Poster

MICRO/NANOSCALE MULTIPLE BIOMOLECULE PRINTING IN ONE STEP USING A PDMS MACROSTAMP

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One of the objectives of the microarray technology is to conduct biological analysis in parallel. To this end, biochips based on spotting technology are currently used. In a comparative study between this classical method of deposition and the microcontact printing (μCP) approach [1] a significant advantage of μCP was discovered. Furthermore, micro-Contact printing is emerging due to its low implementation cost, its ability to produce sub-micron patterns and large surface processing [2-4]. We have developed and patented a novel method for multiplexing the μCP technique which targets the deposition of 100-1000 different molecules in one step. We have fabricated stamps containing millimetric pads arranged in a periodic array compatible with 1536-wells microplate (figure 1.a, 1.b, 1.c). Through a very simple procedure of molding, each of these pads includes micro and nanoscale features on its surface (figure 1.d, 1.e, 1.f). By mechanical machining we have fabricated a mesh in aluminium material that mimics the format of commercial titration plates that are used in biological and pharmaceutical laboratories. By molding a PDMS stamp through this mesh and against a patterned silicon wafer, it is possible at low cost and with high reliability to design large surface PDMS stamps, exhibiting a few hundreds of millimetric pads, each one containing a large number of micro and nanoscale features on their surface. Then by inking in a single step each dot with a different ink through a titration plate, it becomes possible to print different inks in one step (figure 2).

The validation of these multilevel stamps has been achieved using fluorescent inks and antibodies. The results we have obtained show that a reliable printing can be obtained over a few hundreds of pads in one step of contact printing and secondly that no trace of contamination can be found from one pad to another. An automatic system under fabrication will be presented. This machine carries out the multiplexed printing of probe biomolecules in a repetitive, reproducible and robust manner.

To allow the conception of a very low cost biochip platform, this process and automat are integrated with the label-free diffraction based biodetection principle, exhibiting better sensitivity than existing solutions. This new technology fits into the growing market of biomolecular analysis for medicine and environment (Cancer, Serology, infectious diseases, contamination detection).

References:

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Figures:

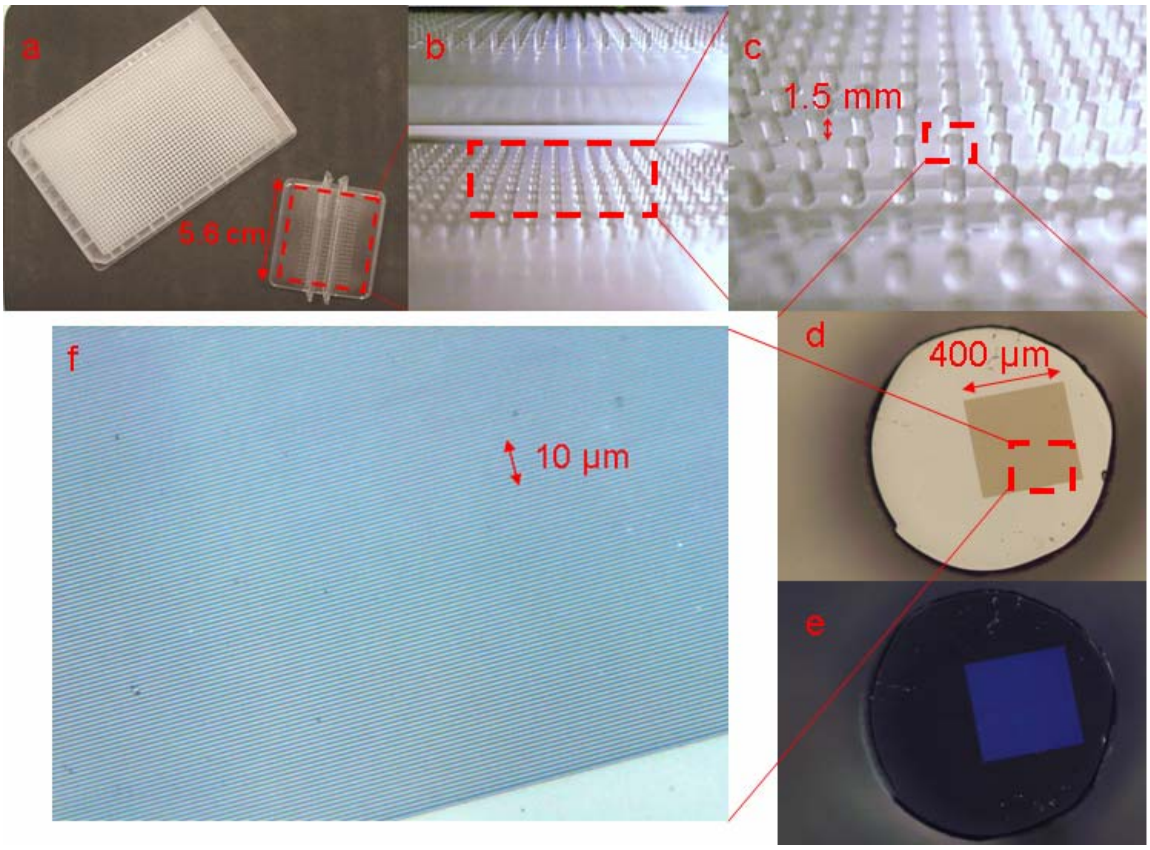

Figure 1 : *a) a 1536-wells microplate with the macrostamp b) two side views of the macrostamp c) magnification of the side view : the height of dots is 1.5 mm d) micrograph picture of a dot with nanocale features : 400 µm-side grating composed e) dark field of d) : grating diffracting light is viewed blue f) magnification of d) : linewidth is 500 nm and period is 1µm.*

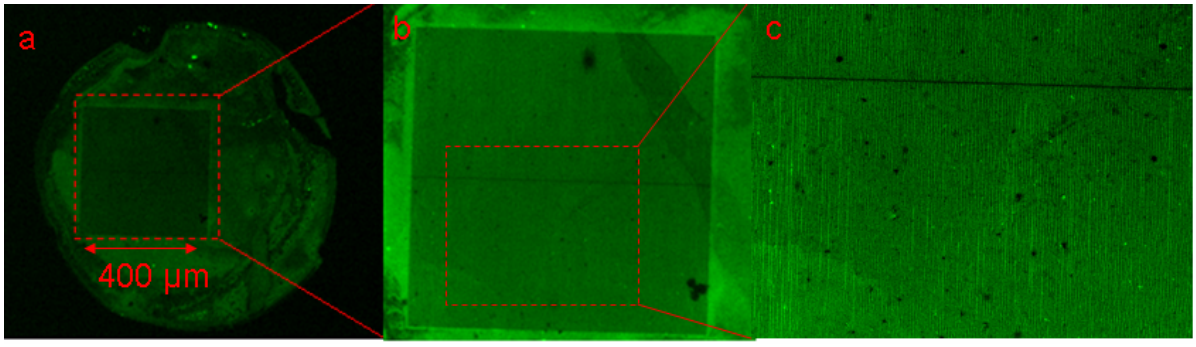

Figure 2 : *a) a antibody µCP b) magnification of a) centered on the grating c) magnification of b), line width is 500 nm*