Electronic Supplementary Material (ESI) for Chemical Communications

Polydopamine Gradients by Oxygen Diffusion Controlled Autoxidation

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Experimental Section

Materials: Dopamine hydrochloride (Sigma, AP), tris(hydroxymethyl) aminomethane and acetone (Sinopharm Chemical Reagent Co., Ltd, AP) were used as received. Silicon wafers were cut into 1×3 cm rectangles and cleaned by following steps below: the wafers were dipped into acetone and clean with ultrasonic washer for 5 minutes, then rinsed by deionic water. After that the wafers were immersed in Piranha solution (H_2SO_4:H_2O_2=7:3) for 20~30 min, rinsed by deionic water again, and finally dried with nitrogen. Polypropenemicrofiltration p membrane (PPMM) and high impact polystyrene (HIPS) were cut into 1×4 cm^2. The former was washed by acetone and the later by deionic water overnight. Tris-buffer solution was prepared to 50 mM and PH was adjusted to 8.5 by dripping 1 M HCl solution into it.

Fabrication of gradient surfaces: The silicon wafers were put into ϕ30×20 ml weighing bottles and laid on inclined platforms with different tilt angles (10°, 20° and 30°), the fresh prepared dopamine solution (2 mg/ml) was dripped into the bottles until about 0.5 cm to the edge of wafers. The samples was deposited for 12 hr at room temperature and then rinsed by deionic water and acetone to remove the particles adhere to the surface. PPMM and HIPS were deposited by following a similar process with different reaction time. It should be mentioned that HIPS was

only washed by deionic water for its dissolution in acetone. The aforementioned experiments should be strictly operated without strirring during the deposition process.

Characterization: The thickness was detected by spectroscopic ellipsometer (Semilab Sopra, GSE-5E) at incident angel of 70°, and the light spot size is 360×360 μm^2. The surface morphologies of PDA-coating on silicon wafers were obtained by scanning probe microscopy (VEECO, Multimodel). The microstructures of PPMM were observed by field emission scanning electron microscopy (Hitachi, S4800). UV absorbance was measured by ultraviolet spectrophotometer (Shimadzu, UV 2450) from 800 to 260 nm. Surface elements components were characterized by X-ray photoelectron spectrometer (Thermo, ESCALAB250Xi).

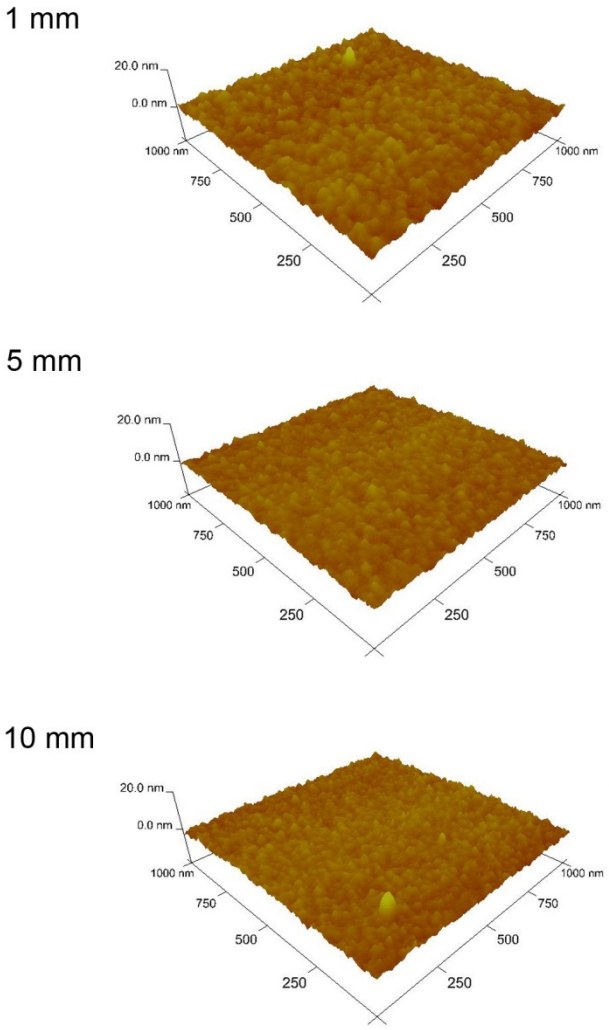

Figure S1. AFM images of PDA on silicon wafer at different positions. $RMS_{d=1}$=1.04 nm, $RMS_{d=5}$ =0.860 nm and $RMS_{d=10}$=0.853 nm.

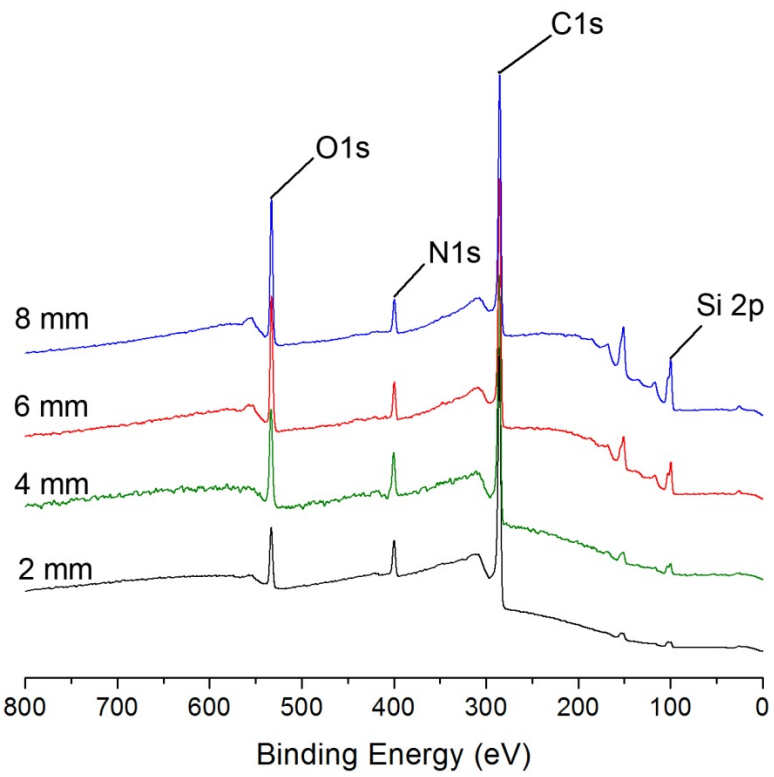

Figure S2. XPS spectra of PDA gradient on silica wafer at different positions.

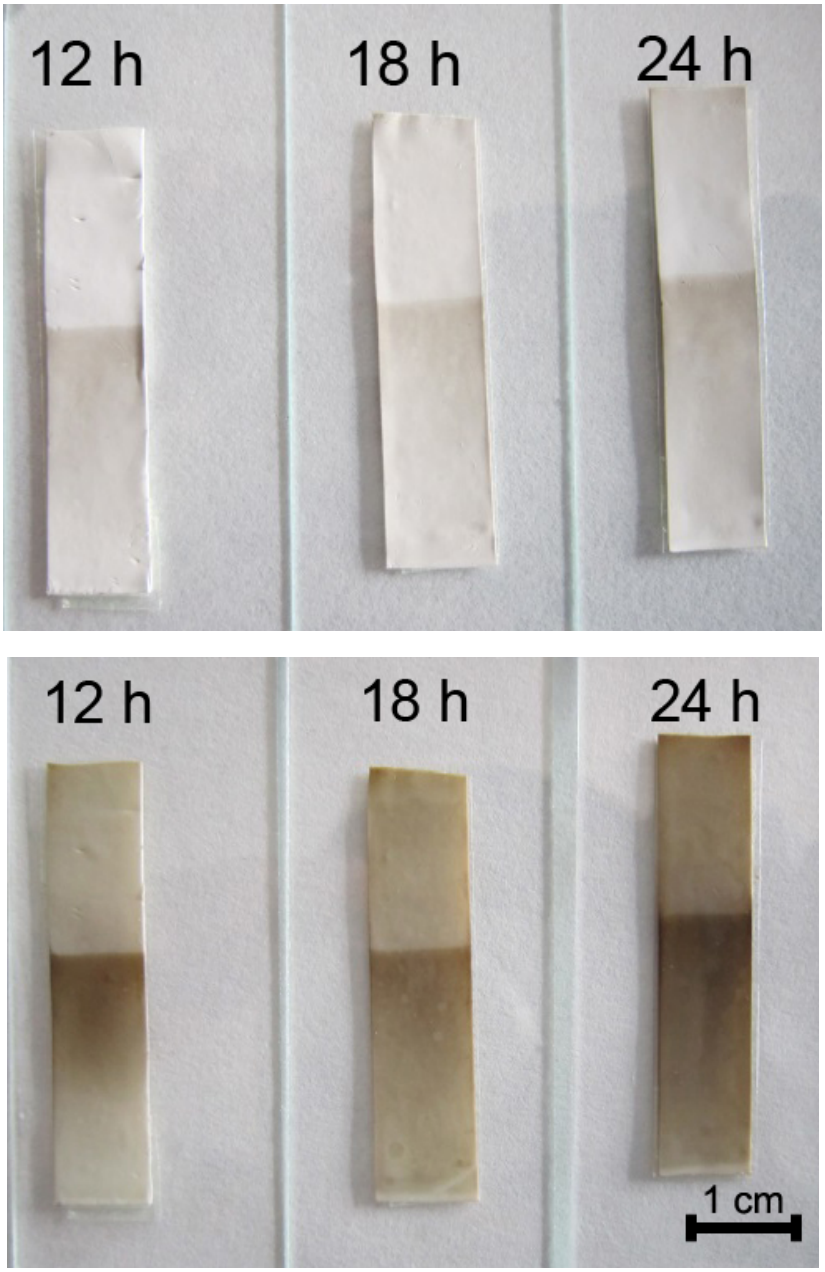

Figure S3. PPMMs with PDA gradients fabricated with different deposition times (12 hr, 18 hr and 24 hr). The above ones were dried under reduced pressure and the below ones were infiltrated by ethanol.

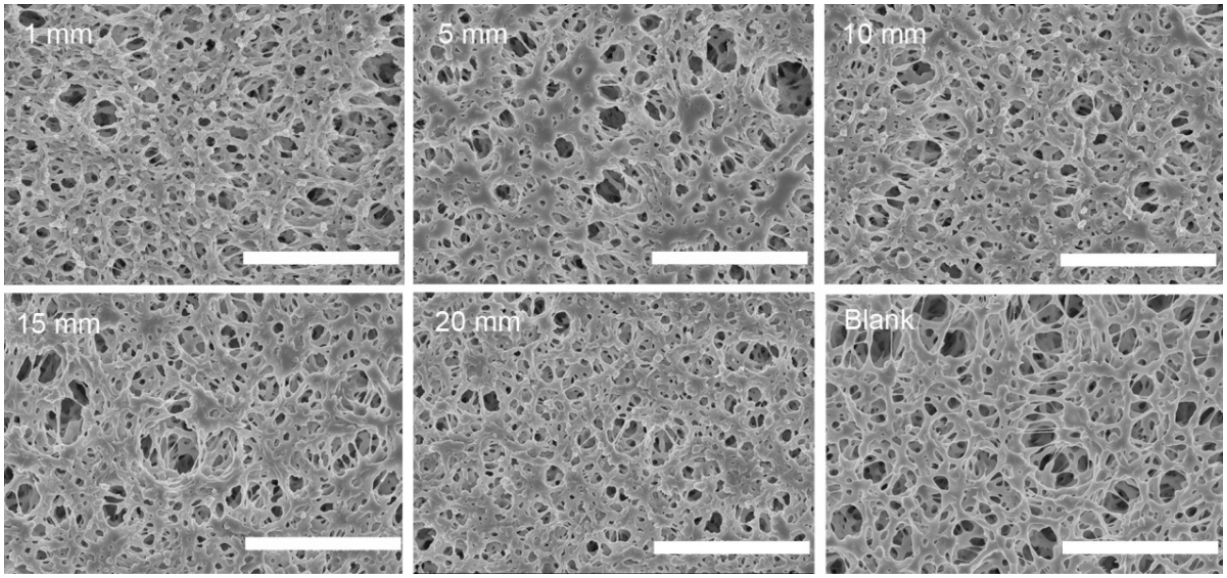

Figure S4. SEM images from different positions of PPMM with PDA gradient deposited for 24 hr at tilt angel of 15°. The scale bar is 5 μm.

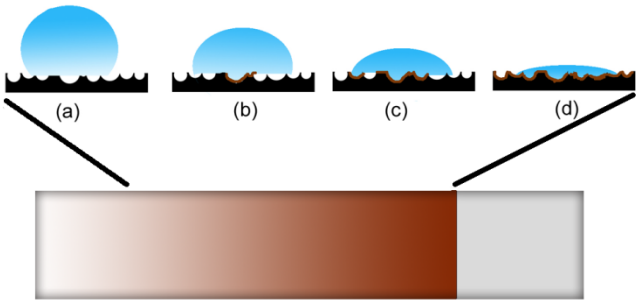

Figure S5. Schematic of wettability gradient on PDA coated PPMM.

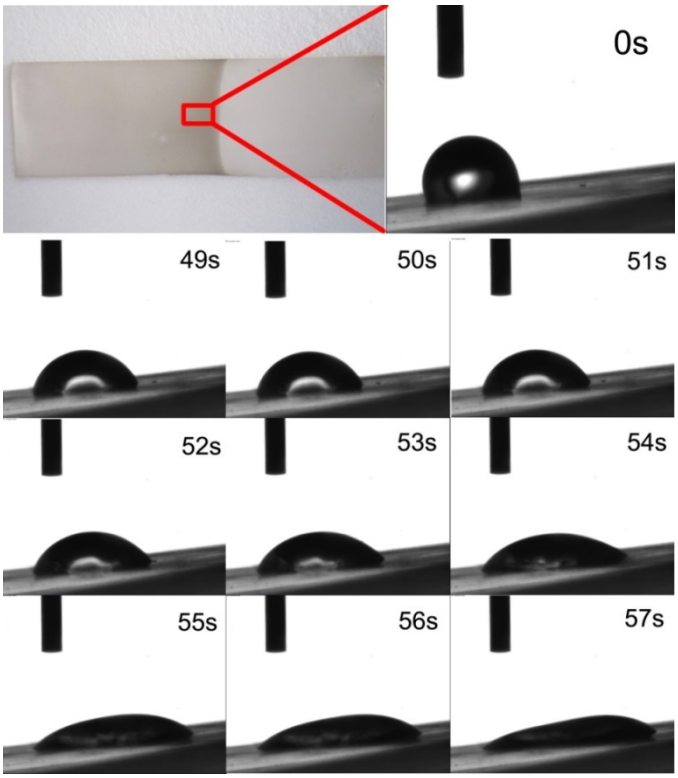

Figure S6. Dynamic contact angle of water drop on the surface of PPMM with PDA gradient deposited for 16 hr at a tilt angel of 35°. The surface is inclined by 7° from the horizontal plane.

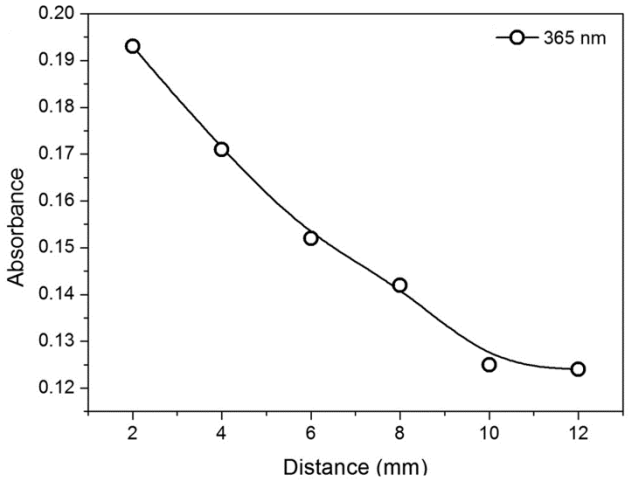

Figure S7. Absorbance of UV light at 365 nm of HIPS (Absorbance of UV light at 365 nm of HIPS (high impact polystyrene) with PDA gradient. The HIPS sheet was dipped into dopamine solution at 15° tilt angle for 24 hr.