Supporting information

3Dgraphene/hydroxypropyl-β-cyclodextrin nanocomposite as electrochemical chiral sensor for the recognition of tryptophan enantiomers

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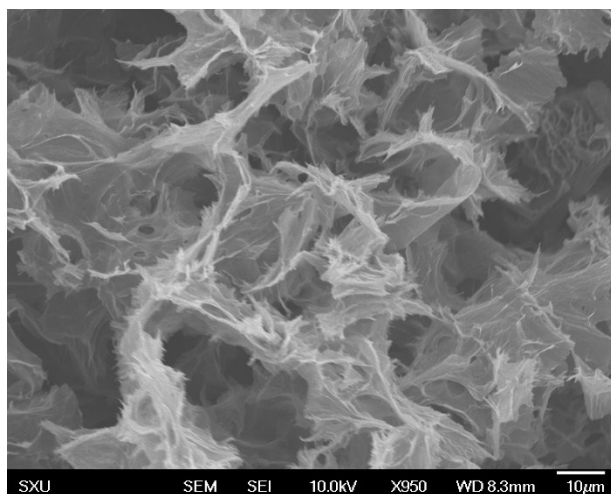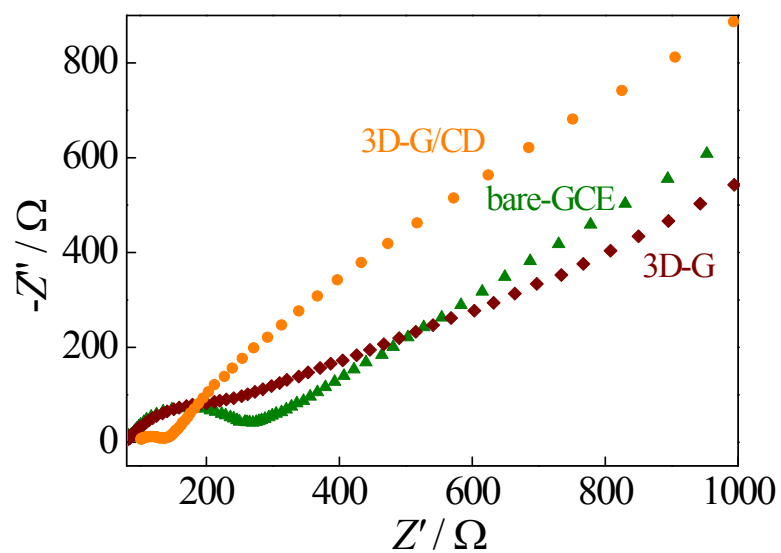
Fig. S1. SEM image of 3D-G

Fig. S2. Nyquist plots of bare GCE, 3D-Gand 3D-G/HP-β-CD modified GCE in 0.1 M KCl containing 10 mM $[Fe(CN)_6]^{3-/4-}$ (pH 7.0) at 25 °C.
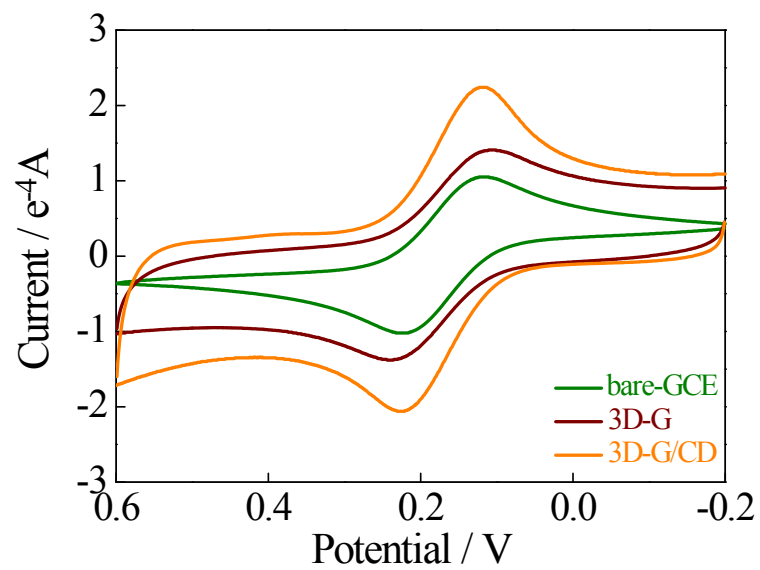
Fig. S3. Cyclic voltammograms of bare GCE, 3D-G and 3D-G/HP-β-CD modified GCE in 0.1 M KCl containing 10 mM $[Fe(CN)_6]^{3-/4-}$ (PBS of pH 7.0) at 25 °C.
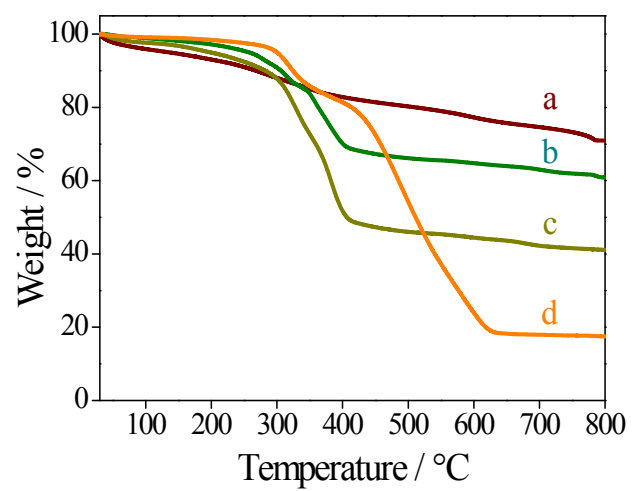
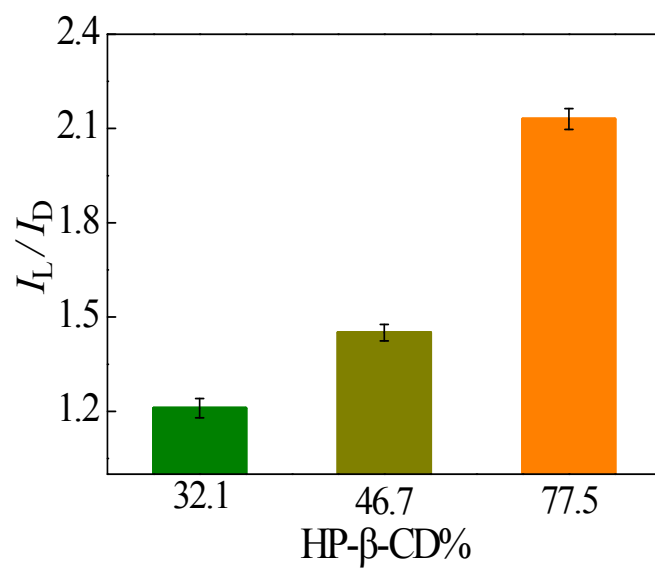**Fig. S4.** TGA of 3D-G (a) and 3D-G/HP-β-CD containing different amounts of HP-β-CD (b-d).

Fig. S5. The HP-β-CD amounts of 3D-G/HP-β-CD (32.1%, 46.7% and 77.5%) influence on the enantiorecognition efficiency (I_L/I_D) of 3D-G/HP-β-CD/GCE toward Trp isomers. Errors bars represent the standard deviation for three independent measurements.
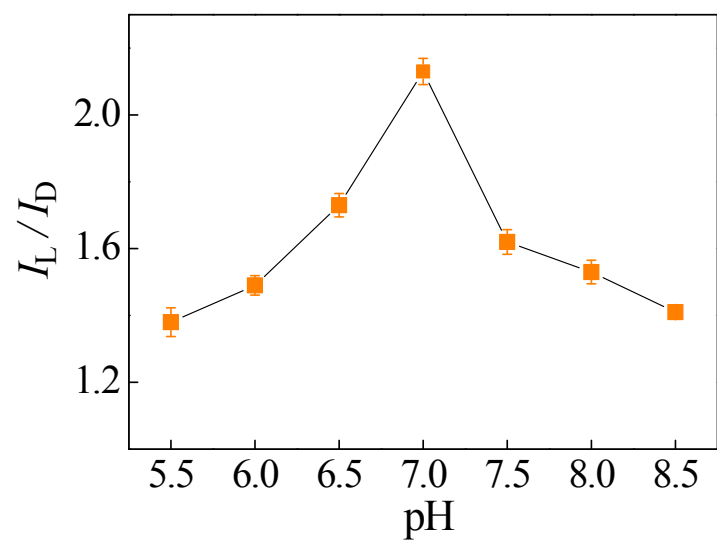
Fig. S6. Influence of pH on the enantiorecognition efficiency (I_L/I_D) of 3D-G/HP-β-CD/GCE toward Trp isomers at 25 °C. Errors bars represent the standard deviation for three independent measurements.

Fig. S7. Influence of the accumulation time on the enantiorecognition efficiency (I_L/I_D) of 3D-G/HP-β-CD/GCE toward Trp isomers at 25 °C. Errors bars represent the standard deviation for three independent measurements.

Fig. S8. Influence of the 3D-G/HP-β-CD amount on the enantiorecognition efficiency (I_L/I_D) of 3D-G/HP-β-CD/GCE toward Trp isomers at 25 °C. Errors bars represent the standard deviation for three independent measurements.
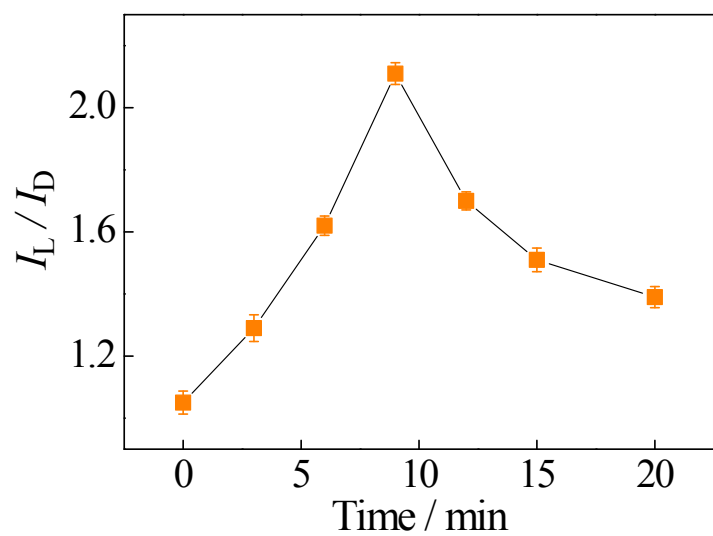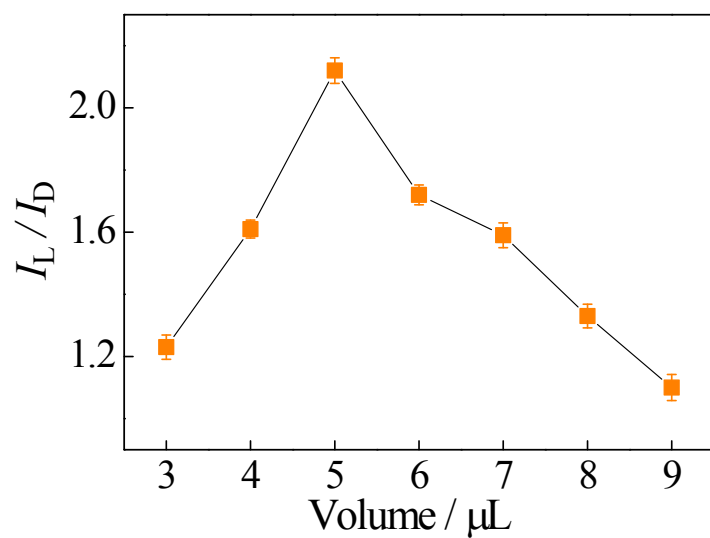
Table S1. Comparison with other electrochemical methods for the recognition of tryptophan enantiomers

Modified electrode	Peak current ratio (L-Trp to D-Trp)	Linear range (mol L^{-1})	Detection limit (mol L^{-1})	Ref.
PTCA–CS/GCE	2.60	—	—	40
P-L-Glu/β-CD/GCE	2.30	—	—	9
GQDs/β-CD/GCE	2.10	—	—	39
GQDs-CS/GCE	2.06	—	—	10
Pd-Cu@Cu$_2$O/N-RGO/GCE	—	$1.0 \times 10^{-8} – 4.0 \times 10^{-5}$	1.9×10^{-9} (L/D)	41
β-CD-MNPs/GCE	—	$8.0 \times 10^{-7} – 3.0 \times 10^{-4}$	5.0×10^{-7} (L/D)	42
ds-DNA/Thi-GR/GCE	—	$5.0 \times 10^{-7} – 2.5 \times 10^{-3}$	1.7×10^{-7} (L/D)	43
NH$_2$-GQDs/β-CD/GCE	—	$1.0 \times 10^{-6} – 3.0 \times 10^{-5}$	6.5×10^{-7} (L) 1.2×10^{-7} (D)	44
NH$_2$-β-CD/Au@Pt/PEI/ MWCNTs/GCE	—	$1.0 \times 10^{-5} – 5.0 \times 10^{-3}$	4.3×10^{-6} (L) 5.6×10^{-6} (D)	45
PLC/MWCNTs/GCE	—	$1.0 \times 10^{-4} – 1.0 \times 10^{-3}$	3.3×10^{-5} (L/D)	46
mNBFs/mNC–GPEs	1.40	$1.0 \times 10^{-7} – 1.0 \times 10^{-5}$	—	47
β-CD-PtNPs/GNs/GCE	1.30	$5.0 \times 10^{-5} – 5.0 \times 10^{-3}$	1.7×10^{-5} (L) 2.1×10^{-5} (D)	36
3D-G/HP-β-CD/GCE	2.13	$5.0 \times 10^{-7} – 1.75 \times 10^{-4}$	9.6×10^{-9} (L) 3.8×10^{-8} (D)	This work

Table S2. Inclusion constant (K) for the 1:1 inclusion complexation of L-, D-phenylalanine, L, D-tryptophan and L-, D-tyrosine with HP-β-CD.

Chiral amino acids	K (M^{-1}) of L-isomer with HP-β-CD	K (M^{-1}) of D-isomer with HP-β-CD
Phenylalanine (Phe)	23.75	19.73
Tyrosine (Tyr)	32.02	25.31
Tryptophan (Trp)	235.3	176.2