ELECTRONIC SUPPLEMENTARY INFORMATION

Separation of Bacteria with Imprinted Polymeric Films

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A) Chip fabrication

The optimal imprinted polymer has as many binding sites as possible, leading to higher sensitivities. In order to achieve this goal, polymerizing conditions were varied. 10:1 PDMS was chosen because it is known to replicate structures on silicon wafers. Furthermore, it is transparent and biocompatible, and thus can easily be used for optical detection with minimal impact on cell viability. The mixture of the prepolymer into cyclohexane was varied from 9-100% PDMS. Each mixture was spin-coated onto microscope slides and three sets of experiments were performed, where the coated microscope slides were pre-cured 0, 4, and 5 minutes before imprinting (only the data for 5 min, which performed the best, is shown). For 0 and 4 min pre-curing times, the polymer was too soft and very few imprints could be found. After imprinting, the stamps were removed and the surfaces were observed under AFM to determine the imprinting density as well as the depth of the imprints. The optimization for 5 min pre-curing is depicted in Fig. S1. A 2:1 PDMS:cyclohexane mixture was found to be best and thus was used for all further experiments.

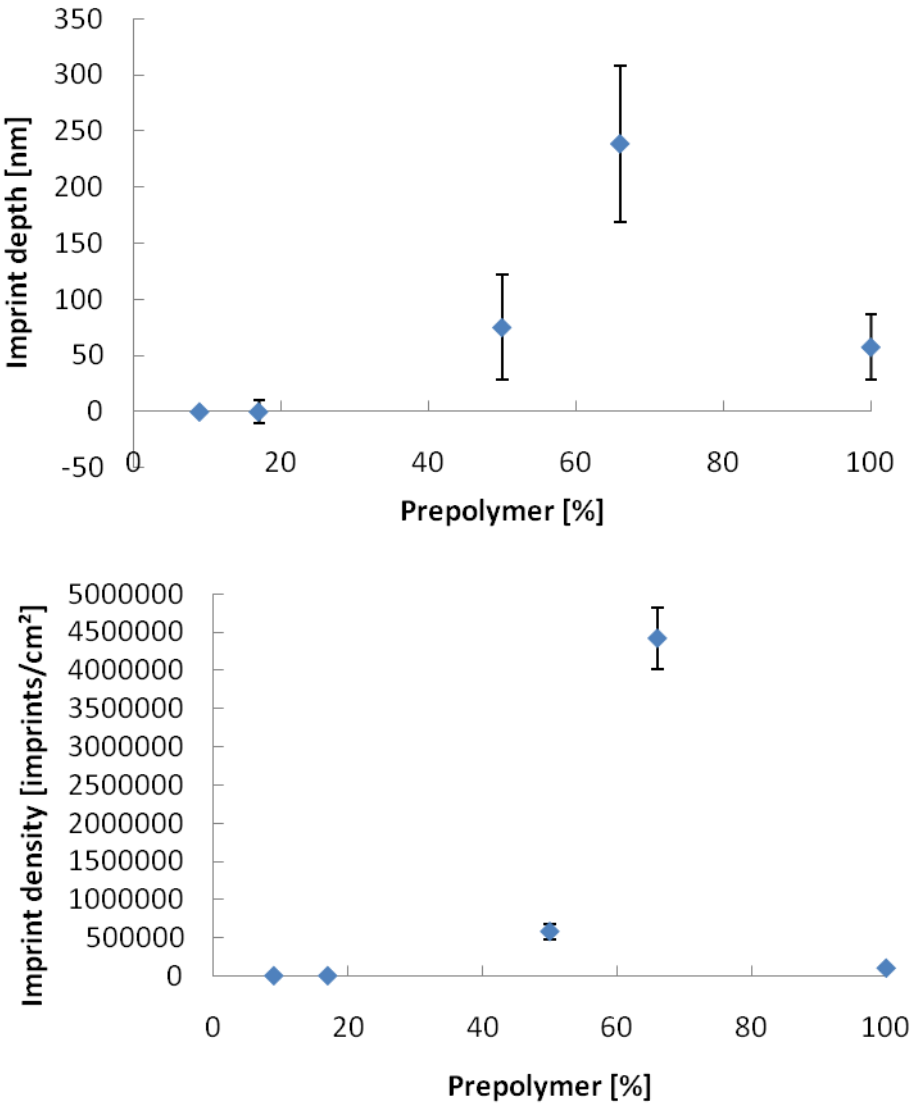

Fig. S1: Optimization of the imprinted polymer. The polymer was optimized to obtain the maximum imprint depth that is possible where the cells can still be removed after imprinting. (For some points, the error bars are smaller than the data point.)

Figure S2 shows the mortar-based binding of the top layer to the capturing surface in more detail.

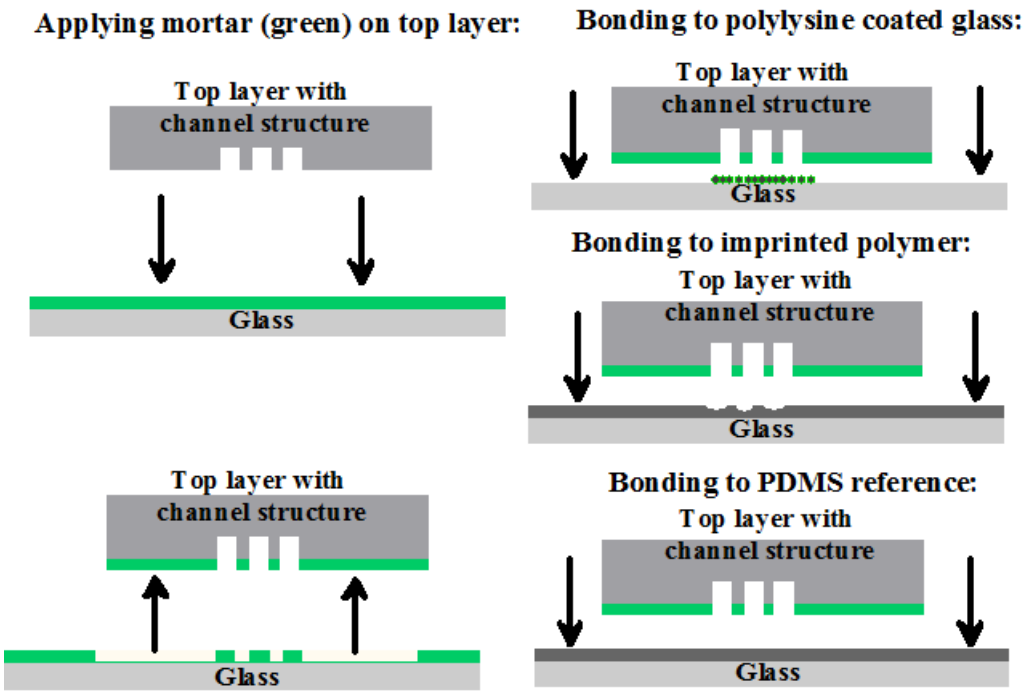

Fig. S2: Assembling the chip. The top layer is dipped into pre-cured PDMS mortar. When the top layer is released the mortar sticks to the areas between channels so that the top layer can be bound to the capturing surface.

B) Adhesion-based separation:

In order to initially evaluate the utility of microfluidic molecularly imprinted films, *Synechococus* OS-B´ and fluorescent beads were mixed together and then processed through the separation device. Figure S3 shows flow cytometery measurements of the pure components, while Figure S4 shows measurements for suspensions before and after separation.

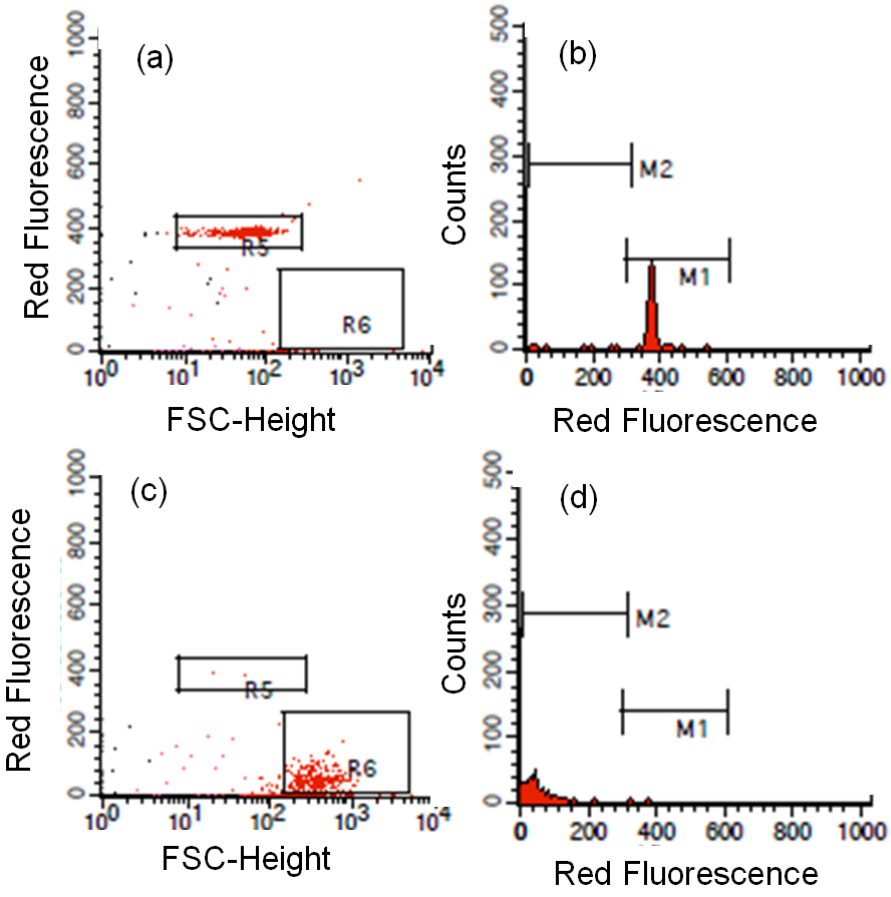

Figure S3: Flow cytometry data for the pure components. Pure labelled beads (a, b) and pure bacteria (c, d) were measured separately. Particles showing up in areas R5 and M1 were identified as beads and particles in R6 and M2 as cells.

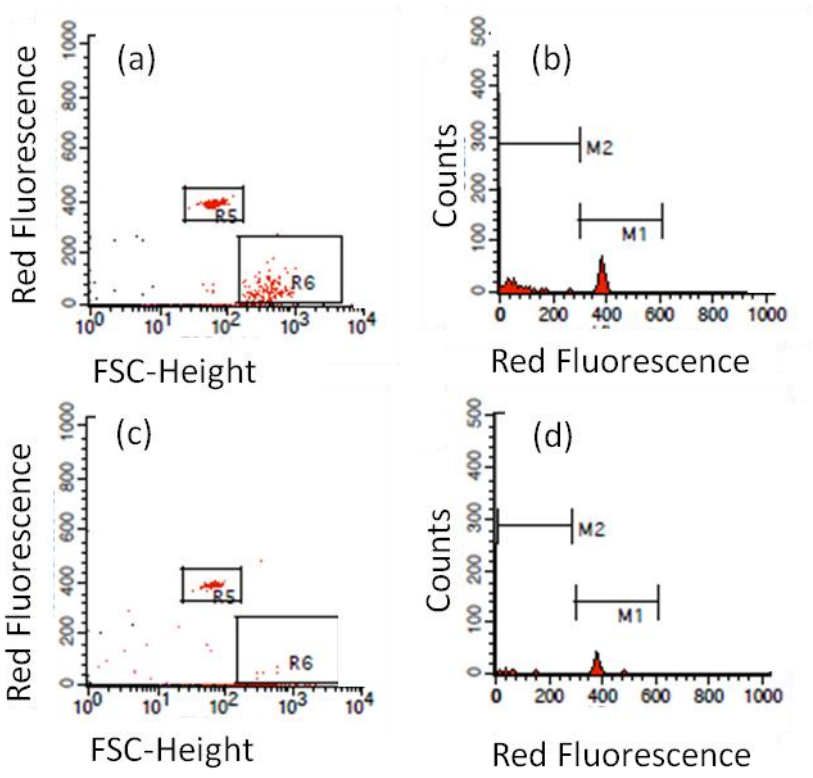

Figure S4: Flow cytometry data taken before (a, b) and after (c, d) adhesion-based separation of a mixture of cyanobacteria and fluorescent beads with a cyanobacteria-imprinted polymer. The relative abundance of cyanobacteria significantly decreases (R6 and M2) whereas the relative abundance of labelled beads (R5 and M1) increases.