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Electronic Supplementary Information

Synthesis of Self-assembled Spindle-like  $\text{CePO}_4$  with Electrochemical Sensing Performance

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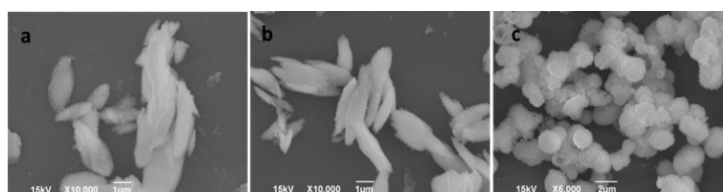


Figure S1 SEM images of (a)  $\text{LaPO}_4$ , (b)  $\text{PrPO}_4$ , and (c)  $\text{TbPO}_4$ .

The assembled  $\text{LaPO}_4$ ,  $\text{PrPO}_4$ , and  $\text{TbPO}_4$  nanomaterials were synthesized as follows. A certain amount of 0.6 M urea, 0.028M  $\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ ,  $\text{Pr}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ ,  $\text{Tb}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ , and quantities of 0.75M  $\text{NaH}_2\text{PO}_2 \cdot \text{H}_2\text{O}$  aqueous solutions were prepared respectively. The  $\text{Ce}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$  aqueous solutions was dropwise added into the urea solution under magnetic stirring. The liquid was stirred for 20 min. Subsequently, aqueous  $\text{NaH}_2\text{PO}_2 \cdot \text{H}_2\text{O}$  was added dropwise and the mixture was stirred constantly at room temperature. After 30 min of stirring, the mixture was transferred to a Teflon-lined stainless-steel autoclave with a capacity of 40 mL, which was sealed, heated to 190 °C for 24 h, and then naturally cooled to room temperature. The resulting precipitate was collected by centrifugation and washed three times with DI water and then ethanol, before being dried at 60 °C for 24 h.

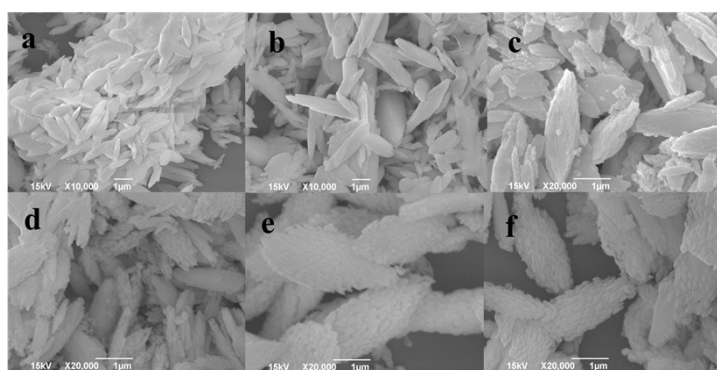


Figure S2 SEM images of S- $\text{CePO}_4$  synthesized by hydrothermal treatment for reaction times of (a) 0.5 h,

(b) 2 h, (c) 4 h, (d) 8 h, (e) 16 h, and (f) 24 h.

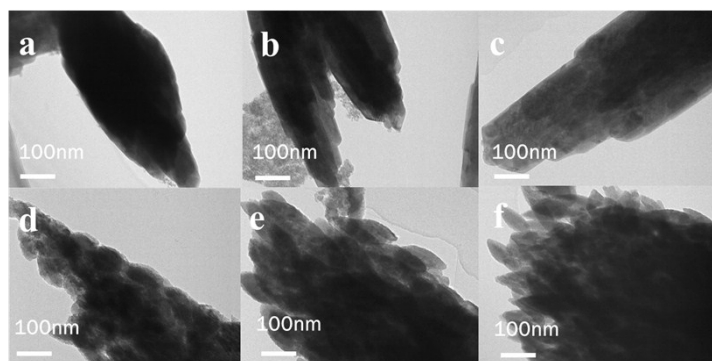


Figure S3 TEM images of the as-prepared products at different time intervals of (a) 0.5h (b) 2h (c) 4h (d) 8h (e) 16h (f-h) 24h

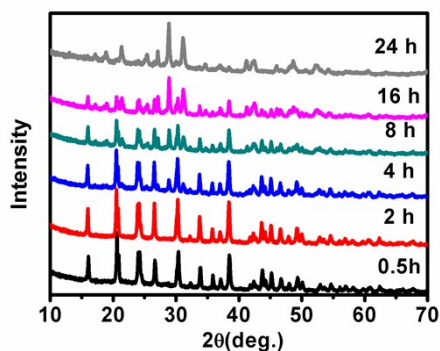


Figure S4 XRD patterns of S-CePO<sub>4</sub> synthesized by hydrothermal treatment for various reaction times.

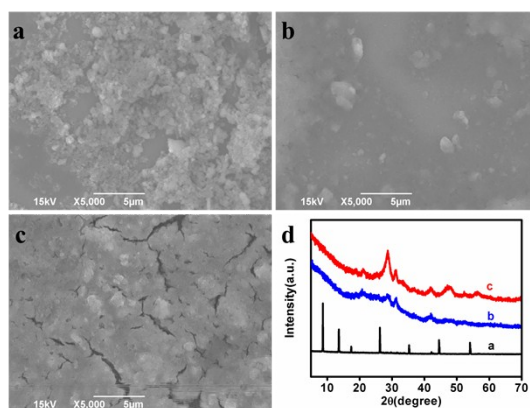


Figure S5 SEM images (a-c) and XRD pattern (d) of synthesized product in the presence of different raw materials: (a) CH<sub>4</sub>N<sub>2</sub>O and NaH<sub>2</sub>PO<sub>2</sub>·H<sub>2</sub>O; (b) CH<sub>4</sub>N<sub>2</sub>O, Ce(NO<sub>3</sub>)<sub>3</sub>·6H<sub>2</sub>O, and Na<sub>3</sub>PO<sub>4</sub>; and (c) Ce(NO<sub>3</sub>)<sub>3</sub>·6H<sub>2</sub>O and Na<sub>3</sub>PO<sub>4</sub>.

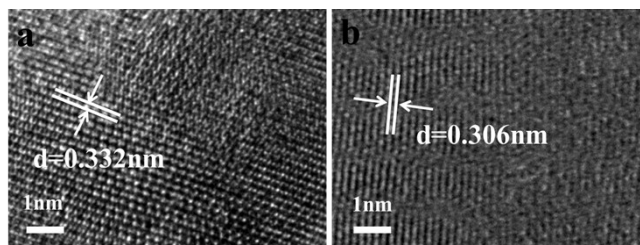


Fig. S6 HR-TEM image of C-CePO<sub>4</sub> (a) and R-CePO<sub>4</sub> (b).

Figure S6 displays the HR-TEM image of C-CePO<sub>4</sub> (a) and R-CePO<sub>4</sub> (b). This was inconsistent with the XRD results in Fig. 2. The HRTEM image exhibited two planes, which corresponded the (-212) and (200) one of the monoclinic CePO<sub>4</sub> forms, respectively.

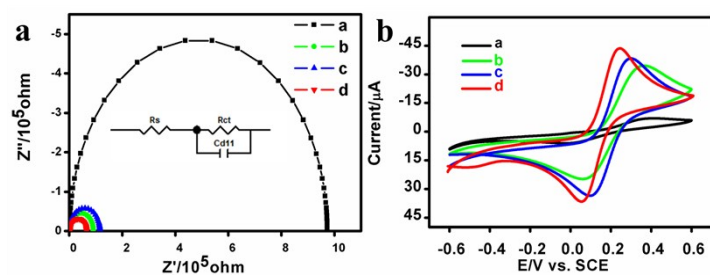


Figure S7 (a) EIS spectra and (b) CV curves of GCE, R-CePO<sub>4</sub>@GCE, C-CePO<sub>4</sub>@GCE, and S-CePO<sub>4</sub>@GCE in 0.1 M KCl solution containing 5 mM [Fe(CN)<sub>6</sub>]<sup>3-/4-</sup>.

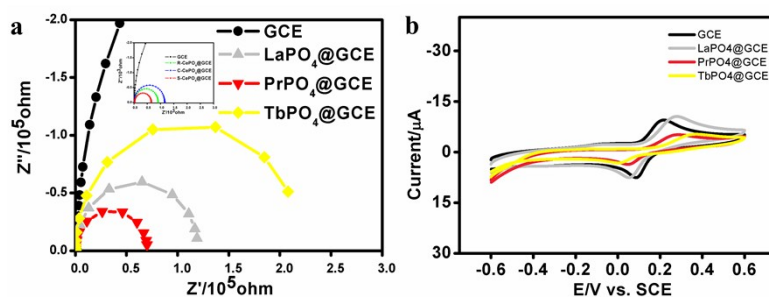
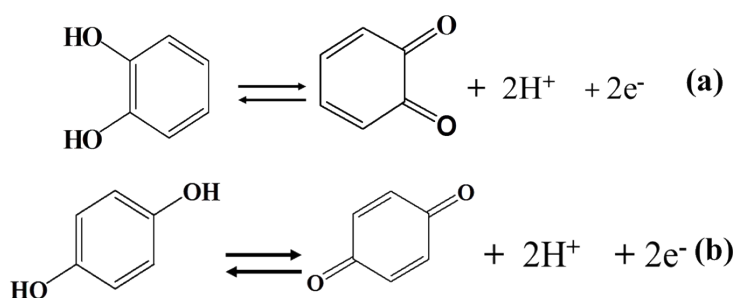


Figure S8 (a) EIS spectra of various electrodes in 0.1 M KCl solution containing 5 mM [Fe(CN)<sub>6</sub>]<sup>3-/4-</sup> (b) CV curves various electrodes in 0.1 M PBS (pH=7) in presence of 100 μM CC.



Scheme S1 Electrochemical reaction mechanism of CC(a) and HQ (b).

Table S1 The value of the parameters in Randles-Sevcik equation

Electrode	$I_p$	$D_0$	$C_0$	$\nu$	effective surface
GCE	$4.13 \times 10^{-6} \text{ A}$	$7.6 \times 10^{-5} \text{ cm}^2 \text{ S}^{-1}$	5mM	80mV	0.0443 cm <sup>2</sup>
R-CePO <sub>4</sub> @GCE	$2.623 \times 10^{-5} \text{ A}$	$7.6 \times 10^{-5} \text{ cm}^2 \text{ S}^{-1}$	5mM	80mV	0.281 cm <sup>2</sup>
C-CePO <sub>4</sub> @GCE	$3.041 \times 10^{-5} \text{ A}$	$7.6 \times 10^{-5} \text{ cm}^2 \text{ S}^{-1}$	5mM	80mV	0.326 cm <sup>2</sup>
S-CePO <sub>4</sub> @GCE	$3.216 \times 10^{-5} \text{ A}$	$7.6 \times 10^{-5} \text{ cm}^2 \text{ S}^{-1}$	5mM	80mV	0.345 cm <sup>2</sup>