Supporting Information

Surface Gradient Material: from Superhydrophobicity to Superhydrophilicity

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The flat gold substrate was prepared by thermal evaporation of gold on polished glass wafers
with an adhesion promoter layer of chromium. Before further process was carried out, the
substrate was immersed in piranha solution (H₂O₂:H₂SO₄ = 3:7) for 1 hour and then rinsed
thoroughly with distilled water and at last sonicated in pure ethanol for 1 hour and dried in a N₂
stream. Then substrate was immersed in a mixed aqueous solution of H₂SO₄ (0.5 mol/L) and
HAuCl₄ (1 mg/mL), and the electrochemical deposition was performed at -200 mV for 40 min
in the single potential time base mode, using a platinum electrode as counter electrode and
Ag/AgCl as the reference electrode. The as-prepared rough gold substrate was placed in a tube
with its back standing against the wall of the tube, and then a 0.05 mmol/L decanethiol solution
was added slowly to the tube using a dropping funnel. At last, the substrate was immersed in 1
mmol/L HS(CH₂)₁₀CH₂OH for 10 min.

The SEM images were carried on a Hitachi S-4300 scanning electron microscope at 15.0 kV.
X-ray photoelectron spectroscopy data were obtained with an ESCALab220i-XL electron
spectrometer from VG Scientific using 300 W Al Kα radiation. Contact angle measurements
were conducted with a Dataphysics OCA20 contact angle system at ambient temperature using
deionized water as probe liquid.
The roughness factor R is defined as the ratio of the real surface area (S) to projected surface area (S₀) of gold surface, and S can be measured from the O-atom electrosorption voltammograms. In our case, a polycrystalline gold electrode (CHI 101, diameter=2mm) was used. S can be calculated from the integrated charge area by scanning the gold working electrode from –0.2 V and 1.55 V vs. Ag/AgCl/KCl (saturated) in 1 M H₂SO₄ solution with a scan rate of 0.1 V·s⁻¹. The anodic peak at around 1.1 V -1.4 V is corresponding to the gold oxidative process, and the peak at around 0.9 V is corresponding to gold reductive process. Using the theoretical value of 482 µC·cm⁻² from for the reduction of a monolayer of divalent oxygen from a gold surface we got the integrated charge data, from which we calculated the roughness is 7.2.