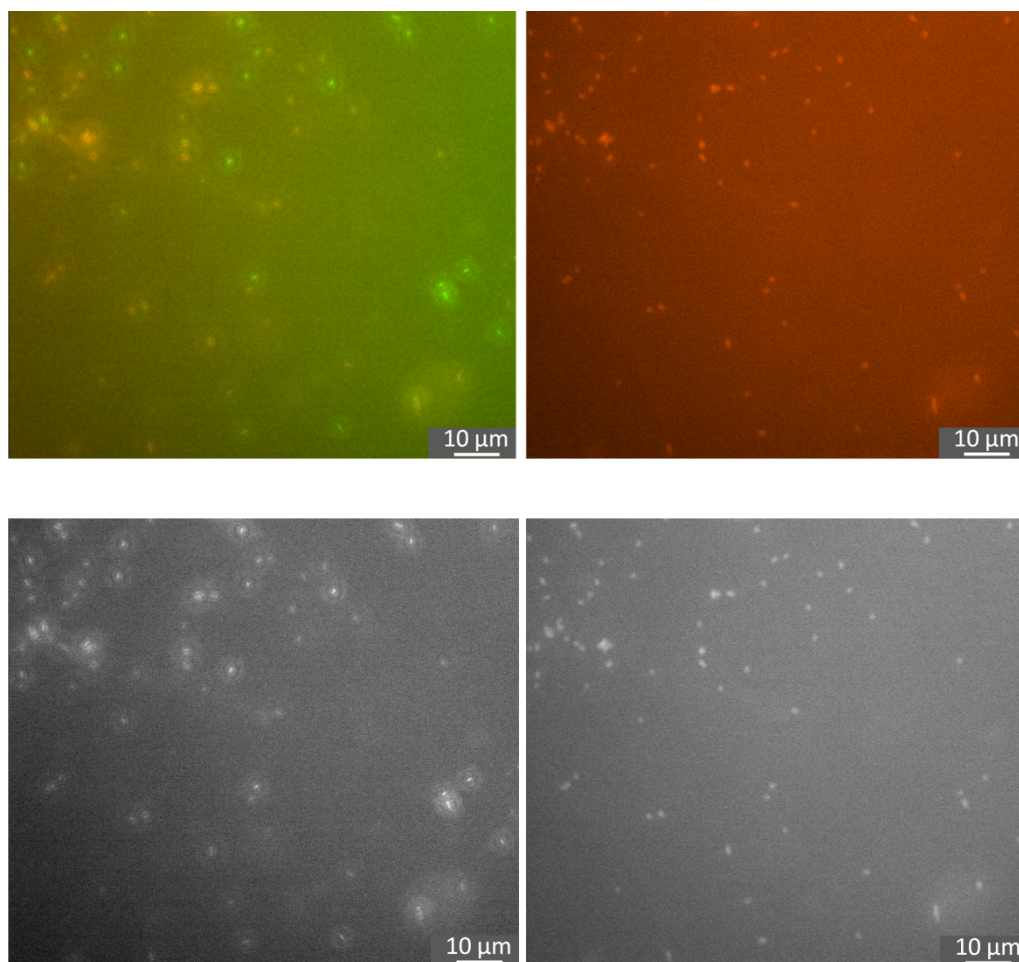


Figure S2. Fluorescence image of bacteria adsorbed to 1550 nm colloidal crystal. Left: In water. Right: after exchange of the water for ethanol then air drying for 3 hours. The original fluorescent images are on the top row and processed images are shown in the bottom row. Note that the position of each bacterium remains unchanged after each stage of preparation that is used for the SEM samples.

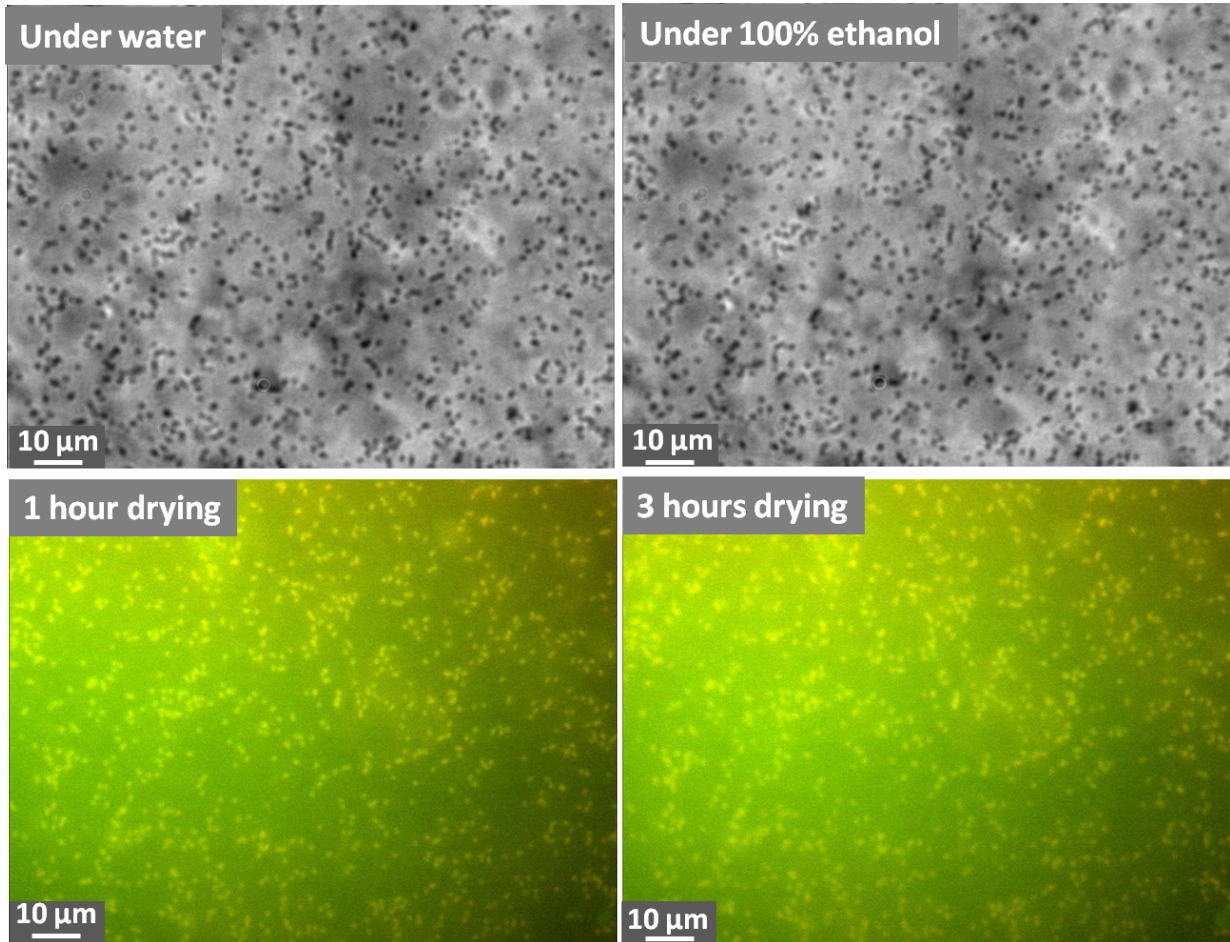


Figure S3. Sequence of fluorescence images of *P. aeruginosa* (PAO1) bacteria adsorbed to a flat sheet. The arrangement of bacteria in this image is not typical for *P. aeruginosa* on a flat polystyrene sheet. In a typical image of a flat surface, the bacteria are arranged in colonies as shown in Figure S1. This unusual area is shown so that one can examine whether the process of drying that is used prior to SEM imaging gives an artifact that looks like colony formation on a flat sheet. The sequence is: under water, then after replacement of the water with ethanol, then 1 hour of drying then 3 hours of drying. Note that the position of each bacterium remains unchanged after each stage of preparation that is used for the SEM samples: drying does not produce an artifact that looks like colony formation.

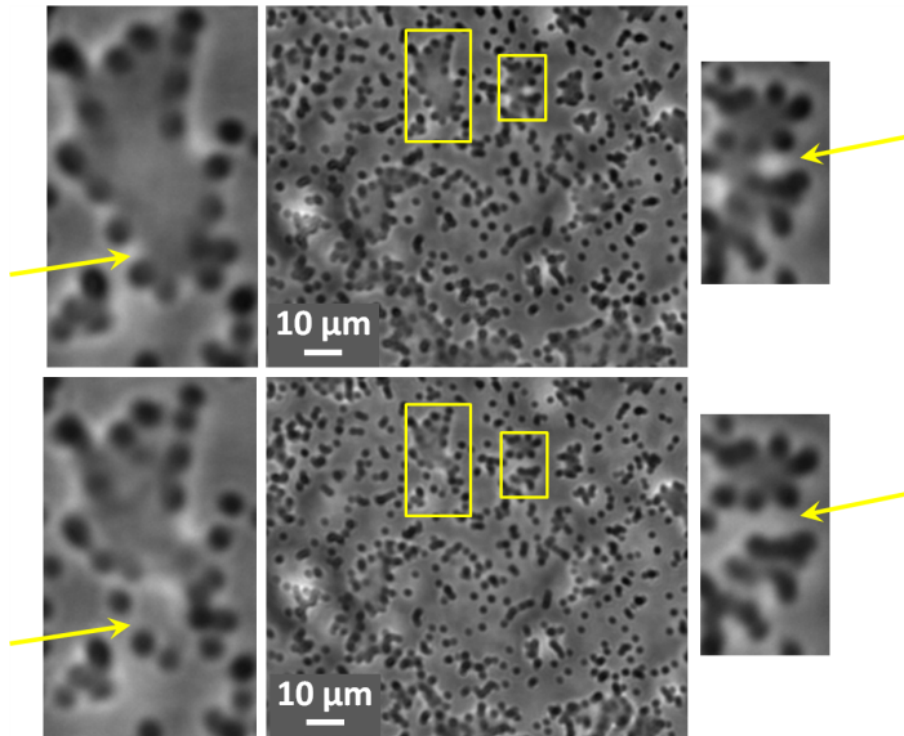


Figure S4 Optical images of *P. aeruginosa* adhered to the surface of polystyrene in water, washed with ethanol and dried for 1 hour (top) and 3 hours (bottom). Arrows point to a position where the interface moved past particles without changing their positions. The passage of the ethanol–air interface across the bacteria does not affect the position of the bacteria.