

Supporting Information

Stability of Polydopamine Coatings on Gold Substrates Inspected by Surface Plasmon Resonance Imaging

Wei Yang^{1, 2}, Chanjuan Liu^{1, 2}, Yi Chen^{1, 2, 3*}

1 Key Laboratory of Analytical Chemistry for Living Biosystems, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

2 University of Chinese Academy of Sciences, Beijing 100049, China

3 Beijing National Laboratory for Molecular Sciences, Beijing 100190, China

* Corresponding Author

Institute of Chemistry, Chinese Academy of Sciences, Zhong-Guan-Cun Bei-Yi-Jie 2#, Haidian, Beijing, 100190, PR China. E-mail: chenyi@iccas.ac.cn (Y. Chen). Tel.: +86-10-62618240. Fax: +86-10-62559373

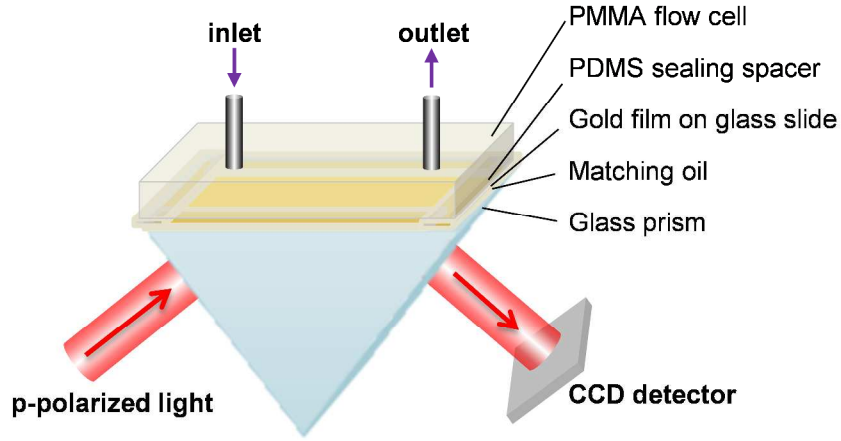


Figure S1. Schematic diagram of SPRi apparatus based on Kretschmann configuration. A gold chip was assembled on the flow cell made of PMMA with a PDMS sealing spacer. Then, they were attached on the prism separated with a thin layer of refraction index matching oil.

Detailed calculation process of detachment ratios (γ)

Eight areas evenly distributed on the gold chip were selected for data acquisition. The SPRi signals before PDA deposition, after PDA deposition followed by water rinsing and after treatment with detaching conditions followed by water rinsing were named as S_0 , S_1 and S_2 respectively. For each selected area ($n = 1 \sim 8$):

$$\Delta_{i,n} = S_{1,n} - S_{0,n}, \quad \Delta_{r,n} = S_{1,n} - S_{2,n}$$

$$\gamma_n = \Delta_{r,n} / \Delta_{i,n} \times 100\%$$

The final γ of each test condition was the average of the eight γ_n , which was used to evaluate the stability of PDA.

$$\gamma = 1/8 \sum \gamma_n$$

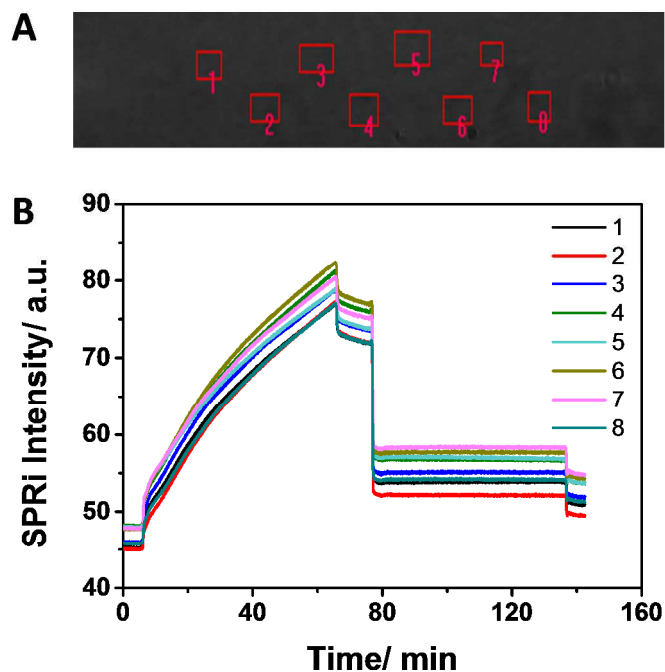


Figure S2. Real-time curves of SPRi intensity (B) gathering from different locations (A) on a gold chip under the condition of pH 13. Liquids were pumped into the flow system in the order of water (till stable), dopamine solution (1 h), water (10 min), phosphate buffer at pH 13 (1 h), and water finally (till stable).

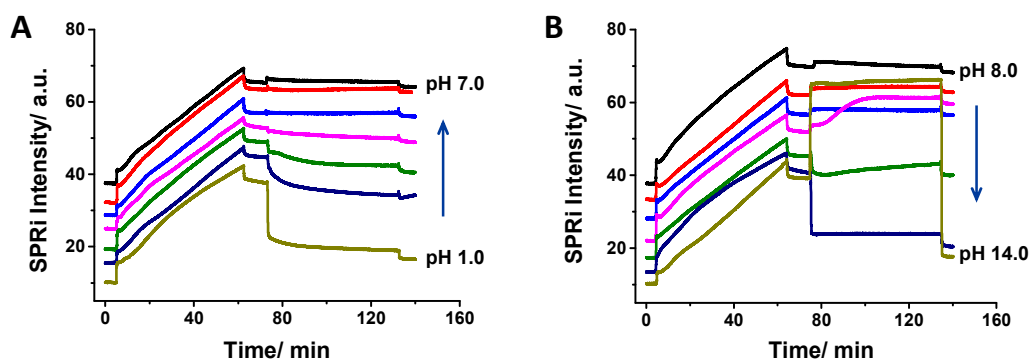


Figure S3. A whole set of real-time curves of SPRi intensity measured in the (A) acidic (pH 1-7) and (B) alkaline (pH 8-14) conditions. The sharp signal increase when pumping in aqueous solution at pH 14.0 is due to a large increase in refractive index.

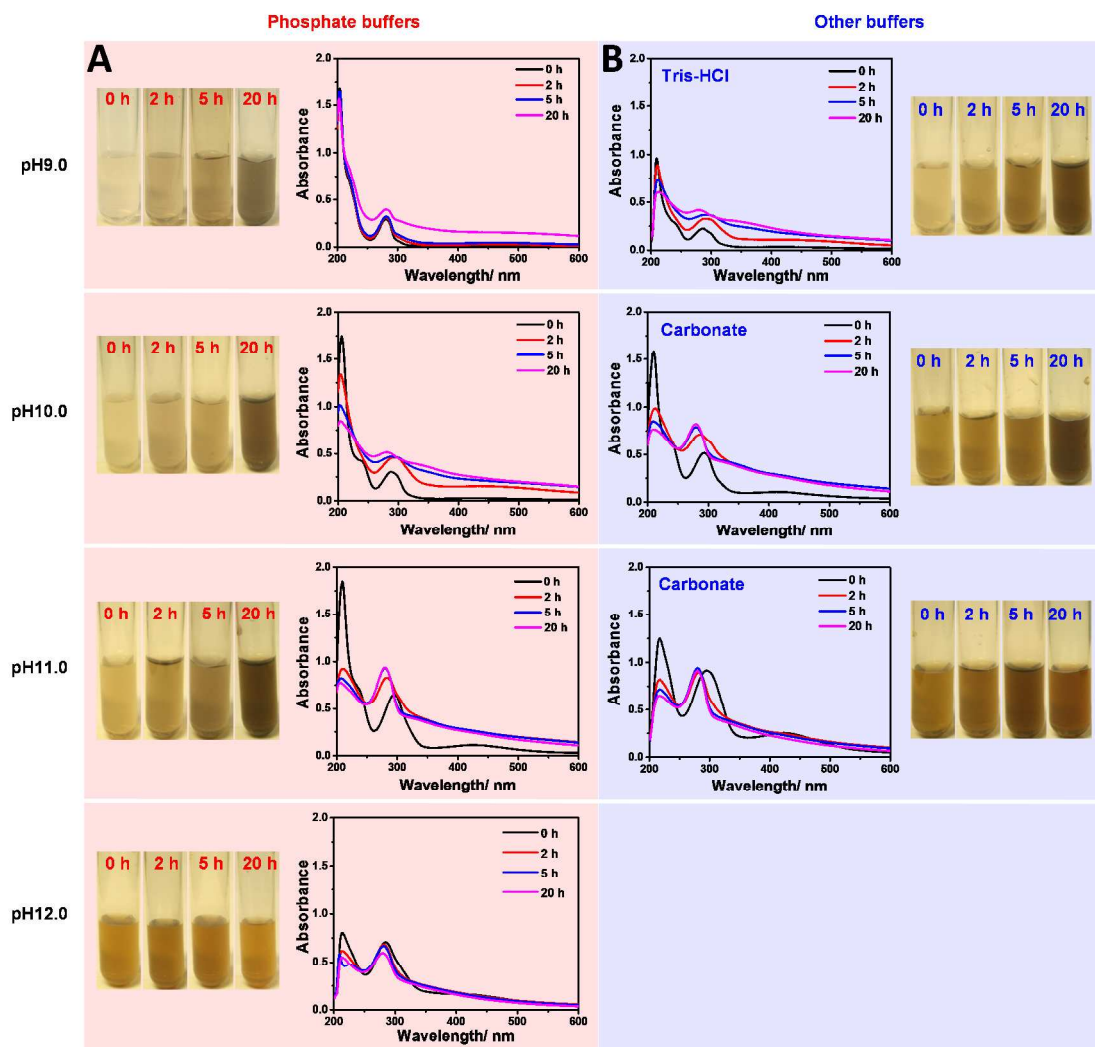


Figure S4 Photographs and UV-vis spectra of collected eluates of (A) phosphate buffers and (B) Tris-HCl (upper lane) and carbonate (lower two lanes) at the labeled pH. The UV-vis spectra were measured at 0, 2, 5 and 20 h, respectively, after dilution for 10 times.

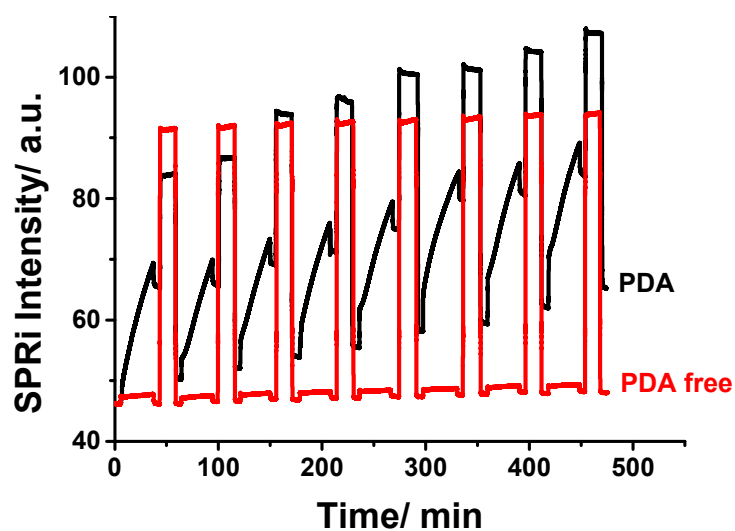


Figure S5 Real-time SPRi curves obtained by repeating the cycle of water, dopamine monomer solution (PDA) or Tris-HCl (PDA free), water, 1 M NaOH and water. The SPRi intensity of PDA curve after each NaOH-detaching step increases gradually with modification times increasing, indicating partial PDA retained on the sensing chip surface for each modification cycle.

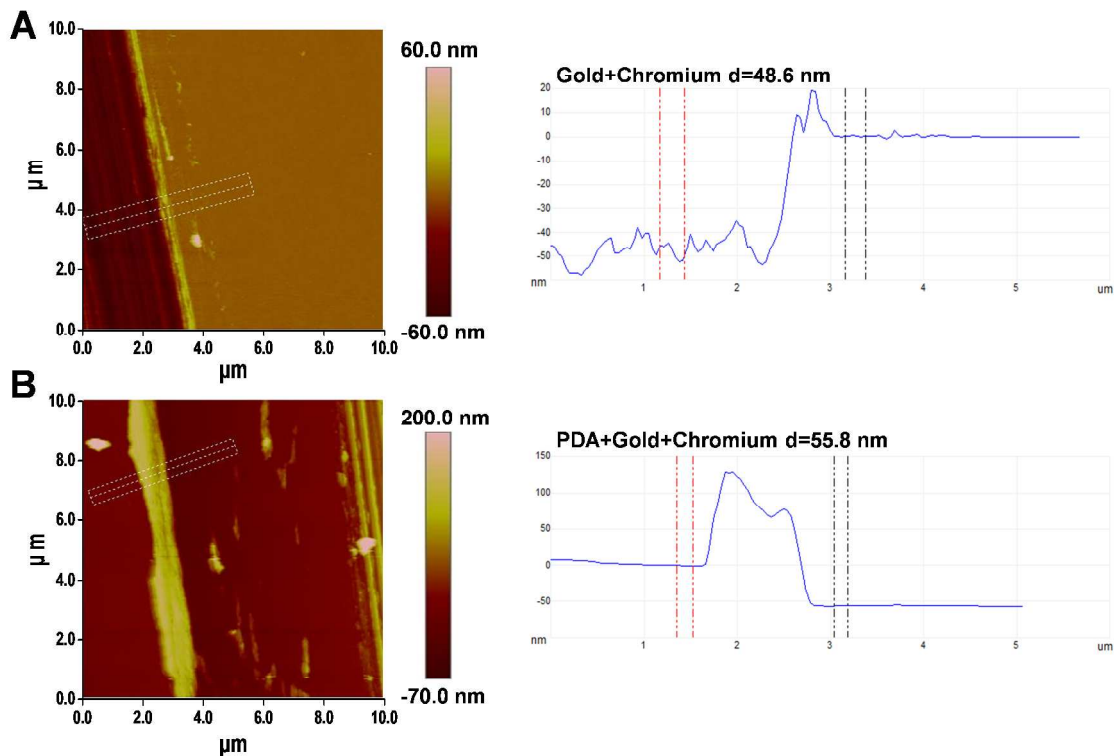


Figure S6 (A) AFM image of bare gold sensing chip, which was scratched with a thin blade. The total thickness of gold film and chromium adherent layer is about 48.6 nm. (B) AFM image of the remained alkali-resistant PDA coatings of eight continuous deposition-detachment cycles. The total thickness of PDA, gold and chromium is 55.8 nm. Therefore, the thickness of remained PDA coatings is 7.2 nm in total and is 0.9 nm per cycle.