

Efficient One-pot Synthesis of Mussel-inspired Molecularly Imprinted Polymers Coated Graphene for Protein Specific Recognition and Fast Separation

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Raman and XRD characterization of GO and BHb imprinted PDA@RGO

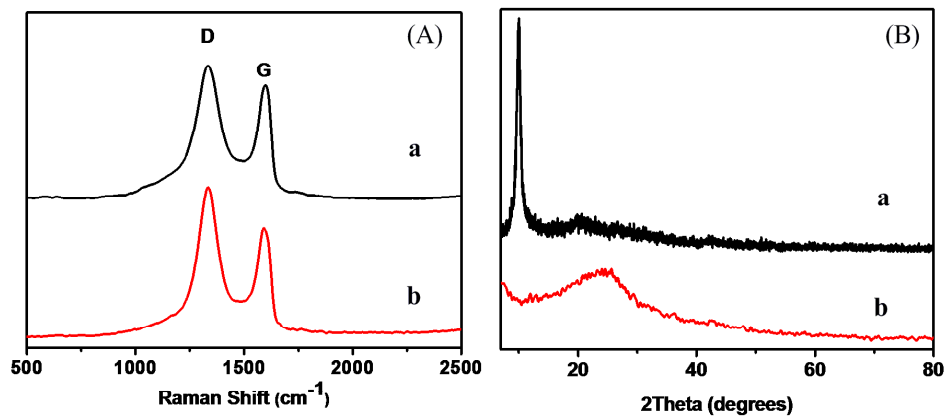


Fig. S1 Raman (A) and XRD spectra (B) of (a) GO and (b) BHb imprinted PDA@RGO

The reduction of graphene oxide was further characterized by Raman spectroscopy. Both the GO and PDA@RGO display a strong D peak (defect peak due to intervalley scattering) at about 1340 cm⁻¹ and a strong G peak (the graphene peak) at about 1600 cm⁻¹. The intensity ratio of the D to G band (I_D/I_G) is generally accepted, reflecting the graphitization degree of carbonaceous materials and the defect density. I_D/I_G of pristine GO is about 1.1. For RGO-PDA, the intensity of the D band at 1325 cm⁻¹ increased substantially and I_D/I_G value increased to be 1.31. This change implied the creation of more small size of the in-plane sp² domains upon the reduction of GO to RGO by PDA modification. X-ray diffraction (XRD) provide additional evidence for the successful reduction of GO to RGO by dopamine. The sharp XRD peak in GO (d-spacing of 0.96 nm at $2\theta = 9.2$) decreased dramatically after reduction and a new broad diffraction peak (d-spacing of 0.36 nm at $2\theta = 24.5$) has appeared in PDA/RGO. This diffraction peak was closer to the typical diffraction peak of graphite (d-spacing of 0.35 nm at $2\theta = 26.6$), indicating the successful reduction of GO.

XPS characterization of GO and BHb imprinted PDA@RGO

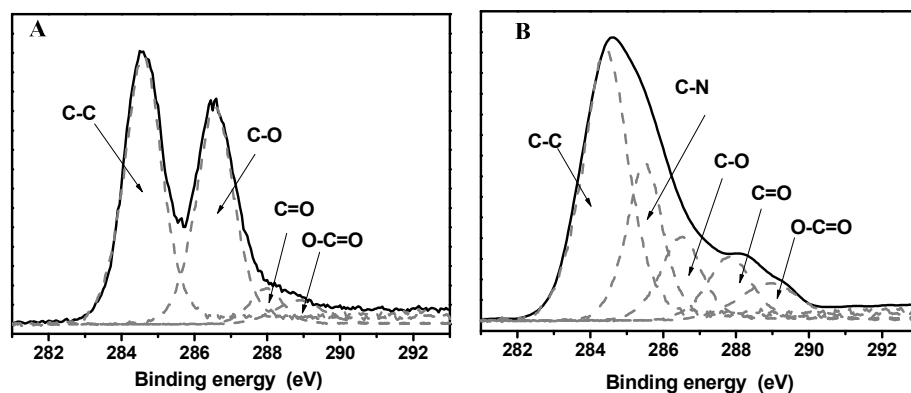


Fig. S2 XPS C 1s core-level spectra of GO (A) and BHb imprinted PDA@RGO (B)

The X-ray photoelectron spectroscopy (XPS) C 1s core-level spectrum of GO nanosheets (Figure S2A) can be curve-fitted into four peak components with binding energies (BEs) at about 284.6, 286.4, 287.9, and 288.8 eV, attributable to the C-C, C-O, C=O, and O-C=O species, respectively. The XPS C 1s core-level spectrum of the PDA@RGO (Figure S2B) can be curve-fitted into five peak components with BEs at about 284.6, 285.5, 286.4, 287.8, and 288.9 eV, attributable to the C-C, C-N, C-O, C=O, and O-C=O species, respectively. (Macromolecules 2010, 43, 8336–8339) The appearance of the C-N peak component at the BE of 285.5 eV in the C 1s core-level spectrum and an N1s core-level spectrum at the BE of 400 eV is consistent with the presence of PDA layer. In addition, compared to GO, a significant decrease of C–O peak component at 286.4 eV, was observed for PDA@RGO (Figure S2B), indicating the reduction of GO by dopamine.

TGA characterization of GO and BHb imprinted PDA@RGO

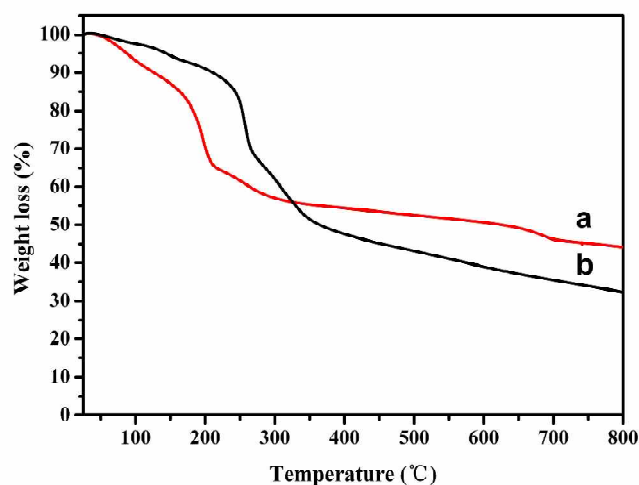


Fig. S3 TGA curves of (a) GO and (b) BHb imprinted PDA@RGO

From the TGA curves, the weight loss of GO at 200 °C was about 30 wt%, which is due to the evaporation of adsorbed water and the decomposition of labile oxygen. In comparison, the weight loss of the PDA@RGO at 200 °C was much lower (about 10 wt%), which is likely due to the reduction of GO by the PDA coating. In addition, PDA@RGO composite shows more weight loss than GO upon heating to 800 °C, further confirming the formation of PDA layer on graphene surface.

AFM characterization of GO and BHb imprinted PDA@RGO

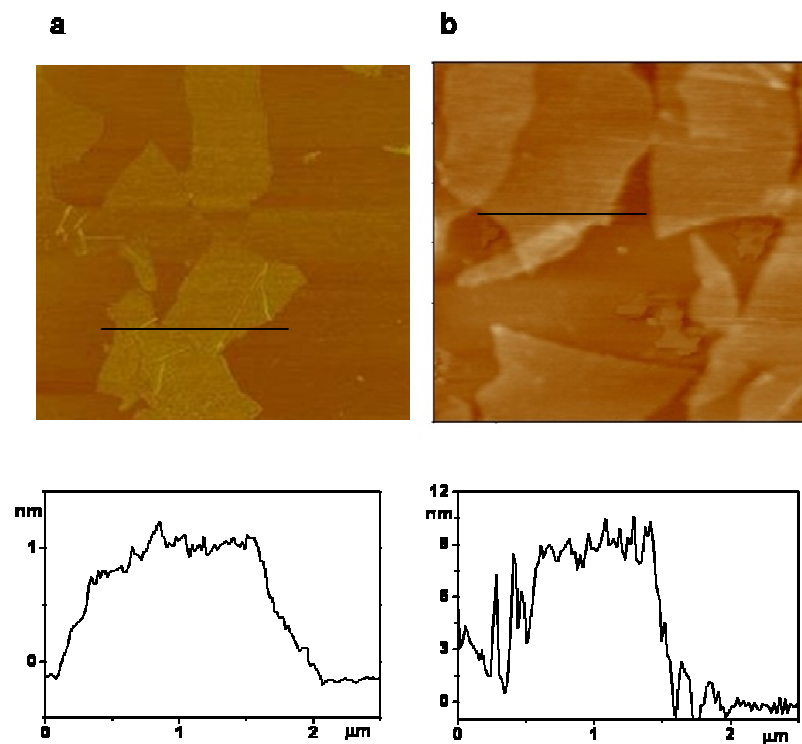


Fig. S4 AFM images and surface profiles of (a) GO and (b) imprinted PDA@RGO