

SUPPLEMENTARY MATERIAL

Magnetic domain wall conduits for single cell applications

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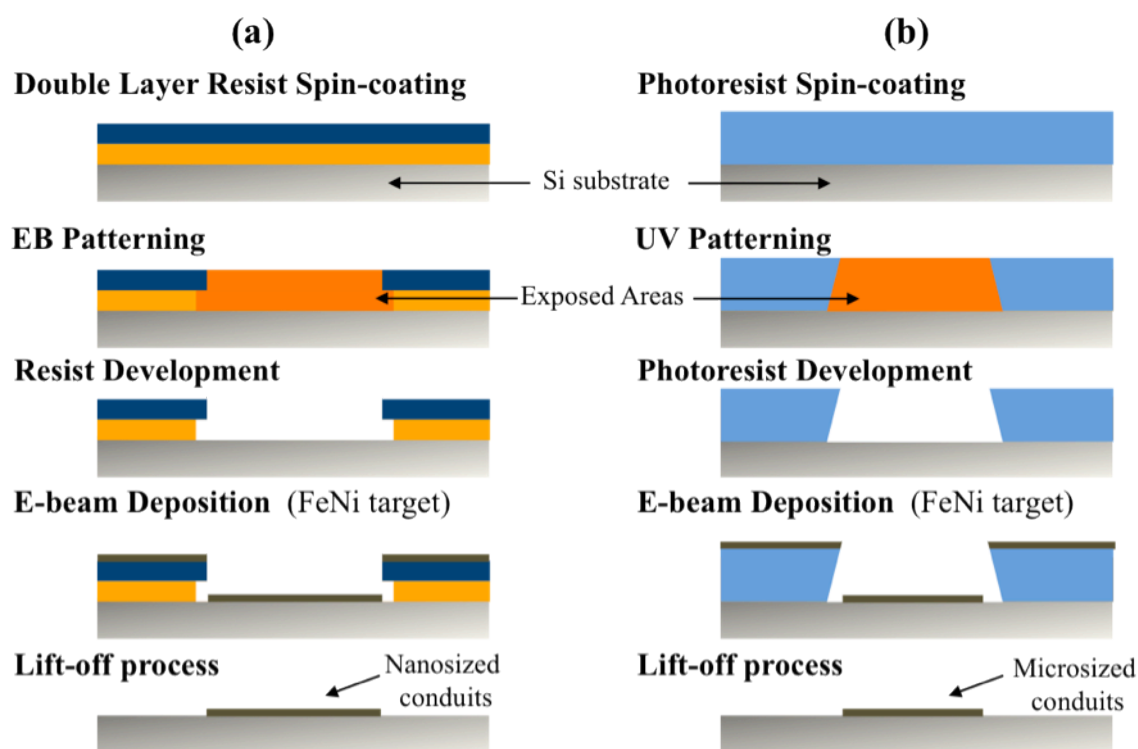


Figure S1: Schematics of the fabrication process for nanosized DW conduits (a) and microsized conduits (b). In the first case we used electron beam lithography; two layer of PMMA photoresist with concentration of 3.5 % (200 K) and 1.5 % (950 K) are sequentially spin coated over the Si substrate in order to obtain a suitable profile for the lift-off. In the optical lithography process we used AZ5214E image reversal photoresist to obtain an undercut profile. In both cases the chips were afterwards covered with 50 nm of SiO₂.

Cells viability test

The same yeast cell suspension as described in the text was used to carry out a cell viability test. Yeast cells were incubated in PBS pH 7.4 containing 0.1% (v/v) Triton for 20 min at RT. After incubation, cells were washed with PBS pH 7.4 three times and used directly for the experiment. In our work we used the standard LIVE/DEAD® Yeast Viability Kit and the experimental protocol provided by Invitrogen (Invitrogen, Paisley, UK). Fluorescent microscopy was performed using a Carl Zeiss Axio Imager M1m microscope equipped with an AxioCam MR.5 computer controlled camera (Carl Zeiss AG, Gottingen, Germany).

Figure S2 displays fluorescence images obtained with a high-resolution digital camera, showing the viability of yeast cells before and after incubation with a detergent Triton X-100. The commercially available FUN-1 dye was used to evaluate cells vitality. The FUN-1 reagent (resazurin, a non-fluorescent substrate) diffuses passively into the cell allowing the metabolic capability of the cell to be quantified. The working mechanism of the assay is based on a coupled enzymatic reaction, where oxidation of glucose-6-phosphate by glucose-6-phosphate dehydrogenase results in the production of NADPH, which is used for the reduction of resazurin by NAD(P)H: quinone oxidoreductase (EC 1.6.5.5), resulting in the production of red fluorescent resorufin. Red fluorescence is observed in living cells with normal metabolic activity as a result of integration between the intracellular metabolic activity and plasma membrane capability, while dead cells emit bright green light. Using the FUN-1 reagent in the cell viability test we could observe only few metabolically less active cells in the sample investigated after incubation with Triton X-100 (Fig. S2 (c)), the rest of cells was as metabolically active. It was hypothesized that non-ionic detergents could alter the yeast cell membrane, decreasing its viability insignificant. Previous studies [1] based on the investigation the effect of detergents, like Triton X-100 and Tween 80 on cells viability, showed that such chemicals can effect very slightly on cell lyses even at concentrations up to the 8%.

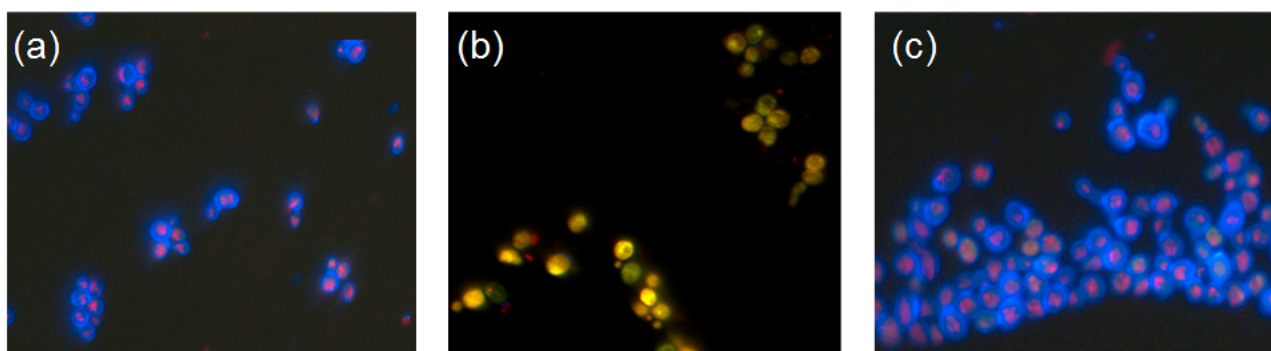


Figure S2: Microscopic fluorescence images of *S. cerevisiae* cells stained with FUN-1 dye viewed at a magnification of 64 \times . (a) Living yeast cells – positive control; (b) Dead yeast cells – negative control; (c) Cells treated with Triton X-100 at the concentration of 0.1% (v/v) at 20 min.

[1] Kimura A, Arima K, Murata K. 1981 *J. Agric. Biol. Chem.*, 45(11), p: 2627-2629