Supporting Information

Interaction of Cells with Patterned Reactors

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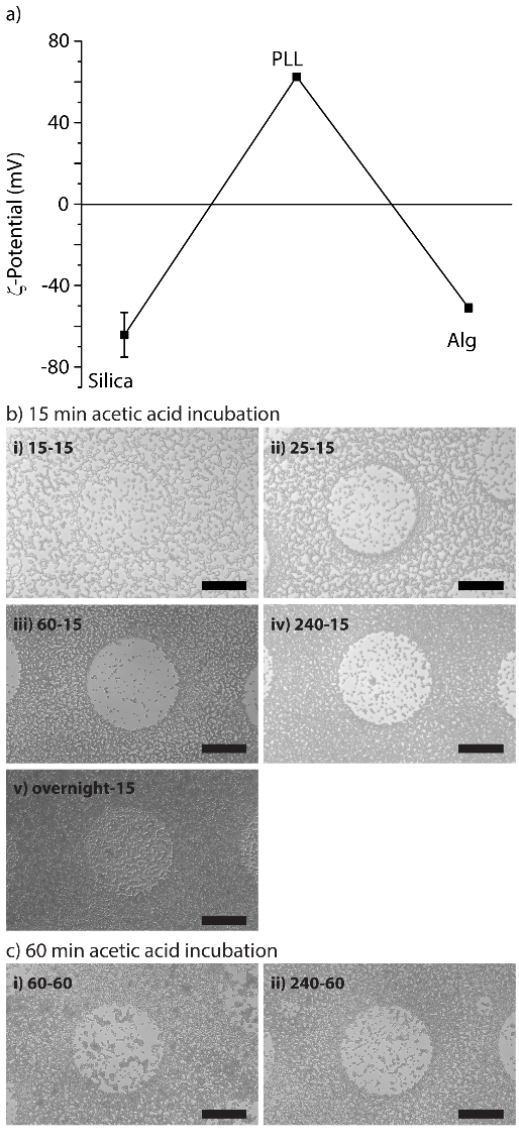

Figure S1. a) ζ-potential measurements at the different stages of P1 assembly. Particle pattern: Representative bright field images of P1 patterns using b) 15 min and c) 60 min of acetic acid incubation. The P1 adsorption times were 15 min (bi), 25 min (bii), 60 min (biii and ci), 240 (biv and cii) and overnight (bv). The scale bars are 50 µm.

Scanning electron microscopy:

Further, the P1 patterns were imaged by scanning electron microscopy (SEM) with an FESEM from FEI (Nova-600). The samples were sputter-coated with gold coated and then fixed on the sample holder with carbon tape and analyzed with a high vacuum detector

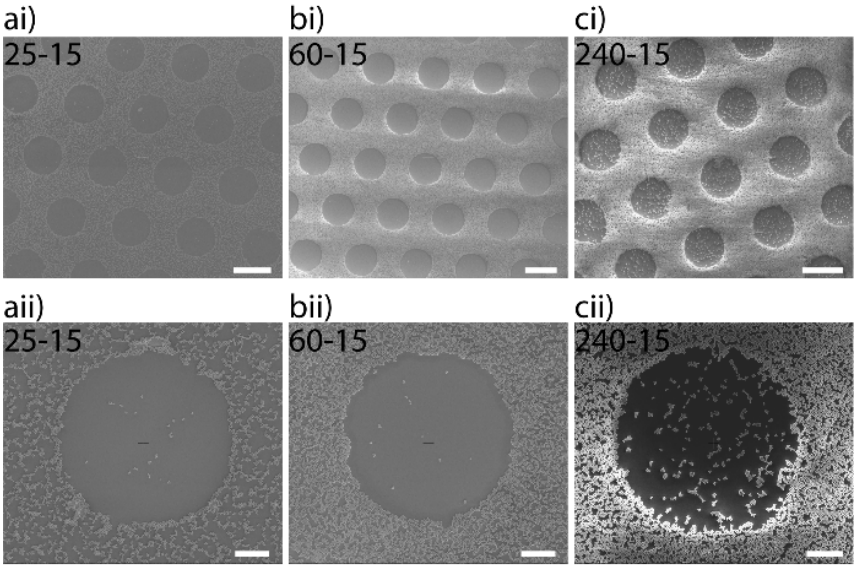

Figure S2. Particle pattern: Representative SEM images of P1 patterns using 15 min acetic acid incubation and 25 min (ai and aii), 60 min (bi and bii) and 240 min (ci and cii) P1 adsorption. The scale bars are 100 µm (ai, bi, ci) and 20 µm (aii, bii, cii).

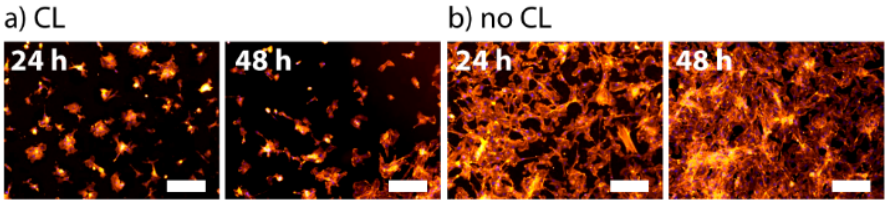

Figure S3. Representative fluorescent microscopy images of endothelial cells adhering to (60-15)/Alg substrates for 24 h and 48 h using PLL_L for printing (Step ii in Scheme 2) with CL (a) or without CL (b). (Blue: DAPI stained nuclei, orange: Phalloidin stained actin) The scale bars are 200 µm.

Multilayer assembly on planar surface:

Quartz crystal microbalance with dissipation monitoring (QCM-D) measurements (Q-Sense E4, Sweden) were used to analyze the adsorption behavior of liposome-containing polymer films. Silica-coated crystals (QSX300, Q-Sense) were cleaned in a 2 % (w/w) SDS solution overnight, rinsed with ultrapure water and dried with nitrogen, exposed to UV/ozone for 30 min. Then the crystals were dried and mounted into the chambers of the QCM-D instrument. The frequency changes (Δf) and dissipation changes (ΔD) were monitored at 20 ± 0.02 °C. After a stable baseline was obtained in Hepes buffer, a PLL solution (1 mg mL^{-1} in Hepes buffer) was introduced into the chambers and let to adsorb. When the surface was saturated, the chambers were rinsed with Hepes buffer. The PLL pre-coated crystals were exposed to a liposome solution until the surface was saturated and the chambers were rinsed with Hepes buffer. Afterwards, PMAc (1 mg mL^{-1} in Hepes buffer) and PLL (1 mg mL^{-1} in Hepes buffer) were deposited (with intermediate washing in Hepes buffer) before the

second incubation with liposomes and washing in Hepes buffer. Then PMAc (1 mg mL^{-1} in Hepes buffer) was adsorbed, followed by a washing step with Tris buffer. Finally, the polymer films coated crystals were exposed to DA solution (2 mg mL^{-1} in Tris buffer). Normalized frequencies using the third harmonics are presented. The ζ-potential of the different layers in the reactors assembly were measured by a Zetasizer Nano ZS (Malvern Instruments, Malvern, UK) employing a material refractive index of 1.590 and a dispersant (water at 25 °C) refractive index of 1.330.

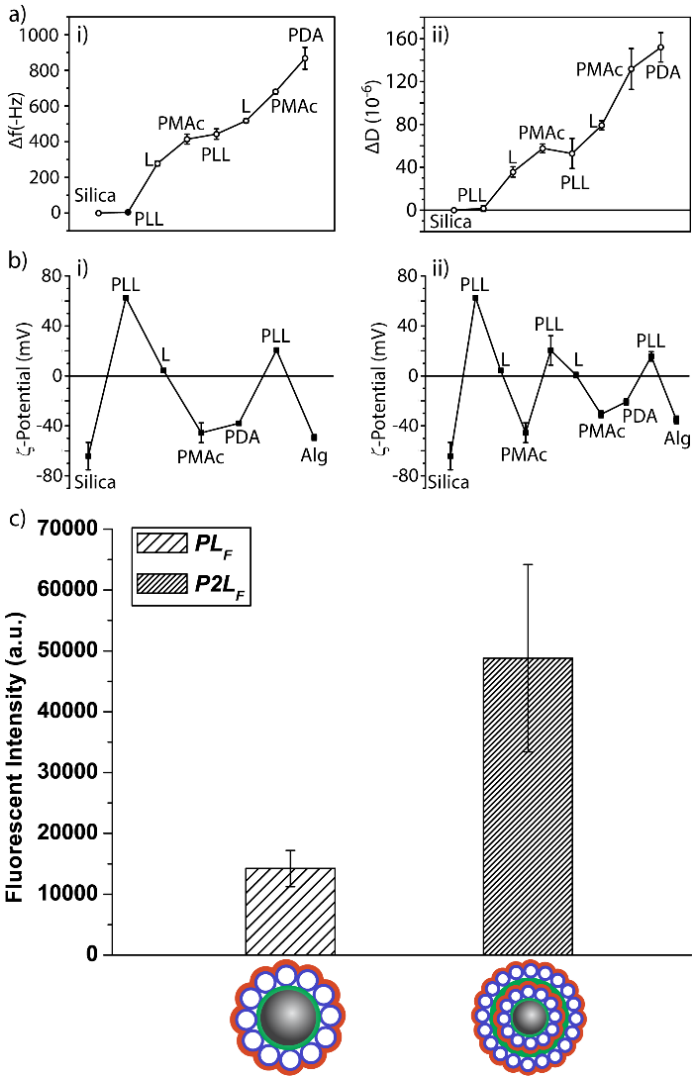

Figure S4. Changes in frequency (Δf, ai) and dissipation (ΔD, aii) of a silica pre-coated QCM-D crystal upon deposition of PLL, liposomes (L), PMAc, PLL, liposomes (L), PMAc and PDA. ζ-potential measurements of the PL (bi) and P2L (bii) reactors at the different assembly layer And the fluorescence intensity (c) of 800 nm silica particles coated with PLL/L_F/PMAc (PL_F) and PLL/L_F/PMAc/PLL/L_F/PMAc ($P2L_F$) measured by flow cytometry.

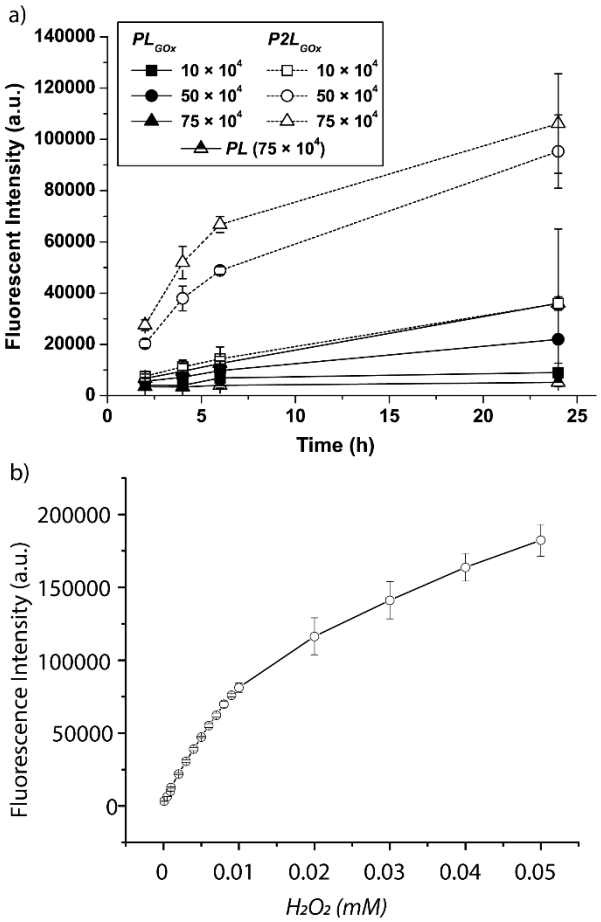

Figure S5. Reactor activity in solution: (a) Reaction kinetics of PL_{GOx} and $P2L_{GOx}$ in comparison to reactors with empty liposomes (PL). (100 mM glucose starting concentration, n = 3). (b) Standard curve reporting the fluorescence intensity at different concentration of H_2O_2 as assessed by the Amplex Red assay.

Reactor activity in cell media:

The reactor activity in cell medium was measured by incubating 75×10^4 reactors (PL_{GOx} and $P2L_{GOx}$) with glucose (100 mM in Hepes buffer) in a total volume of 200 µL at room temperature for 2 h. 75×10^4 PL and P2L were were used as controls. Afterwards, the samples were centrifuged for 5 min at the speed of 2.0 rpm. The supernatant was then transferred to a 96-well plate followed by incubation with 0.16 mM o-dianisidine and 2 U mL^{-1} HRP for 30 min at room temperature. Finally, the absorbance of the solutions was monitored at λ = 500 nm using a multimode plate reader.

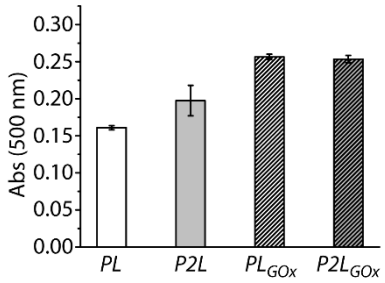

Figure S6. Reactor activity in cell medium.

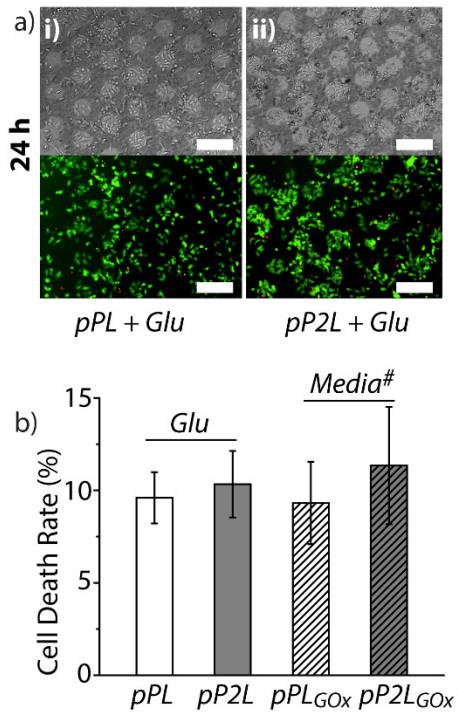

Figure S7. a) Representative bright field (top row) and fluorescent (bottom row) microscopy images of hepatocytes adhering to pPL (i) and pP2L (ii) in the presence of 100 mM glucose after 24 h. (green: live cells, red: dead cells) The scale bars are 200 µm. b) Quantification of dead cells is expressed as percentage of the total number of cells on the substrate.
The bars in cell media are the same as in the main text but are added here for convenience.