Supporting Information

A Serial of Ultrasensitive Electrocatalysts Fe-MOF/MWCNTs for Fentanyl Determination

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Synthesis of the five Fe-MOFs

Preparation of Fe-MOF-235 : H_2BDC (1.23 mmol) was added to 60 mL DMF and stirred for 10 min to form a clear solution. Then $FeCl_3 \cdot 6H_2O$ (0.738 mmol) was added to the solution and stirred for 5 min. The reactant mixture of 30 mL and 30 mL of ethanol were loaded into a Teflon-lined autoclave, heated at 80 °C for 24 h. After cooling to room temperature, the product was collected by centrifugation, washed several times each with ethanol and DMF, and dried at 60 °C for 12 h in a vacuum.[1]

Preparation of Fe-MIL-88B : $FeCl_3 \cdot 6H_2O$ (1 mmol) and H_2BDC (1 mmol) were dissolved in a mixed solution of DMF (5 mL) and NaOH (2 M, 0.4 mL). After stirring for 30 minutes, the mixture was transferred to a Teflon-lined stainless steel autoclave, heated at 100 ℃ for 12 h. After cooling to room temperature, the product was collected by centrifugation, washed many times each with ethanol and DMF, and dried at 60 °C for 12 h in a vacuum.[2]

Preparation of Fe-MIL-53 : $FeCl_3 \cdot 6H_2O$ (5 mmol) and H_2BDC (5 mmol) were dissolved in DMF (25 mL) and stirred for 30 min. The mixture was transferred to a Teflon-lined stainless steel autoclave, heated at 150 ℃ for 15 h. After cooling to room temperature, the product was collected by centrifugation, washed several times each with ethanol and DMF, and dried at 60 ℃ for 12 h in a vacuum.[3]

Preparation of Fe-MIL-68 : $FeCl_3 \cdot 6H_2O$ (1 mmol) and H_2BDC (2 mmol) were dissolved into DMF (12 mL). Then HF (5 M, 120 μL) and HCl (1 M, 120 μL) were added to the above solution. After stirring for 30 minutes, the mixture was transferred to a Teflon-lined stainless steel autoclave, heated at 100 ℃ for 120 h. After cooling to room temperature, the product was collected by centrifugation, washed many times each with deionized water and acetone, and dried at 60 °C for 12 h in a vacuum.[4]

Preparation of Fe-MIL-101 : $FeCl_3 \cdot 6H_2O$ (2.45 mmol) and H_2BDC (1.24 mmol) were added to DMF (15 mL) and stirred for 30 min. The mixture was transferred to a Teflon-lined stainless steel autoclave, heated at 110 °C for 24 h. After cooling to room temperature, the product was collected by centrifugation, washed several times each with ethanol and DMF, and dried at 60 °C for 12 h in a vacuum.[5]

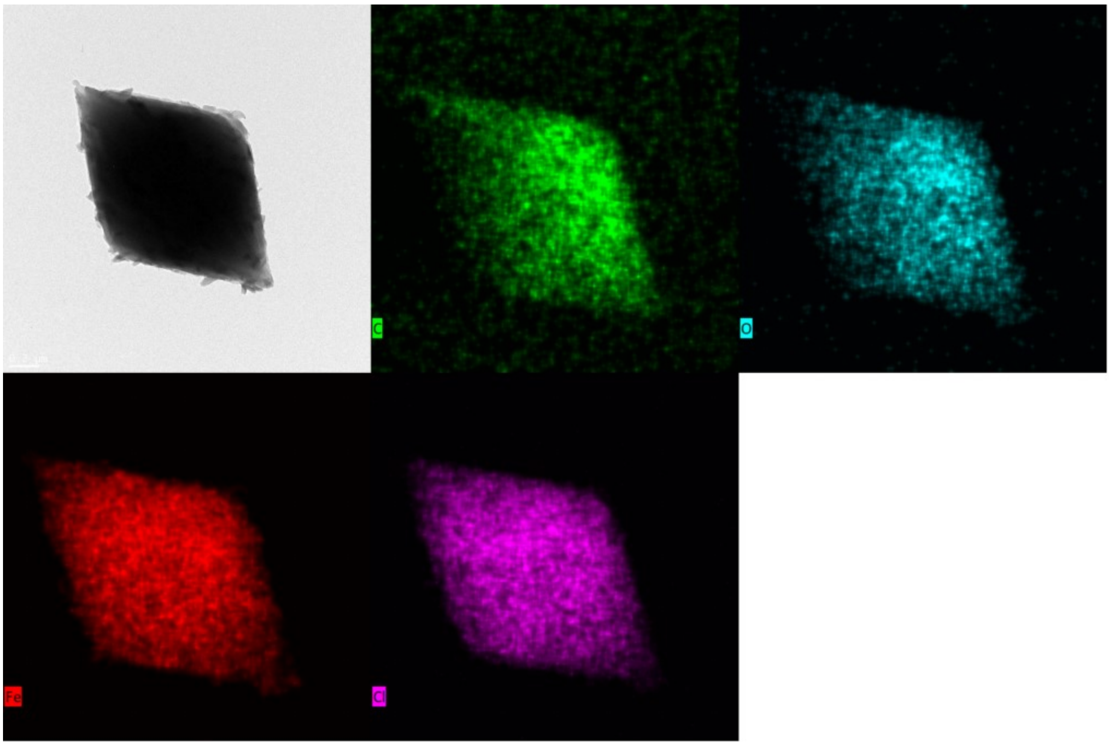

Fig.S1 TEM images and EDS spectrum of prepared Fe-MOF-235.

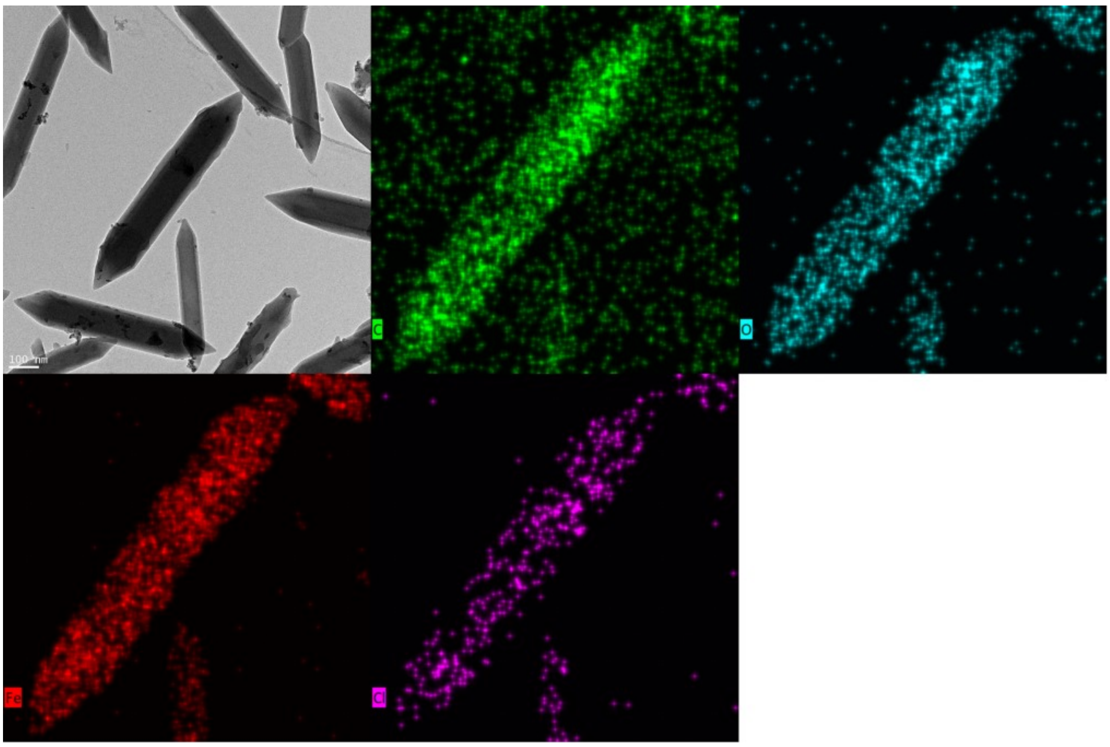

Fig.S2 TEM images and EDS spectrum of prepared Fe-MIL-88B.

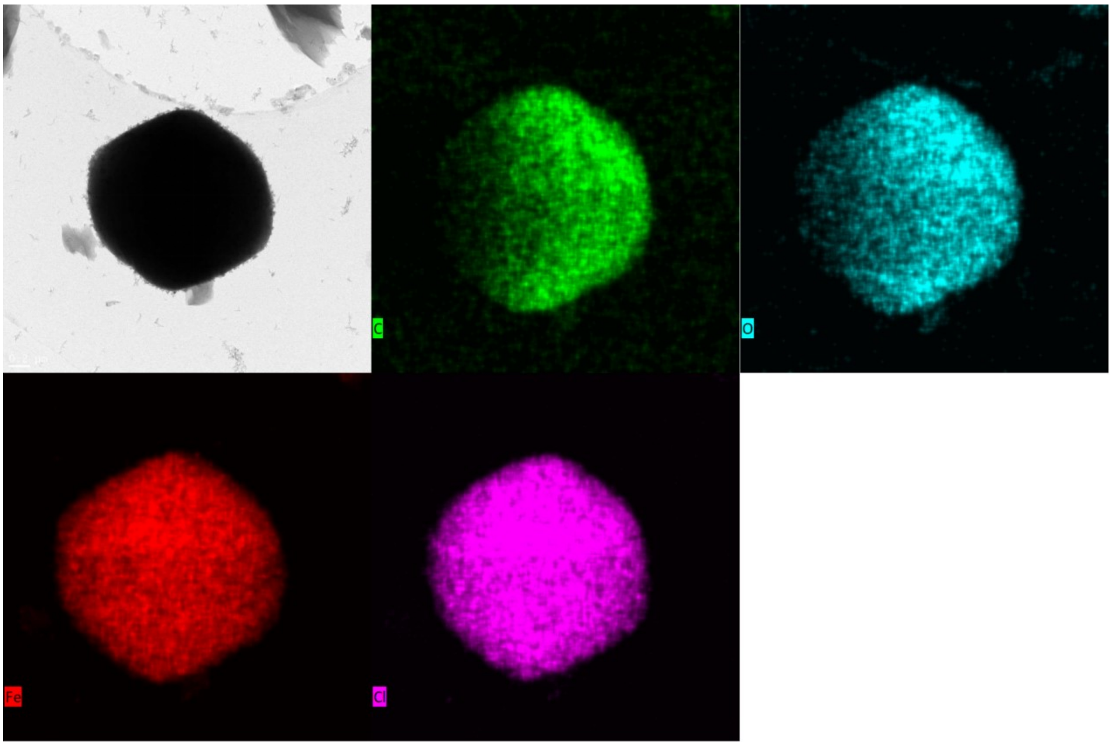

Fig.S3 TEM images and EDS spectrum of prepared Fe-MIL-53.

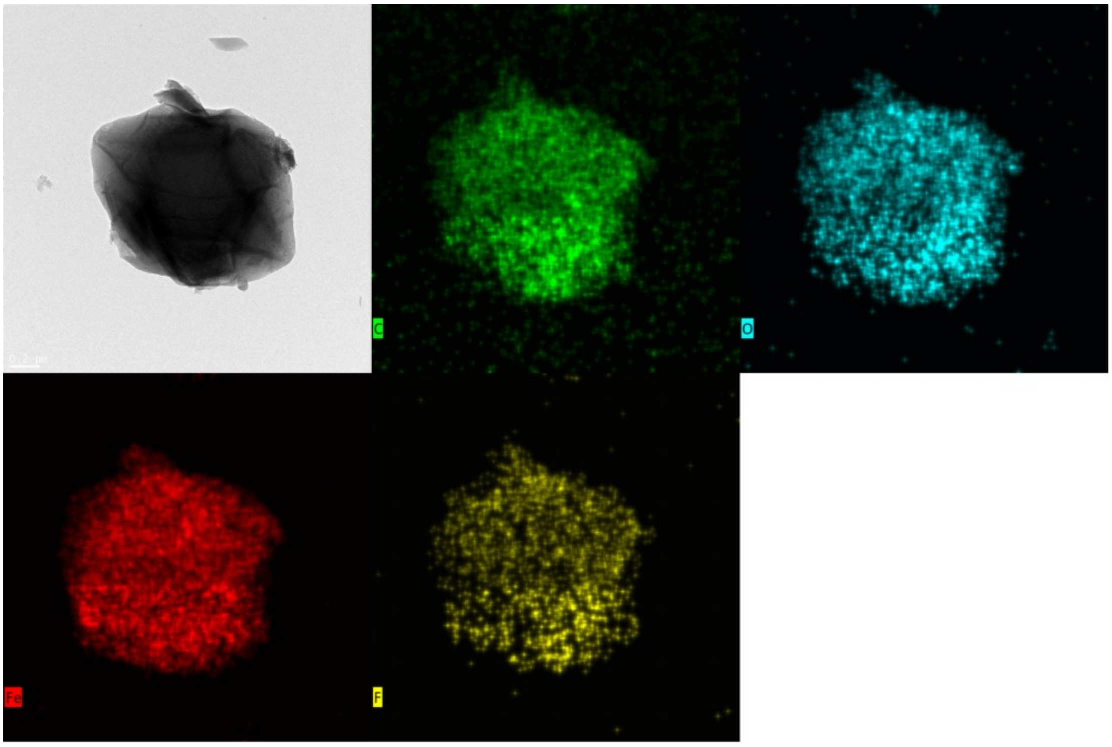

Fig.S4 TEM images and EDS spectrum of prepared Fe-MIL-68.

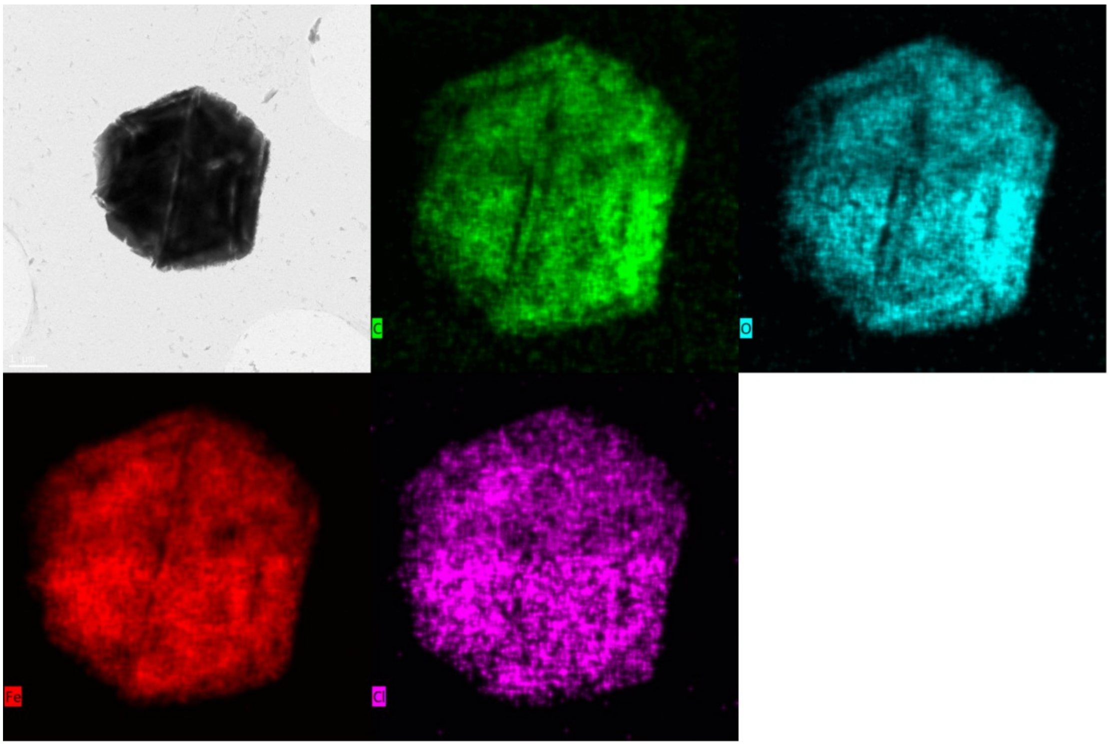

Fig.S5 TEM images and EDS spectrum of prepared Fe-MIL-101.

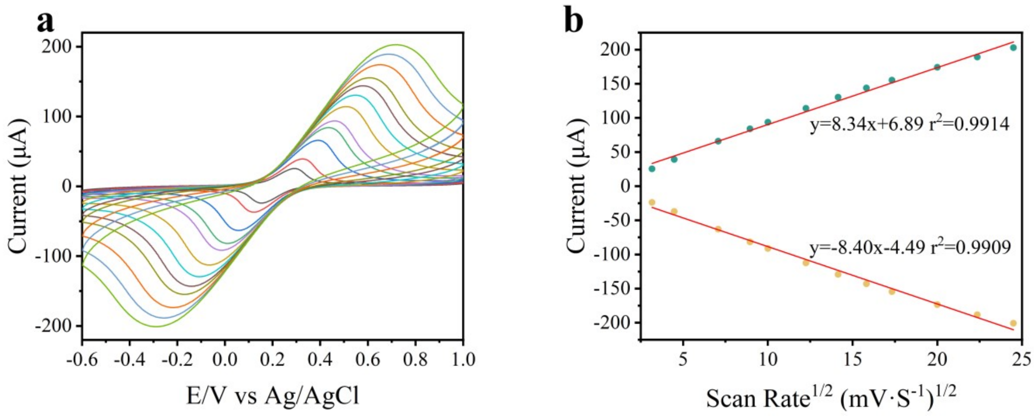

Fig.S6 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of bare CGE.

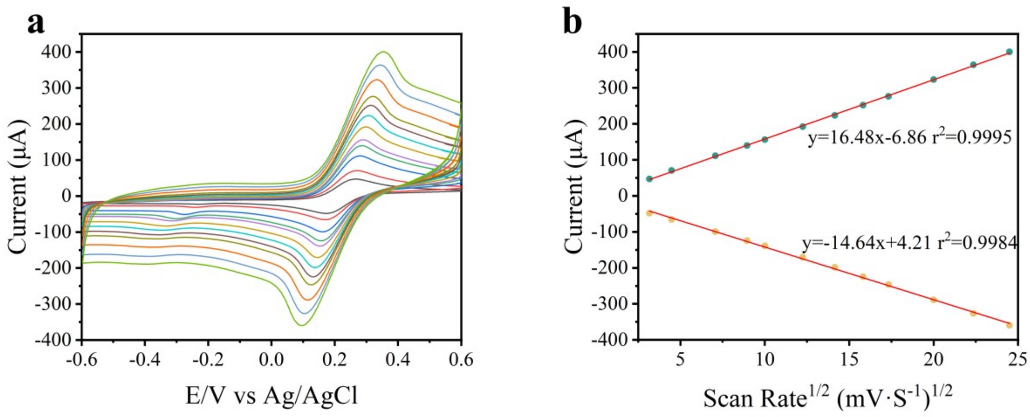

Fig.S7 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of MWCNTs/CGE.

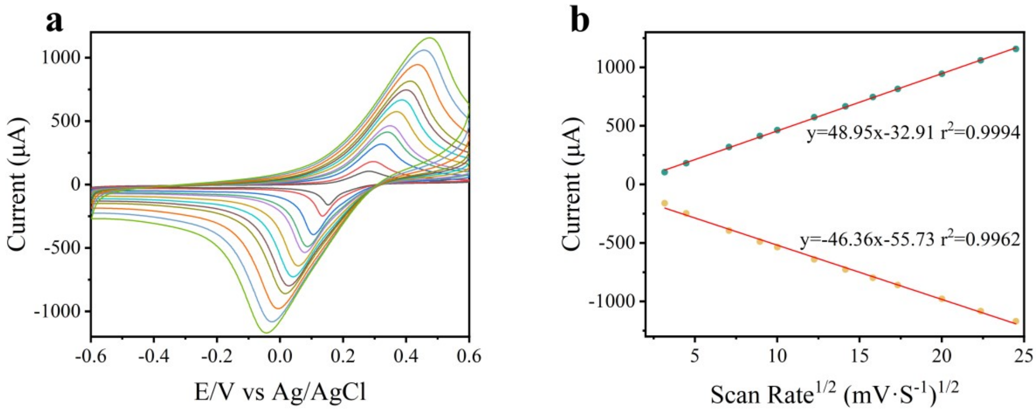

Fig.S8 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of Fe-MOF235/MWCNTs/CGE.

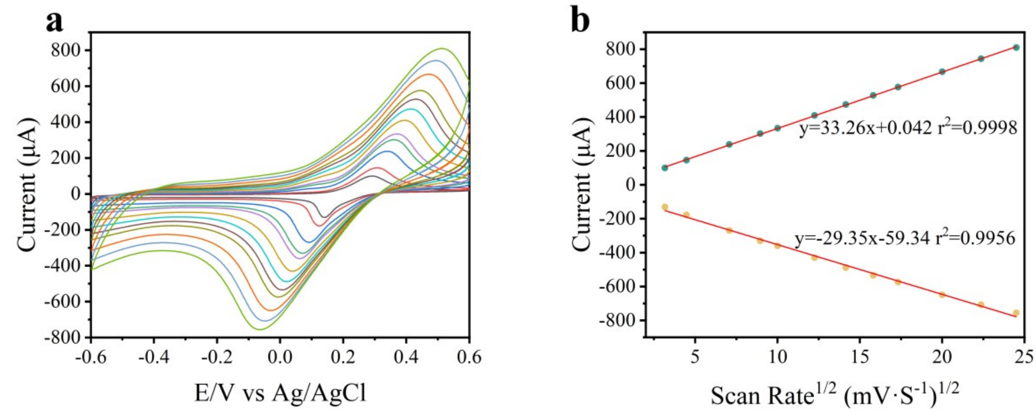

Fig.S9 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of Fe-MIL-88B/MWCNTs/CGE.

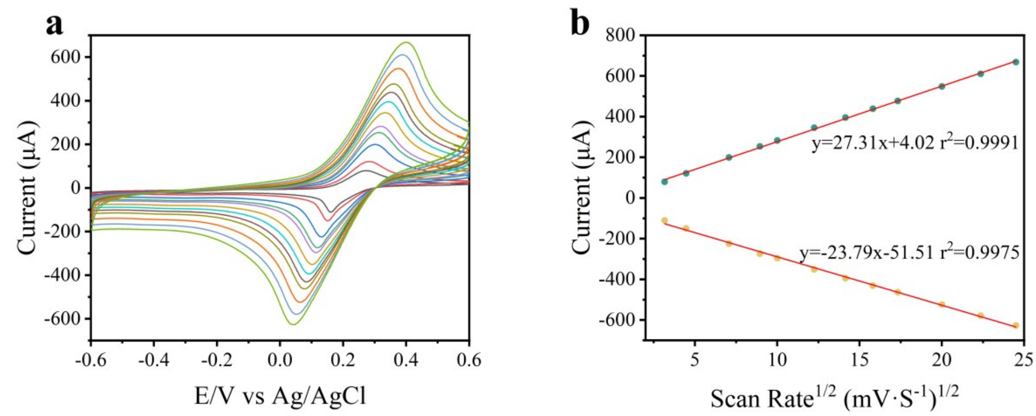

Fig.S10 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of Fe-MIL-53/MWCNTs/CGE.

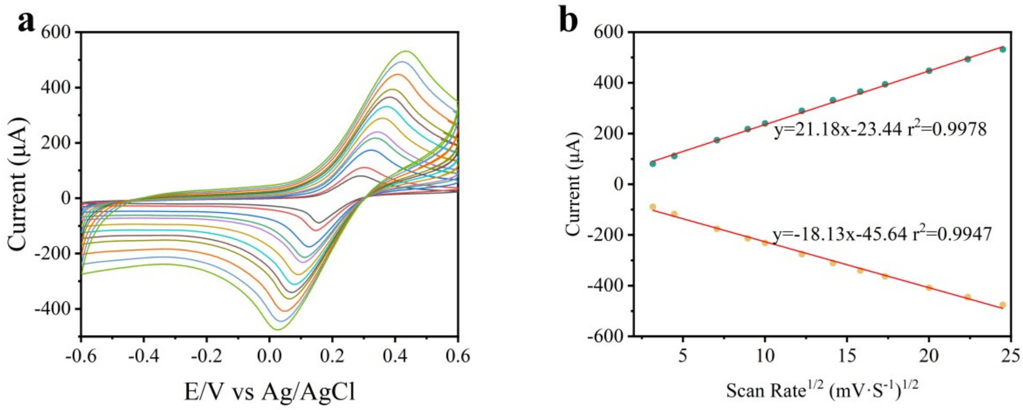

Fig.S11 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of Fe-MIL-68/MWCNTs/CGE.

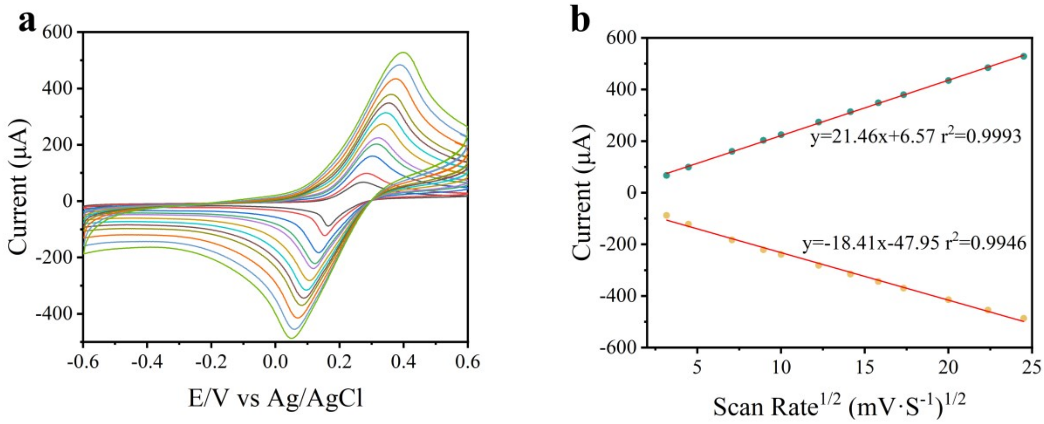

Fig.S12 CV curves of different scan rate values in the range of 10–600 mV·s^{-1}(a) and the Linear relationship of Ipa and $\sqrt{v}$ of Fe-MIL-101/MWCNTs/CGE.

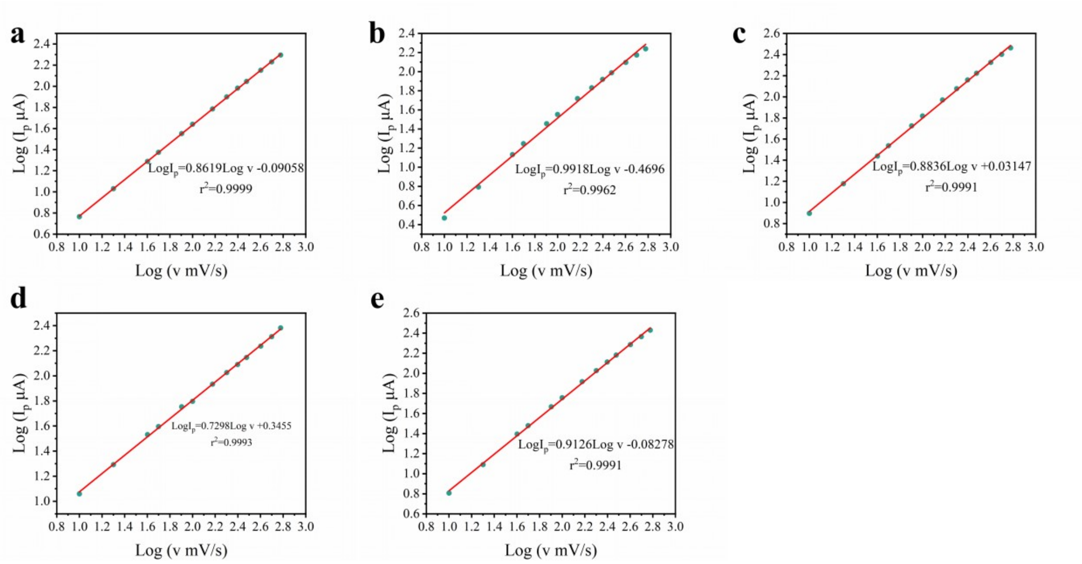

Fig.S13 The Linear relationship of Log Ipa and Log v of, Fe-MOF-235/MWCNTs(a) ,Fe-MIL-88B/MWCNTs(b) ,Fe-MIL-53/MWCNTs(c) ,Fe-MIL-68/MWCNTs(d) ,Fe-MIL-101/MWCNTs(e).

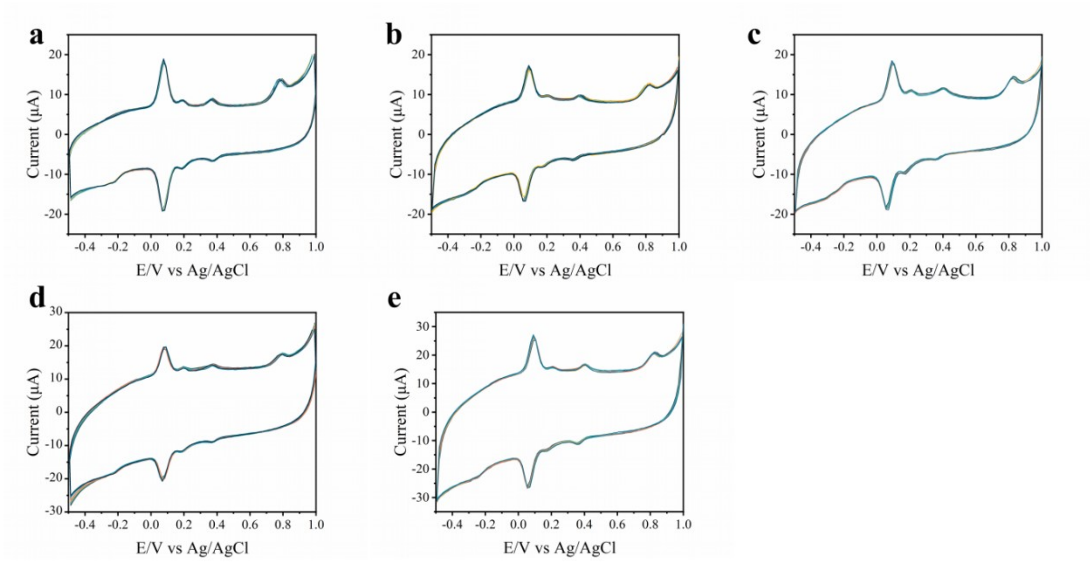

Fig.S14 CV curves of fentanyl recorded by Fe-MOF-235/MWCNTs(a) ,Fe-MIL-88B/MWCNTs(b) ,Fe-MIL-53/MWCNTs(c) ,Fe-MIL-68/MWCNTs(d) ,Fe-MIL-101/MWCNTs(e) repeated for 10 times using a single modified GCE .

Reference

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