

# CHEMISTRY

## A **European** Journal

### Supporting Information

#### **Protein Adsorption Switch Constructed by a Pillar[5]arene-Based Host–Guest Interaction**

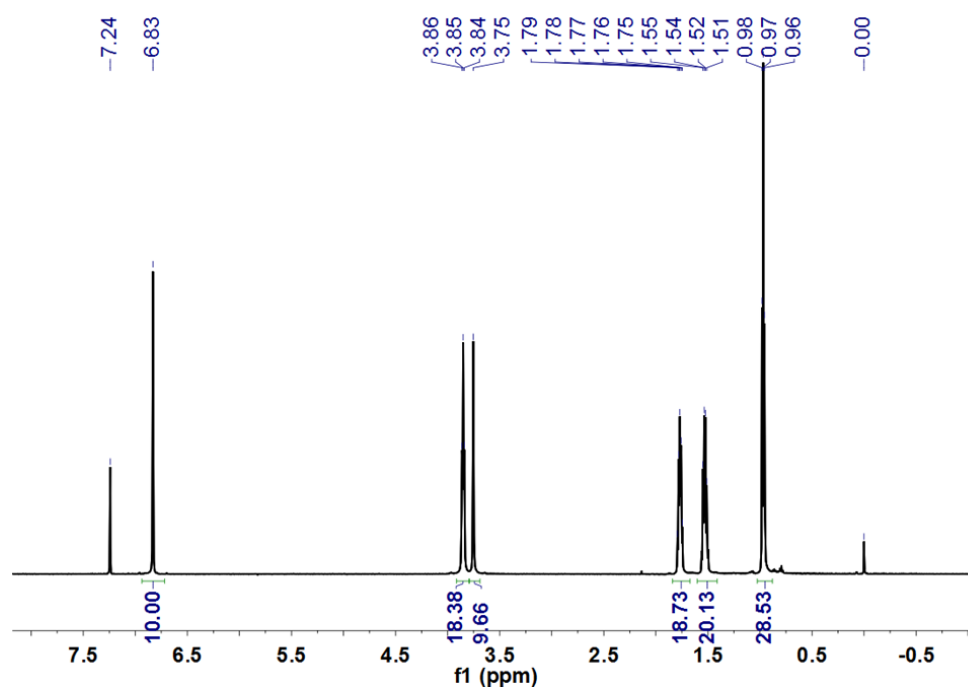
Xuan Xiao, Guanrong Nie, Xiaoyan Zhang, Demei Tian, and Haibing Li<sup>\*[a]</sup>

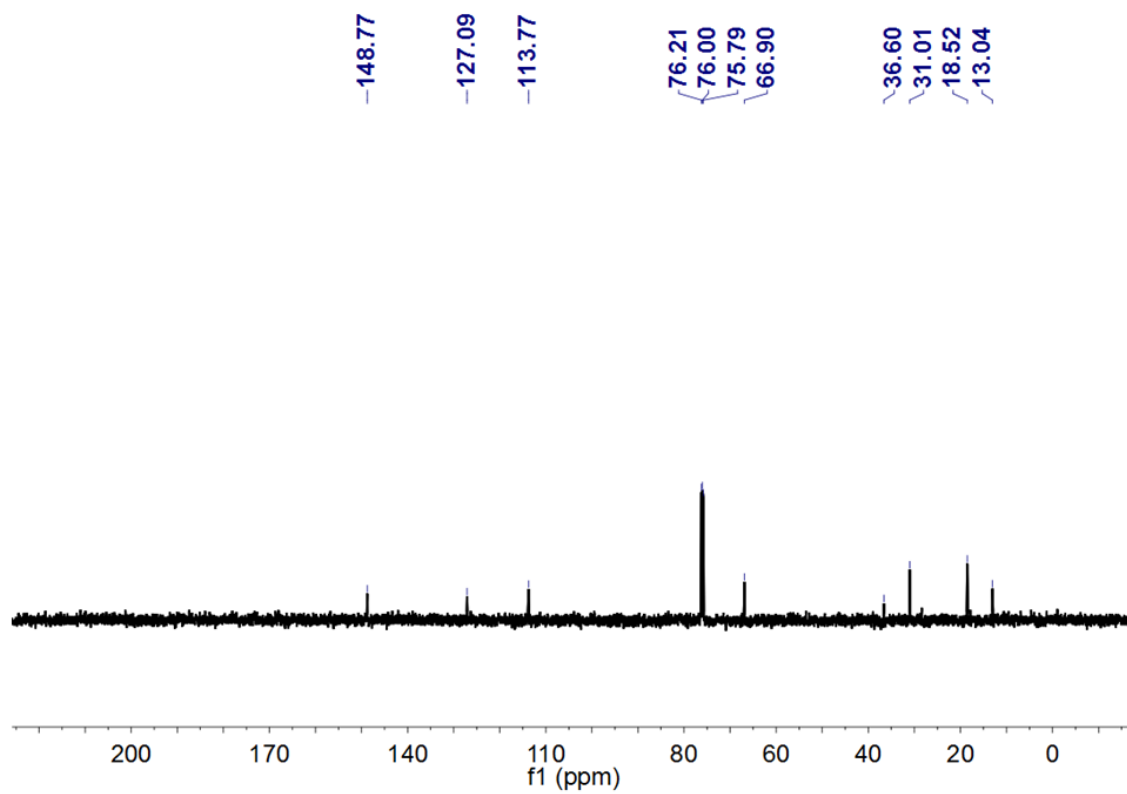
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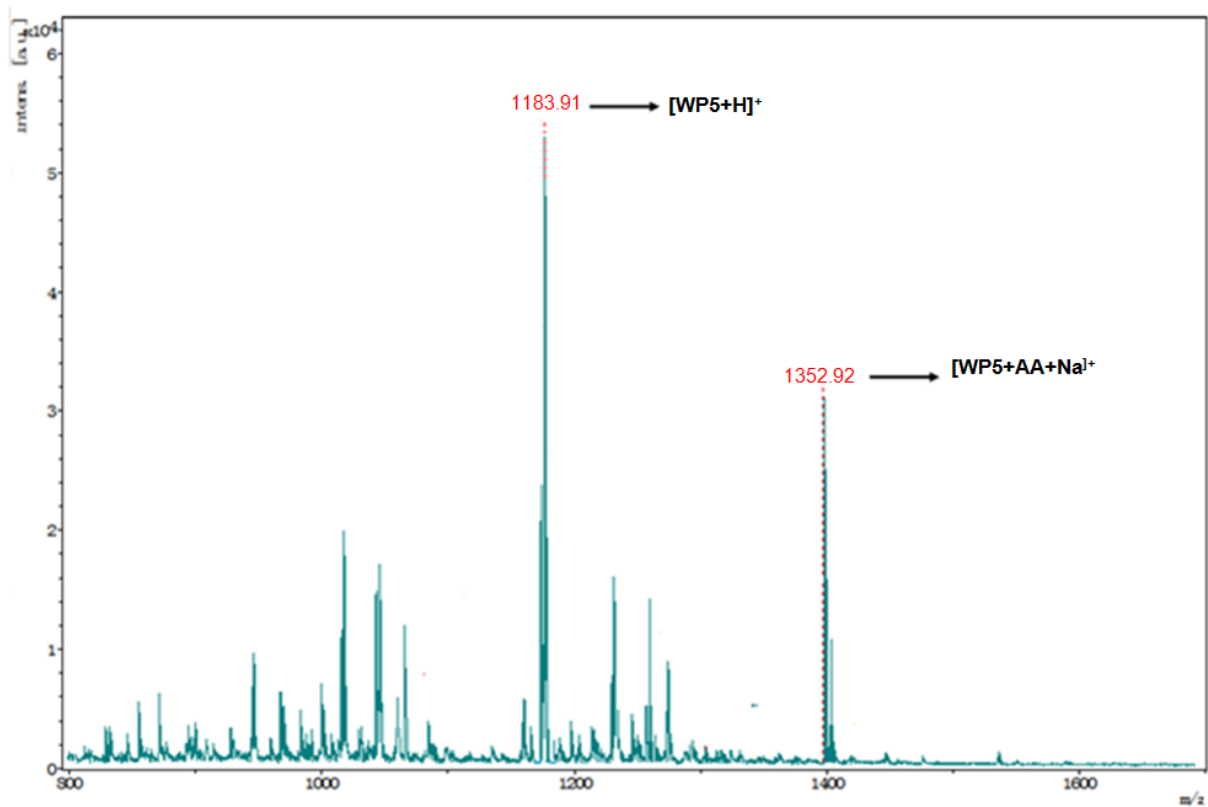
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## 1. Synthesis and characterization of WP5



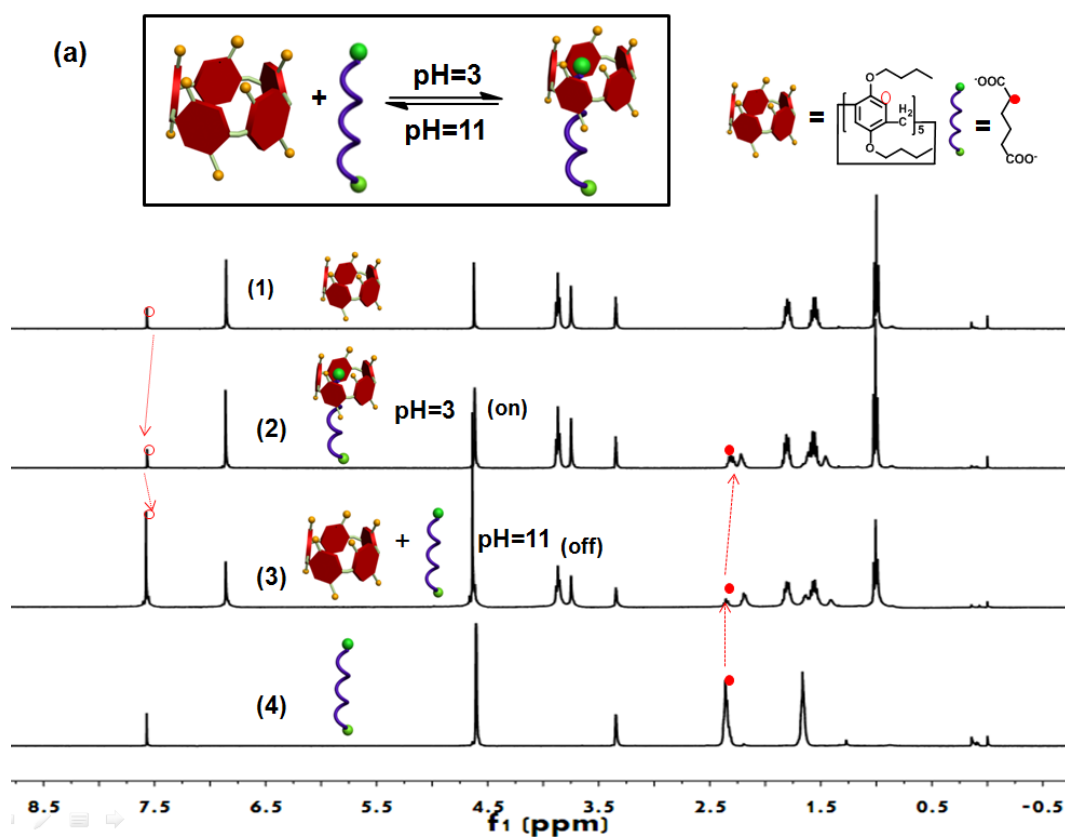


**Figure S2**  $^{13}\text{C}$  NMR of butoxy pillar[5]arene (WP5) ( $\text{CDCl}_3$ , 600 MHz, 298 K).



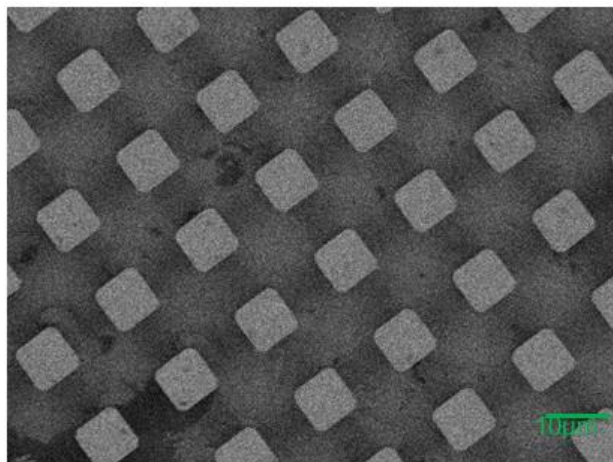
**Figure S3** ESI-MS of WP5 $\supset$ AA complex (CH<sub>3</sub>OH). The molecular ion peak (m/z) of [N + AA + Na]<sup>+</sup> was at 1339.300, indicating a complex ratio of 1:1 between WP5 and AA.

## 2. NMR spectra analysis of the interaction

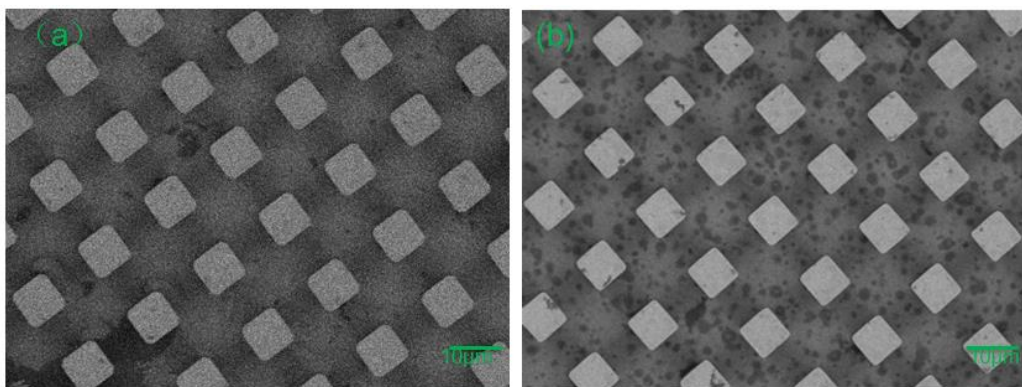


**Figure S4** (a) Schematic representation of the pillar[5]arene self-assembled with adipic acid in solution. (b) <sup>1</sup>H NMR spectra: (1) the host WP5 of pillar[5]arene (2) WP5 and AA system interaction (pH=3); (3) the Adipic acid with butoxy pillar[5]arene after added NaOH (pH=11); (4) the guest of adipic acid, which showed WP5 could bind AA reversibly when changed the pH. (6mM each, CDCl<sub>3</sub>:CD<sub>3</sub>OD = 3:1, 400 MHz, 298K).

### 3. SEM studies of the silicon surface



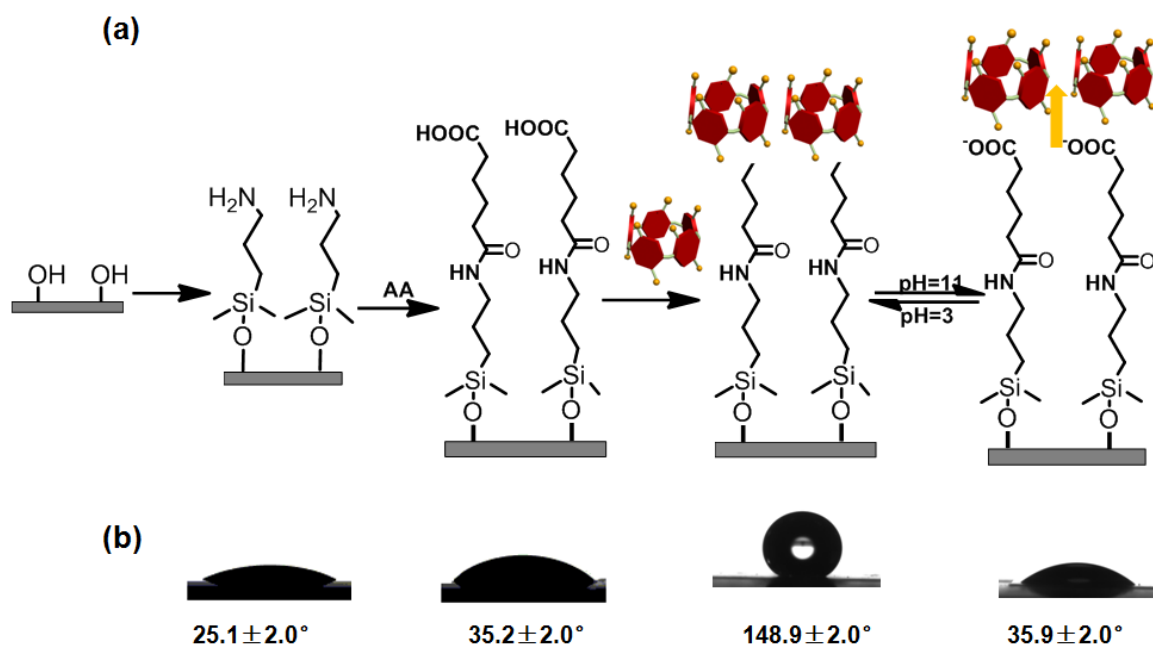
**Figure S5** Scanning electron microscopy (SEM) image on the etching silicon surface.(scale bar = 10 μm)



**Figure S6** Scanning electron microscopy (SEM) image of WP5 $\supset$ AA complex before (a) and after modified on the etching silicon surface, which proved that the interface built successfully. (scale bar = 10  $\mu$ m)

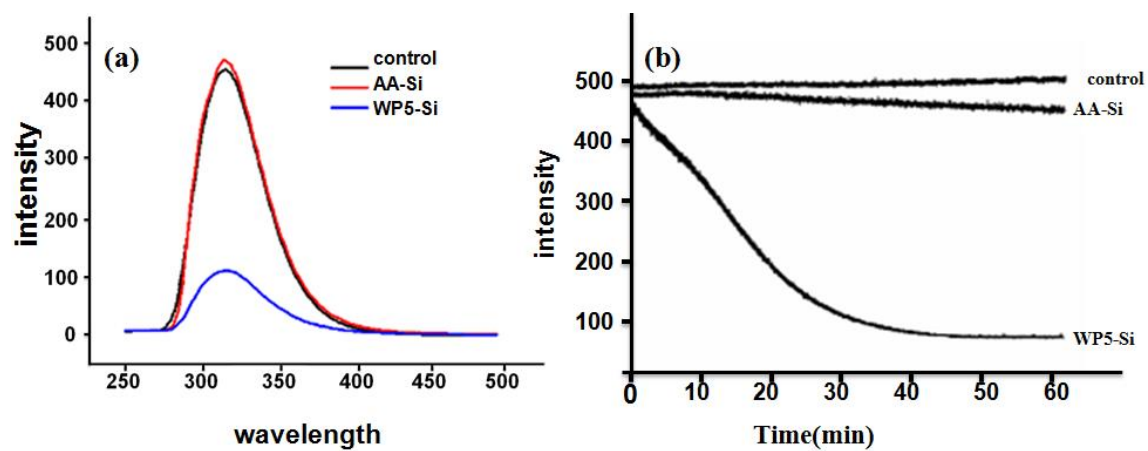


#### 4. The fabricating process of the functional WP5-Si



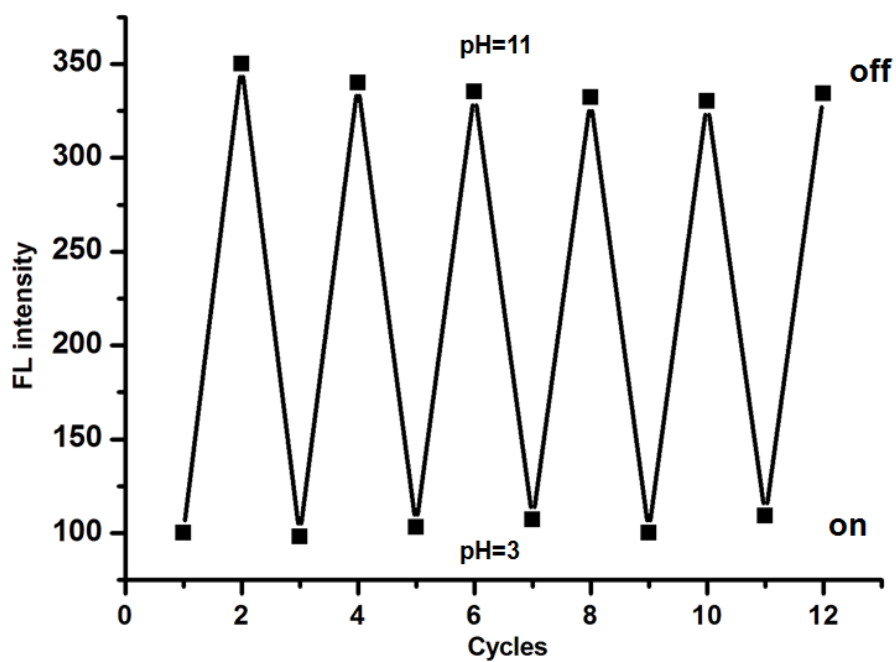
**Figure S7** a) the constructed process of silicon surface for BSA adsorption; b) the contact angel change on the silicon surface after modification respectively, indicating that the WP5-Si were constructed perfectly.

## 5. FL spectrum analysis



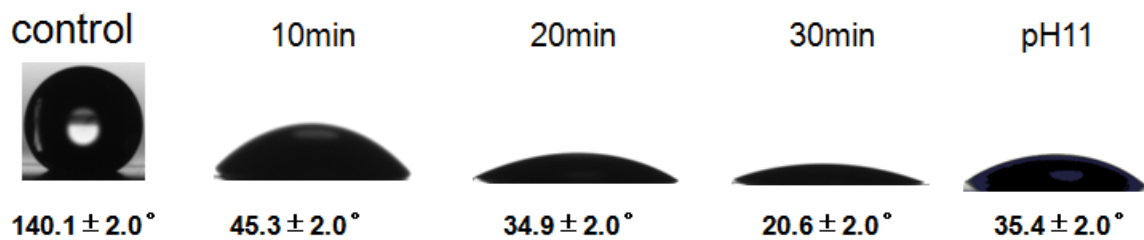
**Figure S8** a) FL spectra of the BSA solution after the WP5-Si and AA-Si was put in the cuvette compared with control BSA solution; b) the fluorescence dynamic test, the fluorescence was monitored for 60 minutes when the WP5-Si and AA-Si put in the cuvette. These results indicated that capacity of BSA adsorbed is mounting with the time.

## 6. Cycling experiment of the FL spectrum



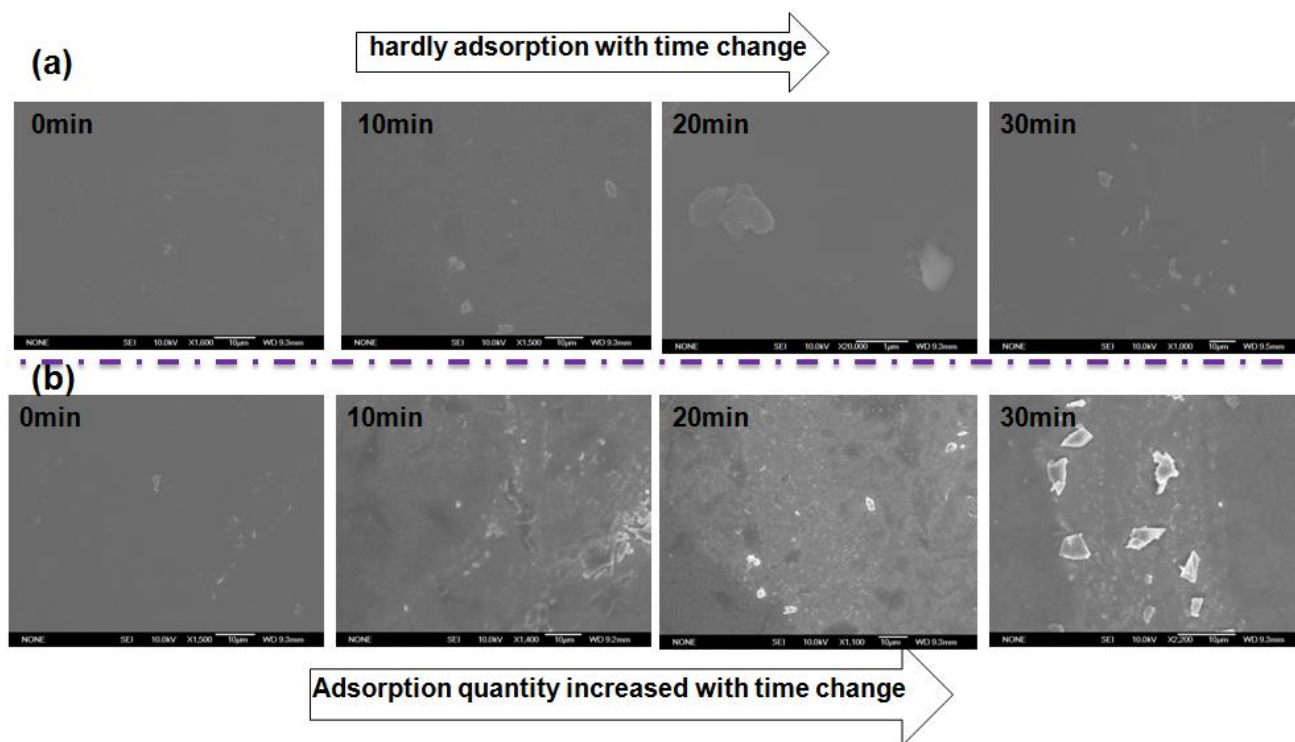
**Figure S9** the Fluorescence intensity of the butoxy pillar [5] arene and joint interface of adipic acid gate valve switch of BSA in cyclic graph of pH changes, which indicates a good reversibility between adsorption and unadsorption under pH regulation.

## 7. the CAs studies after the adsorption of BSA



**Figure S10** The contact angle (CA) of the WP5-Si after adsorbed different concentration of BSA at 10, 20, 30min and after added NaOH (pH11); More clearly, the CA indicated that the WP5-Si surface could adsorb BSA with the time changing, which also proved hydrophobic effect plays a main role in BSA adsorption.

## 8. SEM studies after the adsorption of BSA



**Figure S11** SEM characterization of the substrata images obtained from the BSA layer adsorbed on substrata (a) before (AA-Si) and (b) after (WP5-Si) functionalized at different time, indicating the difference of “on” and “off” state functional surface adsorb BSA with the time changing, which consistent with AFM. (scale bar = 10 µm)