Supporting Information

A novel ascorbic acid electrochemical sensor based on spherical MOF-5 arrayed on three-dimensional porous carbon electrode

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Fig. S1. Schematic illustration of the fabrication of MOF-5/3D-KSC composites and integrated MOF-5/3D-KSC electrode.
**Fig. S2.** CVs of GC electrode (A) and integrated MOF-5/3D-KSC electrode (B) in 0.1 M KCl solution containing 5.0 mM Fe(CN)$_6^{3-/4-}$ at 50 mVs$^{-1}$.

The effective surface areas ($A_{eff}$) of various GC electrode and integrated MOF-5/3D-KSC electrode were estimated before use based on the CVs in 0.1 M KCl solution containing 5.0 mM Fe(CN)$_6^{3-/4-}$ at 0.05 V s$^{-1}$ according to Randles-Sevcik equation:

$$I_p = 2.69 \times 10^5 A n^{3/2} D_0^{1/2} v^{1/2} C_0$$

(1)

where $n$ is the number of electrons participating in the redox ($n = 1$ for Fe(CN)$_6^{3-/4-}$), $D_0$ is the diffusion coefficient of the molecule in a solution (0.673×10$^{-5}$ cm$^2$ s$^{-1}$ for Fe(CN)$_6^{3-/4-}$ in 0.1 M KCl solution, $C_0$ is the bulk concentration of the redox probe ($C_0 = 5$ mM of the Fe(CN)$_6^{3-/4-}$). As shown in Fig. S1, the $I_p$ was calculated to be 47.66 (A) and 78.35 (B) and accordingly the value of $A_{eff}$ for the GC electrode and integrated MOF-5/3D-KSC electrode was estimated to be 0.0610 cm$^2$ and 0.1003 cm$^2$. 

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In the CVs shown in Fig. S2, the peak current ($I_p$) is indicated, which is used to calculate the effective surface area ($A_{eff}$) of the electrodes using the Randles-Sevcik equation:

$$I_p = 2.69 \times 10^5 A n^{3/2} D_0^{1/2} v^{1/2} C_0$$

(1)

where $n$ is the number of electrons participating in the redox ($n = 1$ for Fe(CN)$_6^{3-/4-}$), $D_0$ is the diffusion coefficient of the molecule in a solution (0.673×10$^{-5}$ cm$^2$ s$^{-1}$ for Fe(CN)$_6^{3-/4-}$ in 0.1 M KCl solution), $C_0$ is the bulk concentration of the redox probe ($C_0 = 5$ mM of the Fe(CN)$_6^{3-/4-}$). The calculated $I_p$ values for the GC electrode and integrated MOF-5/3D-KSC electrode were 47.66 (A) and 78.35 (B) respectively, leading to $A_{eff}$ values of 0.0610 cm$^2$ and 0.1003 cm$^2$.
Fig. S3. (A) SEM image of MOF-5. (B) The high magnification image of MOF-5.
**Fig. S4.** SEM images of the MOF-5/3D-KSC composites prepared by (A) 40 mg ml\(^{-1}\) (B) 60 mg ml\(^{-1}\) (C) 70 mg ml\(^{-1}\) (D) 90 mg ml\(^{-1}\) zinc nitrate hexahydrate, and the concentration ratio of zinc nitrate hexahydrate and H\(_2\)BDC is 5.45:1.
### Table. S1 Determination AA in parenteral nutrient solution samples (N= 5)

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<th>NO.</th>
<th>The content (mM)</th>
<th>Added (mM)</th>
<th>Found (mM)</th>
<th>RSD (%)</th>
<th>Recovery (%)</th>
<th>HPLC method (mM)</th>
<th>RSD (%)</th>
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