Supplementary Material (ESI) for Chemical Communications

Electronic Supplementary Information (ESI)

Amorphous FeNiPt Nanoparticles with Tunable Length for Electrocatalysis and Electrochemical Determination of Thiols

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1. Experimental

Typical synthetic procedure: Ethyl alcohol absolute solution (2 ml) was mixed with $FeCl_2 \cdot 4H_2O$ (30 mM), $NiCl_2 \cdot 6H_2O$ (35 mM), and $H_2PtCl_6 \cdot 6H_2O$ (1 mM) by ultrasound at room temperature., then added to 60 ml autoclave tube. Sodium oleate (10 mg), propylene glycol (20 ml), and oleic acid (10 ml) were added into the solution. The reaction system was sealed and heated at a designed heating rate up to 170°C. After the reaction was cooled to room temperature, the FeNiPt nanostructures were collected at the bottom of the container.

Instruments and Measurements: The morphologies of ternary alloy nanostructures were observed by TEM on JEOL JEM-1200EX (JEM, Japan). The composition analysis was conduced at 20 keV on a in-situ TN5400 EDS instrument (Oxford). XRD patterns were measured on Bruker D8 (Bruker, German). A CHI 660 electrochemical work station (CH instruments, Shanghai, China) was employed in all electrochemical measurements, which were carried out with a conventional twocompartment three-electrode electrochemical cell. The reference electrode was a KCl-saturated Ag/AgCl electrode.

2. XRD patterns of as-synthesized FeNiPt nanowires and annealed at 823K for 1h

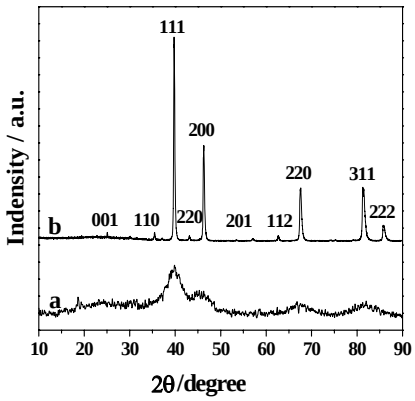

Figure S1. XRD patterns of (a) as-synthesized FeNiPt nanowires and (b) annealed at 823K for 1h.

3. Calculation of Electroactive Surface Area

The electroactive surface areas of all the electrodes could be estimated according to the Randles-Sevcik equation (Bard, A. J.; Faulkner, L. R. *Electrochemical Methods: Fundamentals and Applications*, John Wiley and Sons: New York, 2000).

$$I_p = 2.69 \times 10^5 \, A D^{1/2} n^{3/2} \gamma^{1/2} C$$

Where n is the number of electrons participating in the redox reaction, A is the area of the electrode (cm^2), D is the diffusion coefficient of the molecule in solution ($cm^2\ s^{-1}$), C is the concentration of the probe molecule in the bulk solution (mol cm^{-3}), and γ is the scan rate of the potential perturbation ($V\ s^{-1}$). The surface areas of FeNiPt nanowires-, nanorods-, nanospheres-modified electrodes and GC bare electrode employed in the present work were calculated to be 0.179 cm^{-2}, 0.167 cm^{-2}, 0.161 cm^{-2}, and 0.071 cm^{-2} in $Fe(CN)_6^{4-}$ solution, respectively.

4. Interference

Table S1. Current Responses of the FeNiPt nanowires-Modified GC Electrode for the Measurement of Cys against the Potential Interferences

interference	Applied potential (V)		
	0.1	0.2	0.3
Na^+	0.04 %[a]	0.07 %	0.06 %
Ca^{2+}	0 %	0 %	0 %
K^+	0 %	0 %	0 %
Mg^{2+}	0.07 %	0.07 %	0.10 %
Zn^{2+}	0.03 %	0.04 %	0.02 %
Fe^{3+}	0.12 %	0.12 %	0.16 %
uric acid	0.55 %	2.60 %	5.20 %
H_2O_2	0.40 %	3.70 %	7.85 %

[a]The values given in percentages are current for interference with respect to the current for Cys at the applied electrode potentials of 100 mV vs. Ag|AgCl.