Supporting Information

Inhibiting protein biofouling using graphene oxide in droplet-based microfluidic microsystems

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Supplementary Methods I: Experimental Methods

On a glass wafer, called base, cleaned by ultrasonication in acetone and isopropyl alcohol baths, 20-nm evaporated nickel electrodes are patterned by photolithography. Electrode patterns are developed through wet etching (H_2O/HNO_3, 3:1 v/v, 1min). The photoresist is removed with acetone bath. Then the wafer is rinsed with isopropyl alcohol, deionized water and dried under a stream of nitrogen. The wafer is coated by a SU-8 layer (2 µm thick as dielectric) and by Cytop® (30 nm thick) for the hydrophobic layer, both by spin-coating. The hydrophobic counter electrode consists of a doped silicon wafer coated by a 30 nm thick Cytop® layer. The contact angle and contact angle hysteresis with deionized water are 115° and 11°, respectively.

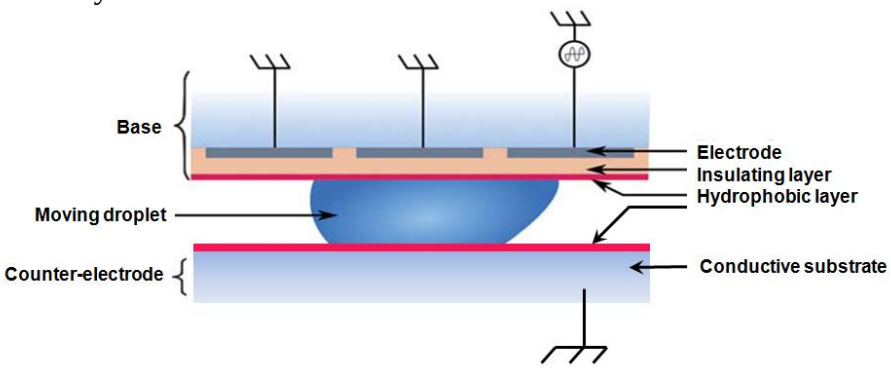

Figure S1: Set up of the electrowetting device.

Each electrode of $1mm^2$ on the EWOD device is driven by a home-made LabView® program through an electric relay card. The electric relay card switches every second on the electrodes, the applied voltage is provided by a signal generator (33120A, Hewlett-Packard®) coupled to a 50dBm high-voltage amplifier (2340, Tegam). The applied voltage is a squared signal at 1kHz and at V_{TRMS}=100V.

Supplementary information: Results and discussion

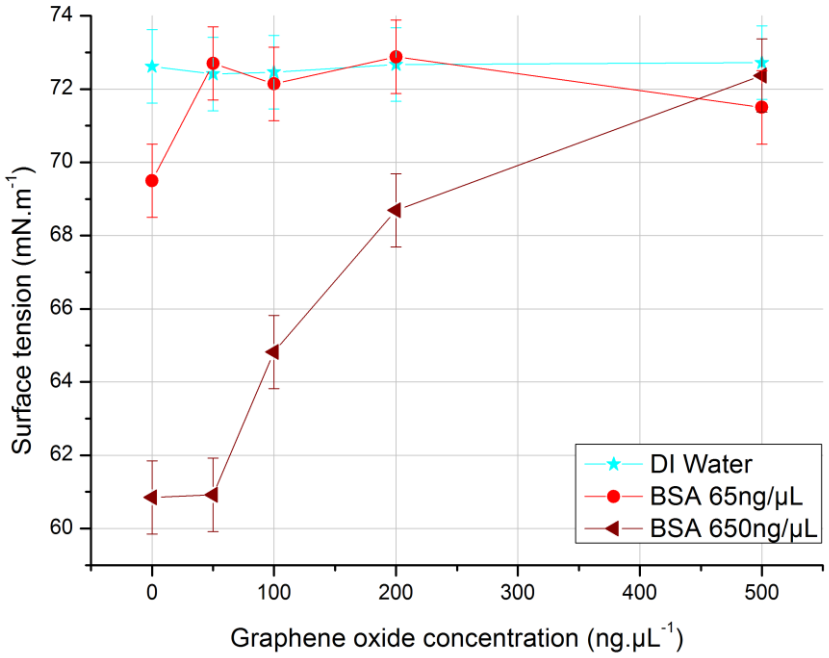

Figure S2: Surface tension measured for different concentrations of BSA and graphene oxide

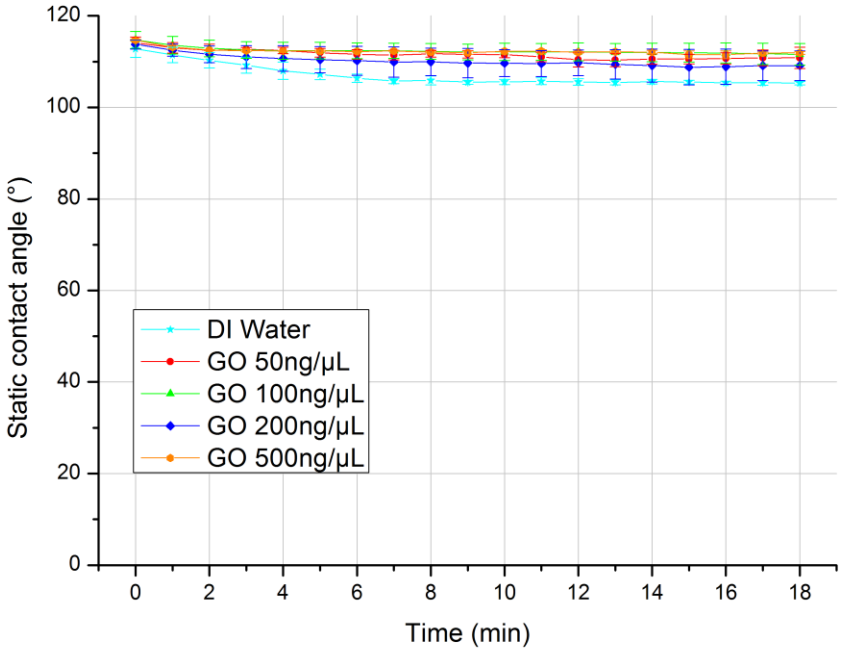

Figure S3: Static contact angle *vs* time during evaporation of a 2µL droplet containing only GO at 50, 100, 200 and 500 ng/µL.

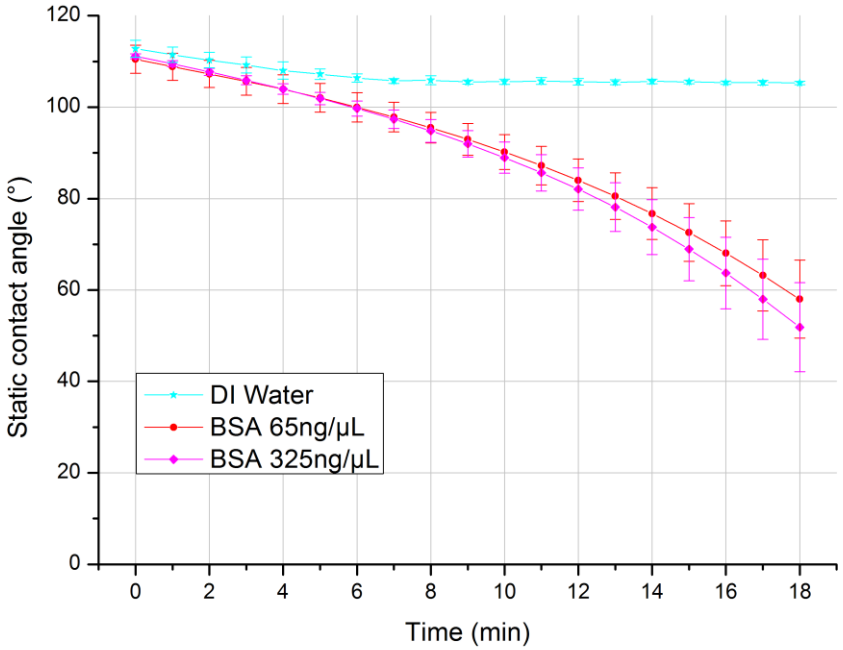

Figure S4: Static contact angle *vs* time during evaporation of a 2µL water droplet without and with BSA at 65 and 325 ng/µL .

Videos

V1: Evaporation of a 2 µL droplet containing proteins (BSA, 65 ng/µL) + GO (100 ng/µL)

https://bigfile.univ-lille1.fr:443/get?k=HO8BysHLLq1VL5ecmk7

V2: Evaporation of a 2 µL droplet containing proteins (BSA, 195 ng/µL) + GO (100 ng/µL)

https://bigfile.univ-lille1.fr:443/get?k=zSsiGLcWov4wAAc2DPN

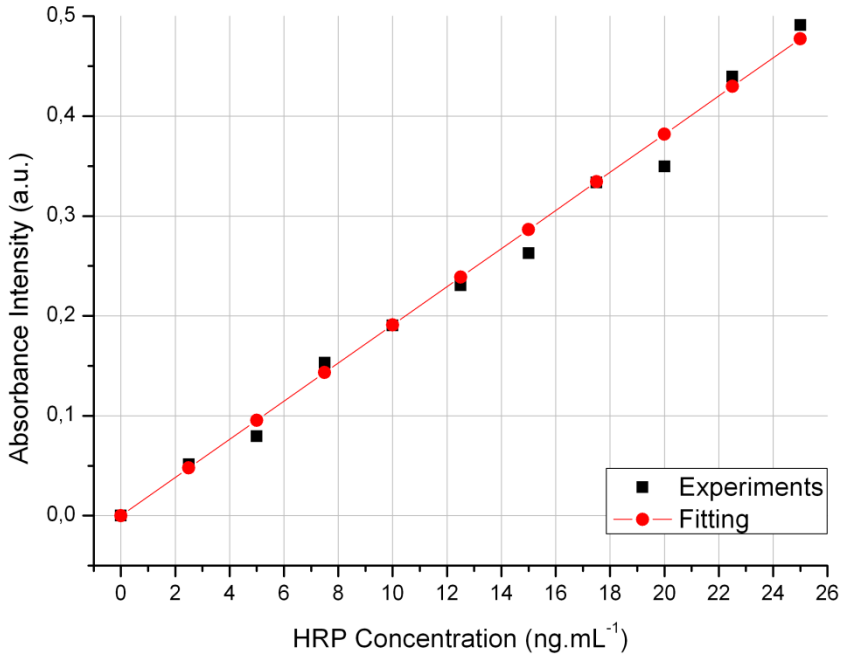

Figure S5: Calibration Curve of HRP in aqueous solution with ABTS (3.6 mM) and H_2O_2 (50 µM) R^2=0.991