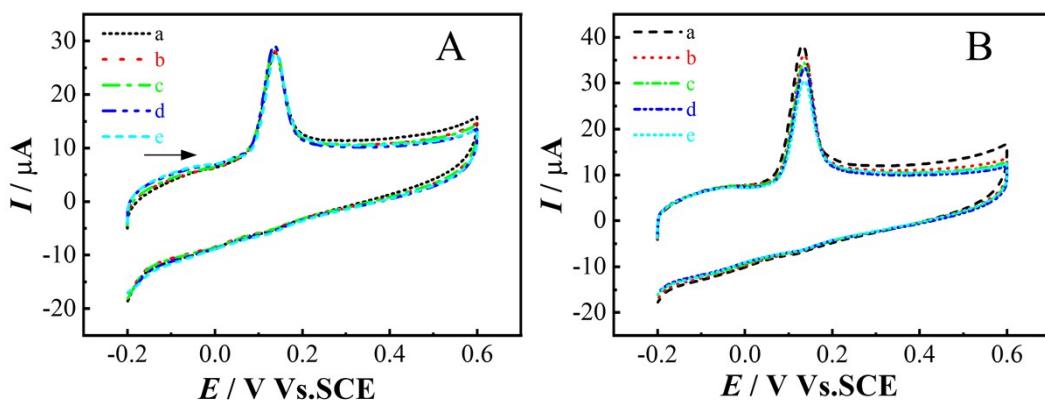
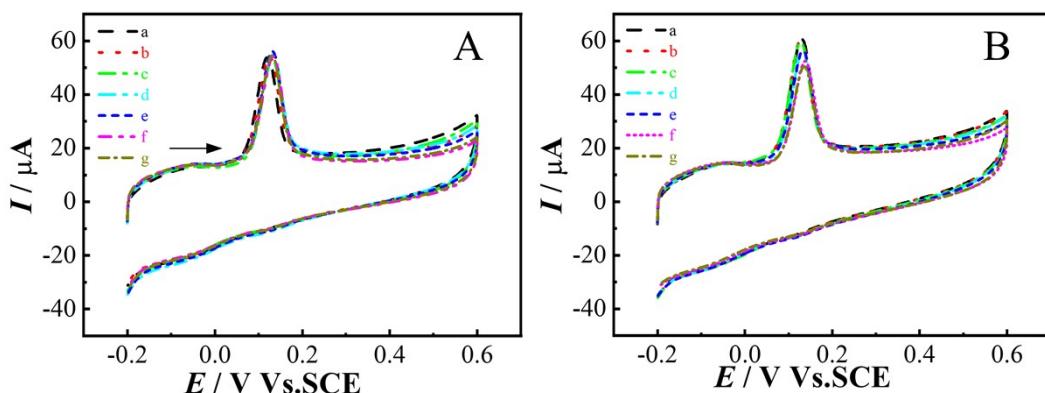


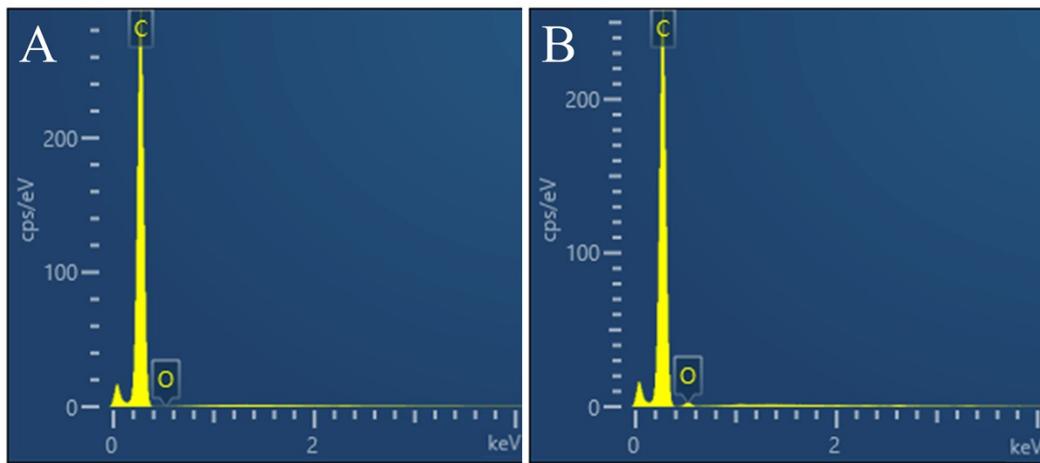
## Supplementary Information



**Fig. S1** A and B are the effects of the potential window -0.5 to 1.0 V and the potential window -0.8 to 1.0 V in electrode pretreatment.



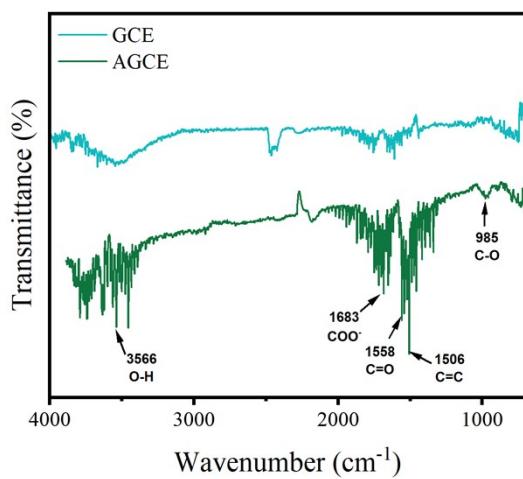
**Fig. S2** A and B are the effects of the GCE<sub>-10-6</sub> (GCE in potential window 0.5~2.0 V sweep rate 0.05  $\text{V}\cdot\text{s}^{-1}$  CV scanning 10 turns after 6 turns in the potential window -0.5~1.0 V sweep rate 0.05  $\text{V}\cdot\text{s}^{-1}$  CV scanning) and GCE<sub>-10-7</sub> (GCE after 10 turns of potentiometric window 0.5~2.0 V sweep rate 0.05  $\text{V}\cdot\text{s}^{-1}$  CV scan and 7 turns of the potentiometric window -0.5~1.0 V sweep rate 0.05  $\text{V}\cdot\text{s}^{-1}$  CV scan ) in electrode pretreatment.



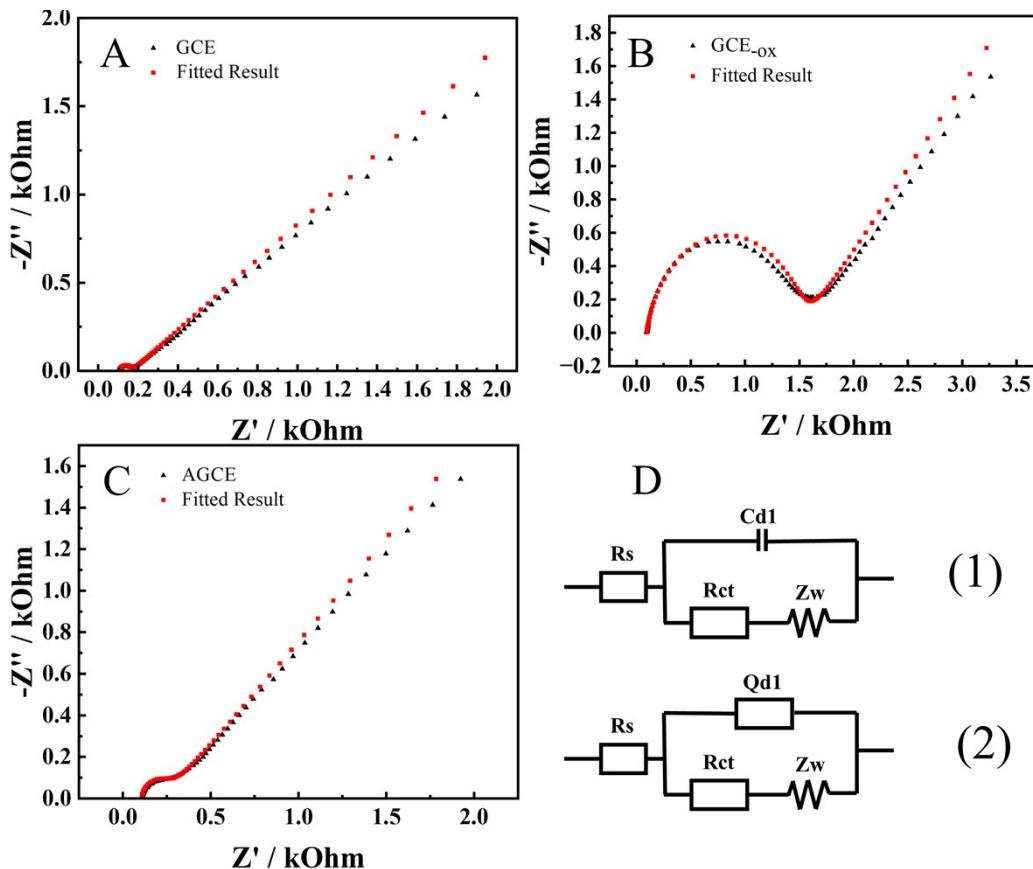
**Fig. S3** Elemental mapping of (A) GCE and (B) AGCE.

**Table S1** C and O mass distribution of GCE and AGCE.

Electrodes	C(wt%)	O(wt%)
GCE	100	0
AGCE	96.90	3.10



**Fig. S4** FTIR spectra of unmodified GCE and AGCE.



**Fig. S5** Nyquist plots and fitted results of (A) GCE, (B) GCE<sub>-ox</sub>, and (C)AGCE in 0.1 M NaCl with  $5.0 \times 10^{-3}$  mol·L<sup>-1</sup> [Fe(CN)<sub>6</sub>]<sup>3-/4-</sup> as an electrochemical probe; (D) The equivalent circuits for simulation of different systems: (1) for GCE, AGCE and (2) for GCE<sub>-ox</sub>.

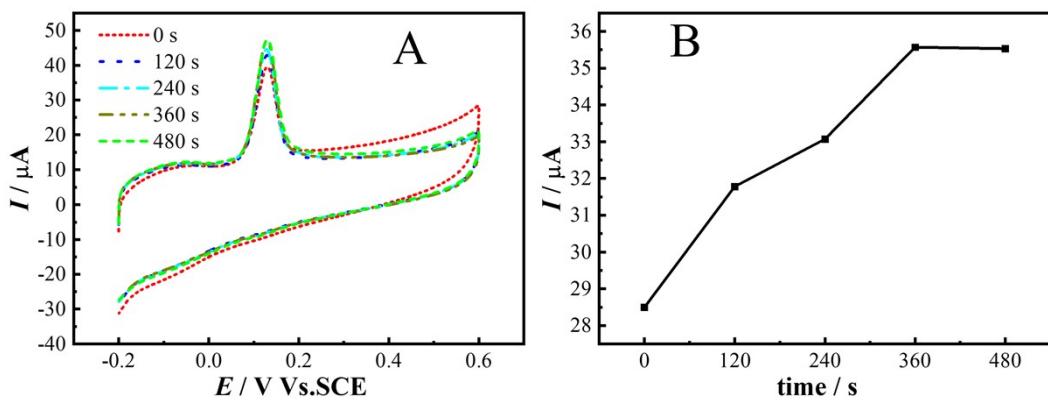
**Table S2** Fitting parameters of electrochemical impedance spectroscopy for different electrodes.

Electrodes	GCE	GCE <sub>-ox</sub>	AGCE
$R_s/\Omega$	107.0	92.7	108.2
$C_{dl}$ or $Q_{dl}/S \cdot s^n$	$9.72 \times 10^{-7}$	$3.63 \times 10^{-6}$	$2.45 \times 10^{-5}$
$n$ (0< $n$ <1)	/	0.86	/
$R_{ct}/\Omega$	61.3	$1.43 \times 10^3$	149.5
$Z_w/S \cdot s^{0.5}$	$1.59 \times 10^{-3}$	$1.65 \times 10^{-3}$	$1.67 \times 10^{-3}$
chi-squared	$1.55 \times 10^{-3}$	$7.13 \times 10^{-4}$	$1.31 \times 10^{-3}$

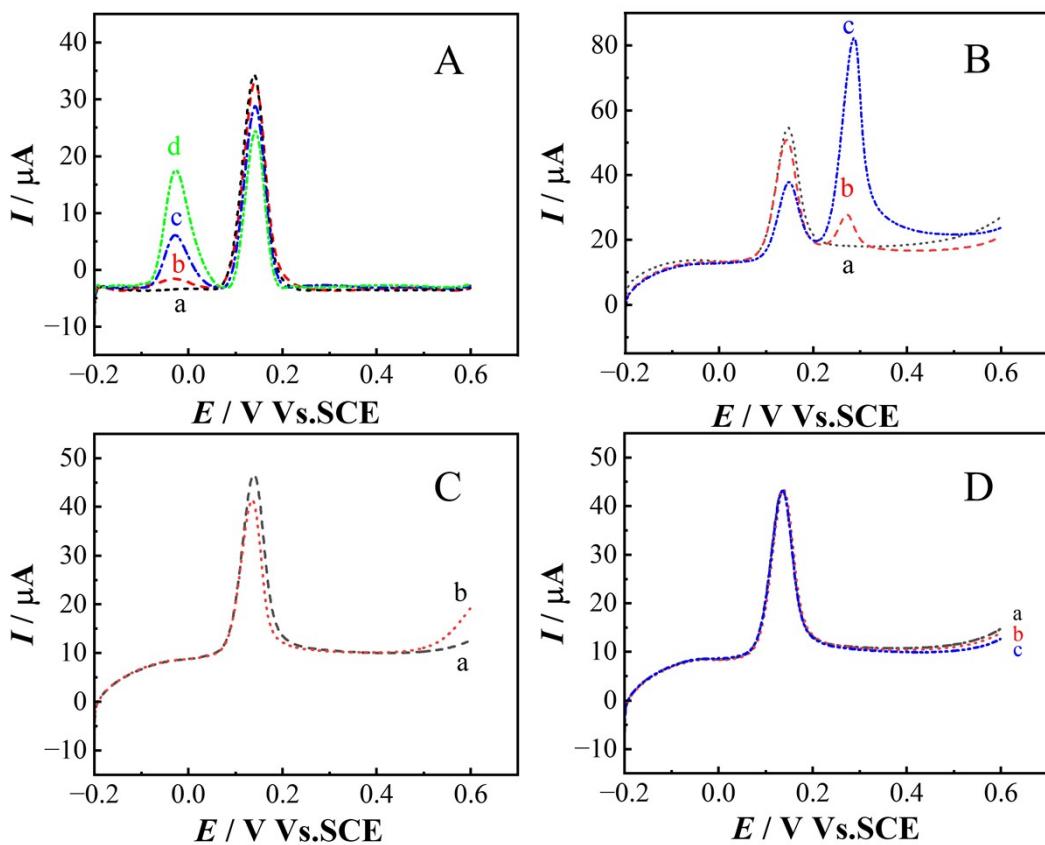
$R_s$  is the resistance of electrolyte solution;  $C_{dl}$ , double layer capacitance;  $Q_{dl}$ , constant phase element relating to the electric double layer;  $n$  is a number ranging from 0 to 1 with  $n = 1$  for the ideal capacitor;  $R_{ct}$ , charge transfer resistance;  $Z_w$ , Warburg impedance; chi-squared, A measure of goodness of fit.

**Table S3** Summary of CV results obtained in **Fig. 5**.

Electrodes	GCE	AGCE
solution	$5.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ EP	$5.0 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$ EP
$E_{\text{pa}}$ (mV)	205	129
$i_{\text{pa}}$ ( $\mu\text{A}$ )	1.27	35.57



**Fig. S6** CV curves of (A) AGCE for the detection of  $5 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$  EP at different accumulation times (from 0 to 480 s), (B) the effect of different accumulation times on the peak EP anode current.



**Fig. S7** (A) LSV curves after baseline subtraction of EP (a), EP equimolar AA (b), EP 10-fold AA (c), and EP 20-fold AA (d) detected by AGCE; (B) AGCE detection of EP(a), EP equimolar UA(b), and EP 10-fold UA(c); (C) AGCE detection of EP(a) and EP equimolar PE(b); (D) AGCE detection of EP(a), EP 100-fold Glu(b), and EP 100-fold Gly(c). All the experiments were performed in pH 7.4 phosphate buffer with  $5.0 \times 10^{-5}$  mol·L<sup>-1</sup> EP.

**Table S4** Summary of LSV results obtained in **Fig. 6B**.

AA		EP		UA		PE	
$E_{pa}$ (mV)	$i_{pa}$ ( $\mu$ A)						
-25	0.80	145	40.24	269	3.95	615	1.84

**Table S5** Comparison of AGCE with those reported in the literature for the determination of EP using

different techniques.

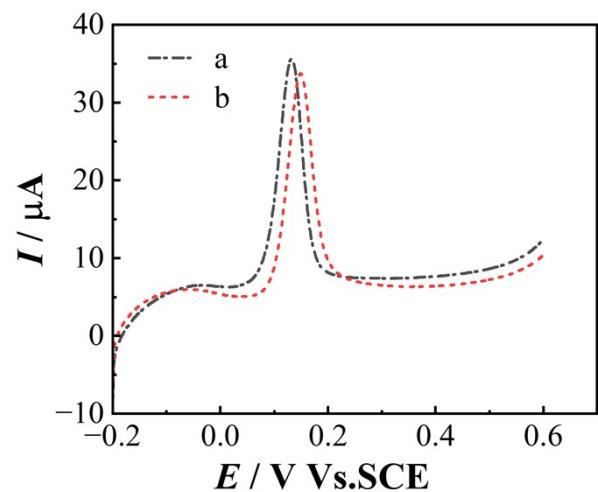
Sensor	Method	Linear range ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Detection limit ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Reference
PGCE	SWV	10.3–102.7	2.86	[11]
AuNPs/PEDOT/G CE	CV	10–640	1.4	[12]
CuO/CQDs/ GCE	SWV	10–100	15.99	[13]
$\text{MoS}_2/\text{MW}-$ CNTs/GCE	CV	9.9–137.9	3	[14]
MGO/GCE	CV	100–600	0.13	[15]
Lac/GC@B <sub>4</sub> C/NF	i-t	0.1–2600	0.04	[17]
AGCE	LSV	0.1–8.0, 10–100, 100– 700	0.032	This work

**Table S6** Detection of EP in the identical EP solution in pH 7.4 phosphate buffer using the same AGCE electrode.

n	added ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	found ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Average ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Relative error (%)	RSD (%)
1		50.21			
2	50.00	49.02	49.69	0.62	1.23
3		49.84			

**Table S7** Detection of EP in the identical EP solution in pH 7.4 phosphate buffer using different AGCE electrodes prepared in identical conditions.

electrode	added ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	found ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Average ( $\mu\text{mol}\cdot\text{L}^{-1}$ )	Relative error (%)	RSD (%)
1		51.60			
2	50.00	50.42	50.09	0.18	3.40
3		48.24			



**Fig. S8** AGCE measured the (a) LSV curve of  $5 \times 10^{-5} \text{ mol}\cdot\text{L}^{-1}$  EP at first detection and the (b) LSV curve after 8 days of storage at room temperature.