

**Layer-by-layer self-assembly of polydopamine/gold nanoparticles/
thiols coating as the stationary phase for open tubular capillary
electrochromatography**

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Supporting information

Characterization

AFM study

Investigation of morphological feature of PDA/Au NPs/thiols@capillary was carried out by Atomic Force Microscope (AFM). In order to observe in a better way, the LBL self-assembly coating of PDA/Au NPs/thiols was deposited on quartz plate instead of the capillary column. The image showed that the nanoparticles were almost spherically shaped. Some aggregation occurred. Calculation of the average particle size gave a size of 100 nm. The particle size of Au NPs was almost in the range of 40-120 nm, indicating a wide range of size distribution of Au NPs.

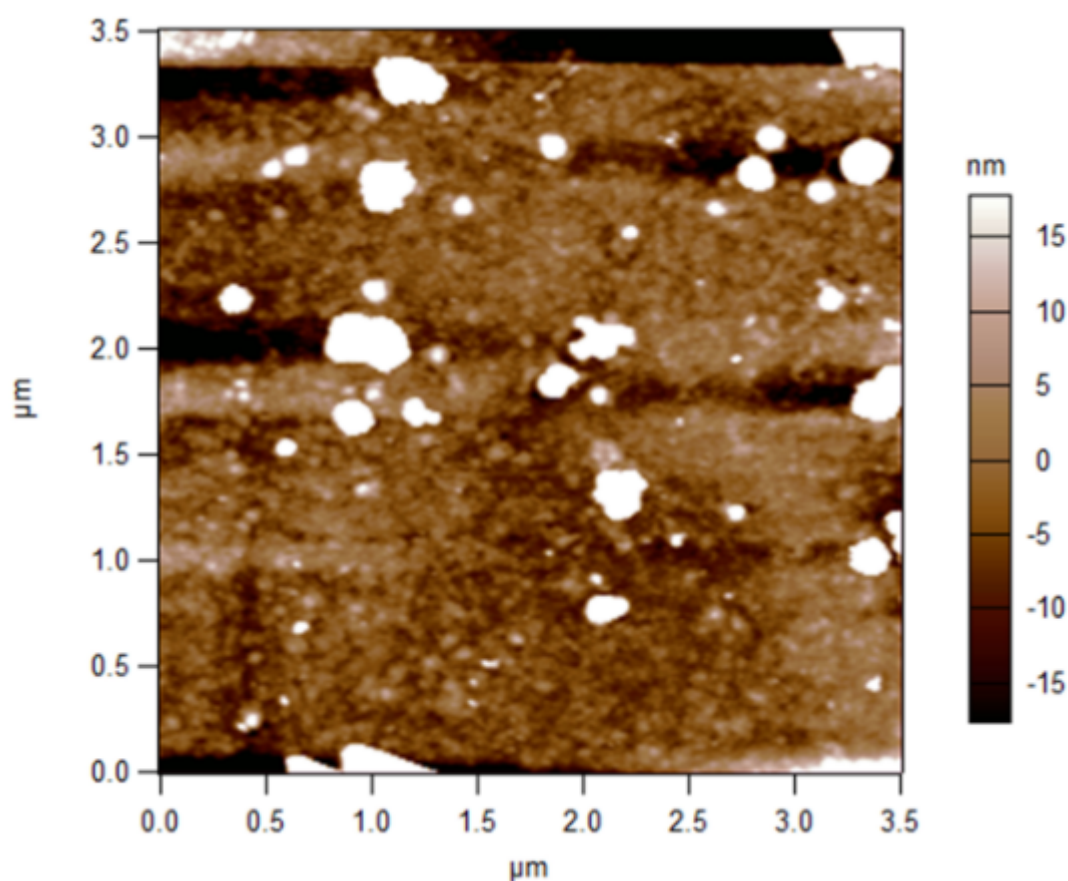


Fig. S1. AFM image of gold nanoparticles.

The thickness test: SEM study

The thickness of different layers of PDA/Au NPs/thiols@capillary was measured by SEM and their thickness was as follows. The monolayer of PDA/Au NPs/ thiols @capillary was around 110 nm, two-layer was nearly 430 nm, four-layer coating was almost 790 nm and six-layer was about 1370 nm.

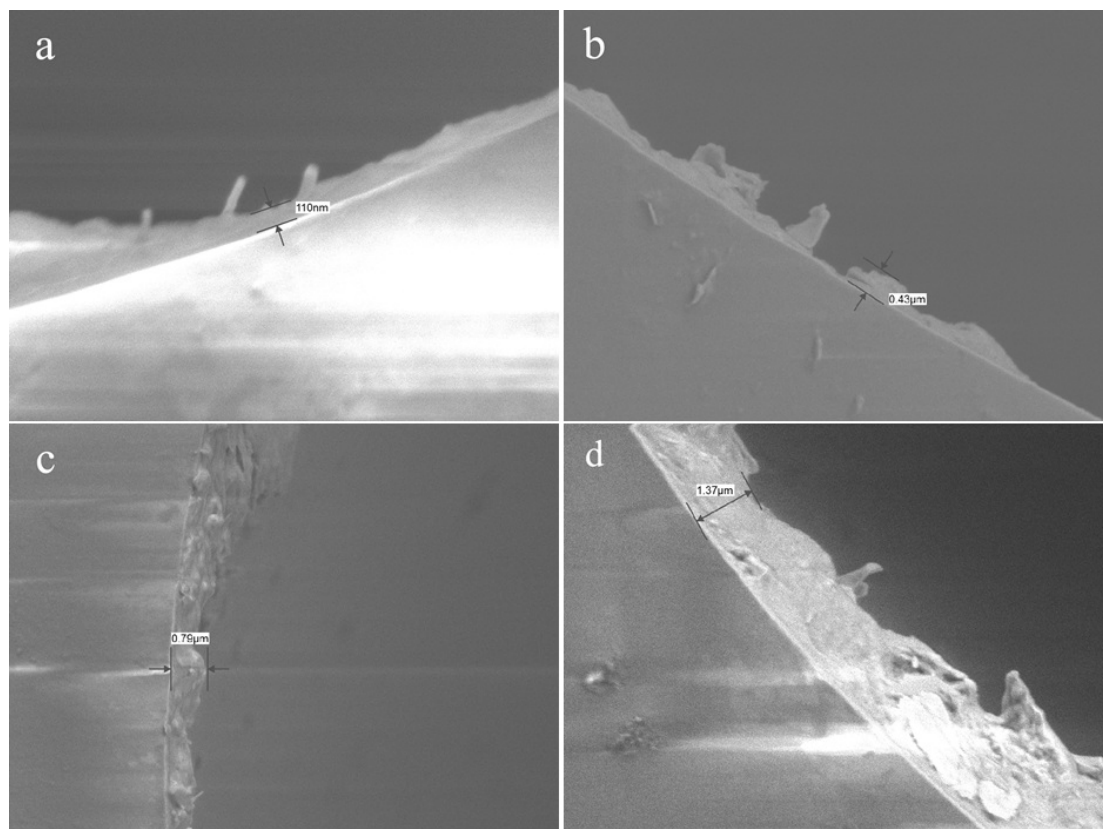


Fig. S2. SEM image of the thickness of different layers in PDA/Au NPs/thiols@capillary. (a) One layer; (b) two layers; (c) four layers and (d) six layers.

Results and Discussion

Influence of pH on separation

Since the EOF mobility on the PDA/Au NPs/thiols@capillary showed a pH-dependent tendency, the pH value had great impact on the migration time. Therefore, the influence of pH value on migration time and resolution was investigated. As can

be seen from Fig. S3A, the migration time was increased with pH value decreased from 6.5 to 5.0, which was in accordance with the decreased EOF mobility. From Fig. S3B, the greatest improvement in resolution of benzene and toluene (1.79) obtained at pH 6.0.

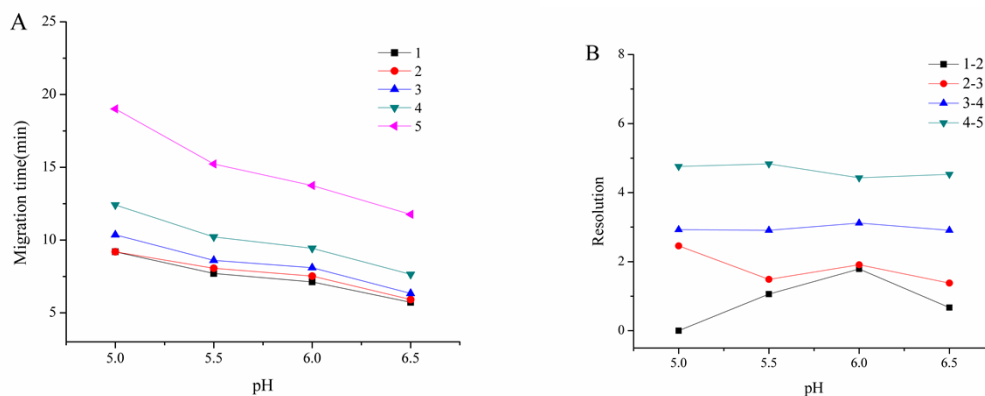


Fig. S3. The influence of pH value on the migration time (A) and resolution (B) of five alkylbenzenes on the PDA/Au NPs/thiols@capillary. Experimental conditions: acetonitrile–20 mM CH₃COONa (12/88, v/v). All other separation conditions are the same as mentioned in Fig. 4.

Effect of acetate buffer concentration on separation

The effect of acetate buffer concentration ranging from 5 mM to 30 mM on the separation was also investigated, which was exhibited in Fig. S4. It can be seen that the migration time of alkylbenzenes increased slightly with the increase of CH₃COONa concentration. It may be caused by the EOF decreases with the increase of buffer concentration. On the other hand, the peak shape was also improved when the concentration of CH₃COONa increased. Furthermore, the resolution decreased when the concentration was increased to 30 mM as compared with 20 mM. Therefore, according to peak shape and resolution, the acetate buffer concentration of 20 mM

was selected.

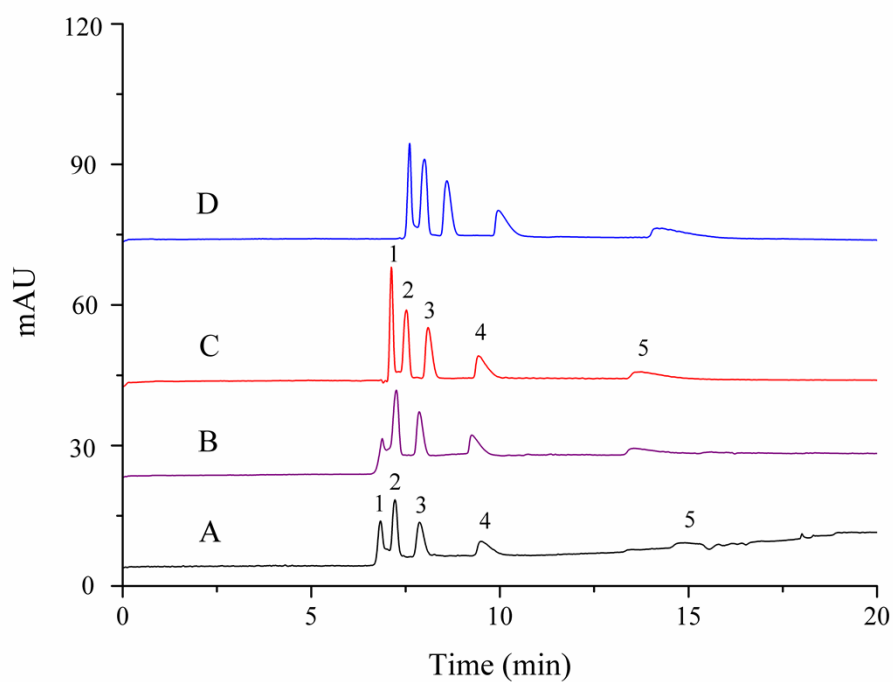


Fig. S4. The electrochromatograms of five alkylbenzenes with different acetate buffer concentrations on the PDA/Au NPs/thiols@capillary. (A) 5 mM; (B) 10 mM; (C) 20 mM and (D) 30 mM. Experimental conditions: acetonitrile-CH₃COONa (12/88, v/v), pH 6.0. All other separation conditions are the same as mentioned in Fig. 4. Peak identifications are identical to Fig. 5.