On-chip immunoassay using electrostatic assembly of streptavidin-coated bead micropatterns

***** Supporting information *****

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Movie S-1

When the streptavidin-coated bead solution flows inside the microchannel, the beads are self-assembled on the ridges of the APTES micropatterns present on the microchannel surface. This ~ 30 s accelerated movie shows the complete bead patterning process which in real time takes about 5 min.

APTES micropatterning procedure:

The positive photoresist AZ1512 is spin-coated on a float glass substrate and patterned using photolithograpy (Figure S1(i)). Then the unmasked glass area is treated with air plasma (Harrick plasma cleaner) for 40s, resulting in the creation of surface silanol groups. Following this, 1 % v/v APTES solution in D.I water is spin-coated at 5000 rpm and there after the wafer is baked at 100 °C for 2 min. This results in the covalent binding of the APTES molecules to the glass surface (Figure S1(ii)). Then the remaining photoresist mask is ultrasonically lifted-off in acetone resulting in APTES micropatterns on the glass substrate (Figure S1(iii)).

Figure S-1

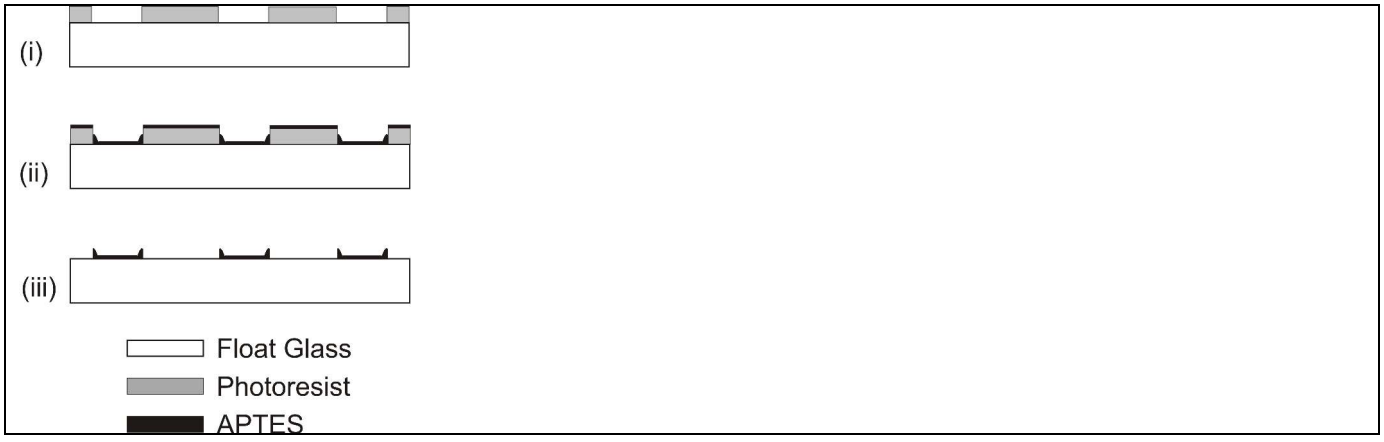

Fig. S-1: Schematic illustration of the process of creating APTES micropatterns using the lift-off technique. (i) Positive photoresist (AZ1512) micropatterns. (ii) Spin-coating of the APTES layer and curing. (iii) Lift-off of photoresist layer leaving the APTES patterns with ridges.

Figure S-2

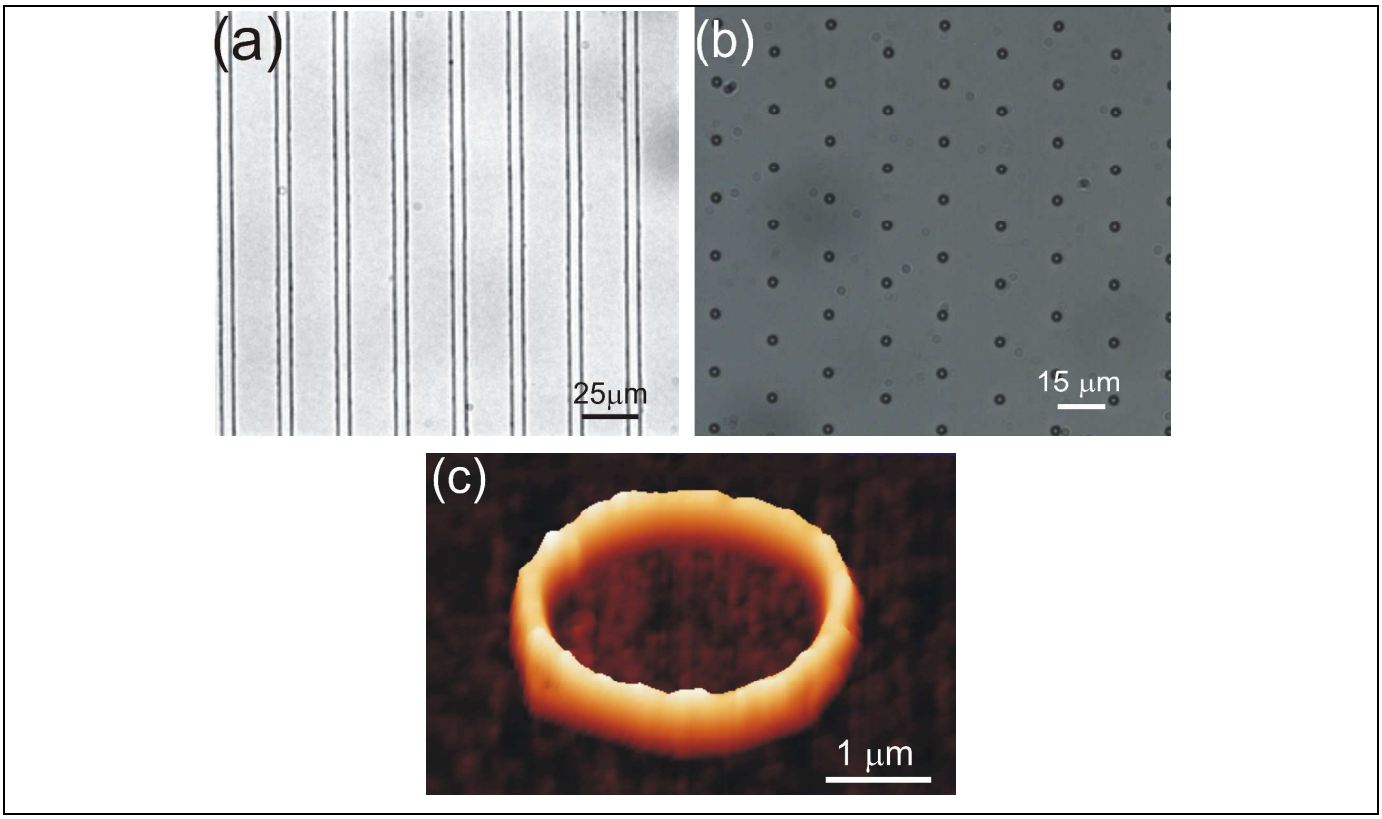

Fig. S-2: Optical micrographs showing the APTES double line patterns (a) and APTES dot patterns (b). (c) Atomic force micrograph of a single APTES dot.