Electronic Supplementary Information (ESI)

Recognition of Poly(dimethylsiloxane) with Phage Displayed Peptides

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FLUORESCENT CHARACTERIZATION OF PLASMA OXIDIZED PDMS (15 W, 30 S) WITH PEPTIDE (LSNNNLR) DISPLAYING PHAGES AND M13 PHAGES

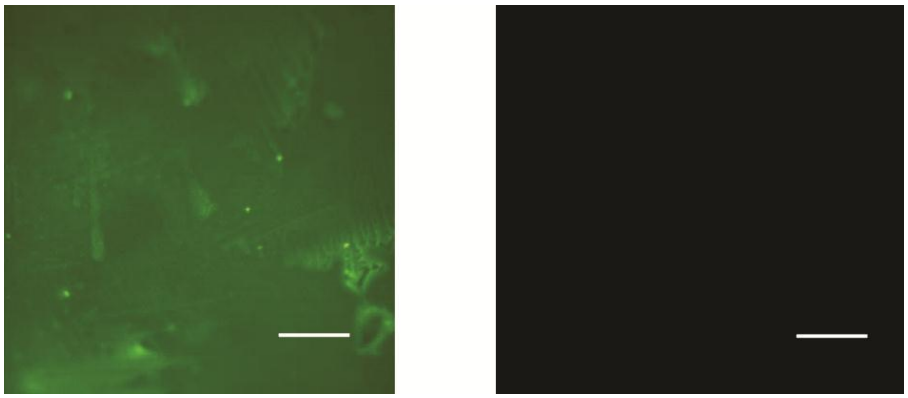

Figure S1. Fluorescent characterization of plasma oxidized PDMS (15 w, 30 s) with peptide (LSNNNLR) displaying phages (left) and M13 phage without displayed peptides (right). Scale bar: 50 μm.

Recognition of PDMS with phage displayed peptides was also performed with plasma oxidized PDMS (15 w, 30 s) which shows a hydrophilic surface. One phage displayed peptide sequence (LSNNNLR) was isolated for the investigation. The fluorescent characterization for the binding of this phage to the surface oxidized PDMS surfaces was investigated. This was accomplished by incubating the substrates sequentially to (1) the phage displayed peptide (LSNNNLR), (2) blocking buffer 0, (3) biotin conjugated antibody, and (4) avidin-FITC, with TBS buffer washing steps in between to remove non-specific binding. The intensity of FITC on the surface, which is a measure of the phage displayed peptides bound to the etched PDMS, was observed by a fluorescence microscope as shown in Figure S1 left image. The fluorescence characterization was also performed using M13 phages (without any peptide displaying on the phage particle) as a control, as shown in Figure S1. The figure shows fluorescent signals for both non-oxidized PDMS and slightly oxidized PDMS.

FLUORESCENT CHARACTERIZATION OF THE LOW FREQUENCY PEPTIDE (LQPRANF)

Figure S2. Fluorescent characterization of plasma oxidized (15 w, 30 s) PDMS (left) and non-oxidized PDMS (right) with the low frequency phage displayed peptide (LQPRANF). Scale bar: 50 μm.

Similarly, recognition of PDMS with low frequency phage displayed peptide LQPRANF was also performed with both non-oxidized PDMS and slightly oxidized PDMS (15 w, 30 s). The fluorescent characterization for the binding of this phage to the PDMS surfaces with and without plasma oxidation was investigated. This was accomplished by incubating the substrates sequentially to (1) the phage displayed peptide (LQPRANF), (2) blocking buffer, (3) biotin conjugated antibody, and (4) avidin-FITC, with TBS buffer washing steps in between to remove non-specific binding. The intensity of FITC on the surface, which is a measure of the phage displayed peptides bound to the etched PDMS, was observed by a fluorescence microscope, as shown in Figure S2. The result shows that LQPRANF can bind to both non-oxidized PDMS and oxidized PDMS (15 w, 30 s) effectively.

FLUORESCENT CHARACTERIZATION OF PLASMA OXIDIZED PDMS (100 W, 20 MIN) WITH PHAGE DISPLAYED PEPTIDES

Figure S3. Fluorescent characterization of plasma oxidized (100 w, 20 min) PDMS with phage displayed peptides LSNNNLR (left) and LQPRANF (right). Scale bar: 50 μm.

Recognition of PDMS with phage displayed peptides was also performed with strongly oxidized PDMS, which was oxidized by plasma with a high power and a long time (100 w, 20 min). The fluorescent characterization for the binding of this phage to the surface strongly oxidized PDMS surfaces was investigated, as shown in Figure S3. This was accomplished by incubating the substrates sequentially to (1) the phage displayed peptide (LSNNNLR/ LQPRANF), (2) blocking buffer, (3) biotin conjugated antibody, and (4) avidin-FITC, with TBS buffer washing steps in between to remove non-specific binding. The absence of fluorescence on the oxidized PDMS surfaces is an indication of surface changes subjected during etching due to the high plasma power and long oxidation time, which shows the phage displayed peptides only recognize non-oxidized PDMS and PDMS subject to mild plasma cleaning, and do not recognize the PDMS oxidized with a high plasma power and a long oxidation time.

FLUORESCENT CHARACTERIZATION OF MICROFLUIDIC CHANNELS AND MICROPATTERNS WITH M13 PHAGES

Figure S4. Fluorescent characterization of PDMS-based microfluidic channels (left image), and micropatterns (right image) with M13 phages. Scale bar: 50 μm.

Control experiments were carried out to investigate the fluorescent characterization of PDMS-based microfluidic channels and micropatterns with M13 phages (without phage displayed peptide), as shown in Figure S4. The fluorescent characterization was performed by incubating the microfluidic channels or micropatterns with M13 phages, blocking buffer, biotin conjugated antibody, and avidin-FITC with washing steps in between. There was no fluorescent signal observed, and the result suggests that M13 phages do not bind to the PDMS microfluidic channels and micropatterns.