Electronic Supplementary Material (ESI) for Analytical Methods.

A modified electrode based on 3D reduced graphene oxide and MoS_2 composite for simultaneous detection of sunset yellow and tartrazine

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Preparation of electrode modification materials

A mixture containing 0.5 g graphite powder, 0.5 g $NaNO_3$ and 23 mL concentrated H_2SO_4 was put into an ice bath for 30 min under mild agitation. Then 3.0 g $KMnO_4$ was added slowly and the mixed suspension was heated to 35℃ and kept for 1 h. After adding 40 mL of double deionized water (DDW), the heating temperature of the mixed solution was raised to 90℃ and kept for another 30 min. Then, 100 mL DDW was added to dilute the above mixture. With the slow addition of H_2O_2 (30%, 30mL), the mixture turned from dark brown to bright yellow. After that, the resulting mixture was centrifuged and washed with anhydrous ethanol and DDW. Finally, the obtained GO sample was dried in vacuum at 60℃ for 24 h.

10 mg of GO was dispersed in 30 mL of HCl (0.1 mol/L) followed by sonification for 1 h. 30 mg of sodium molybdate (Na_2MoO_4) and 45 mg of thiourea were then added to the dispersion of GO. The resultant mixture was transferred into a 75 mL autoclave and then kept in an oven at 200 °C for a period of 24 h. After cooling, the precipitate was gathered by centrifugation, washed with anhydrous ethanol and DDW for several times. Finally, the product named as 3DrGO-MoS_2 was dried under vacuum at 60℃ for 2 h.

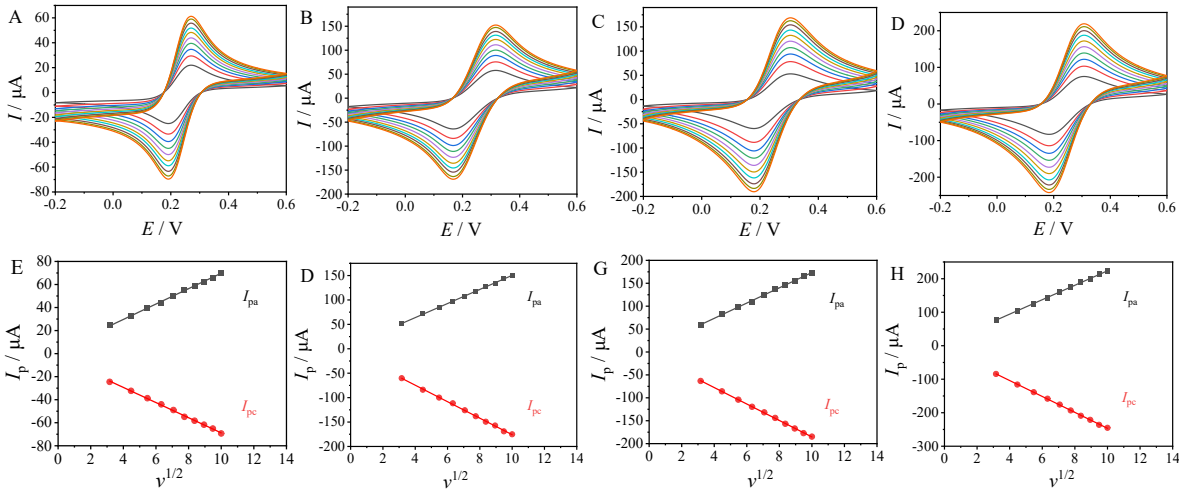

Fig. S1 CV curves of (A) bare GCE, (B) MoS_2/GCE (C)3DrGO/GCE, and (D) 3DrGO-MoS_2/GCE in 5 mmol/L $[Fe(CN)_6]^{3-/4-}$ at different scan rates (10-100 mV/s). (E)-(H) The corresponding plots of peak current versus square root scan rate. The measurement was implemented in 0.1 moL L^{-1} KCl medium.

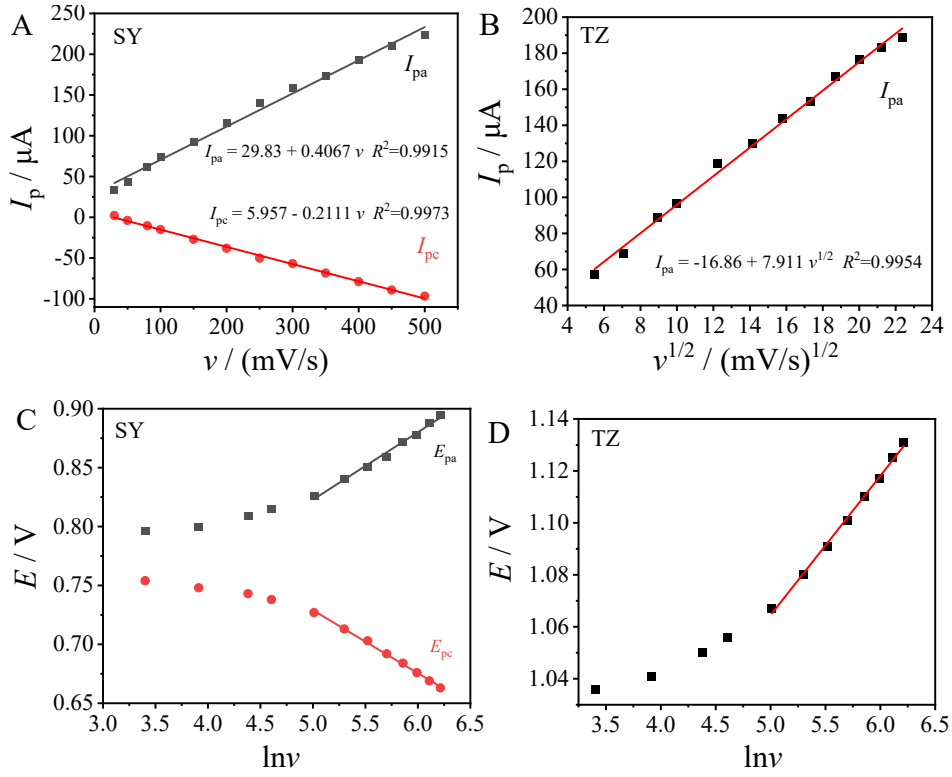

Fig. S2 (A) The plots of peak current versus scan rate (v) for SY. (B) The plots of peak current versus the square root of scan rate for TZ. (C) The plots of peak potential versus ln$v$ for SY. (D) The plots of peak potential versus ln$v$ for TZ. The measurement was implemented in acetate buffer (pH 5.0) medium.

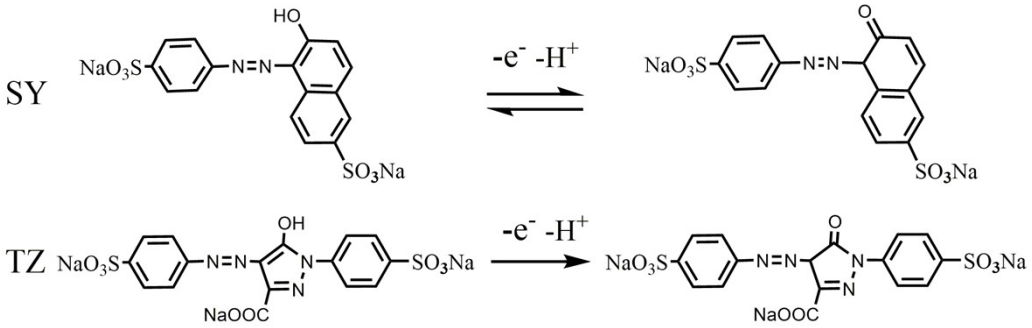

Fig. S3 Reaction mechanism of SY and TZ on 3DrGO-MoS_2/GCE

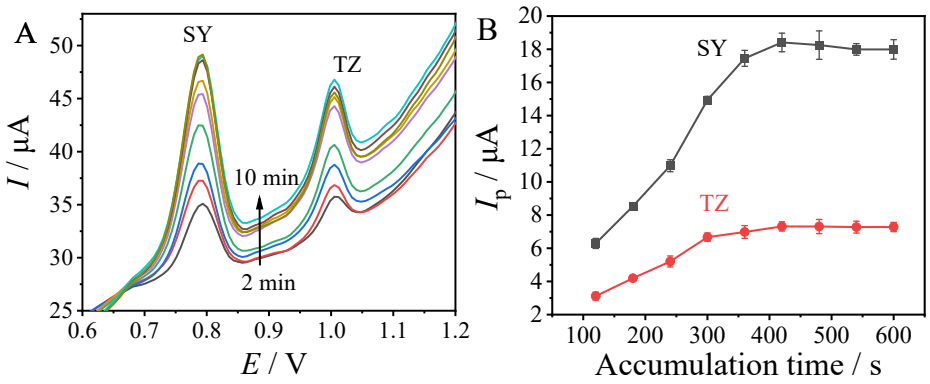

Fig. S4 (A) DPV curves of 3DrGO-MoS_2/GCE in mixture of SY (10 μmol/L) and TZ (10 μmol/L) with different accumulation times (2, 3, 4, 5, 6, 7, 8, 9 and 10 min). (B) The plots of peak current versus accumulation time. The measurement was implemented in acetate buffer (pH 5.0) medium.

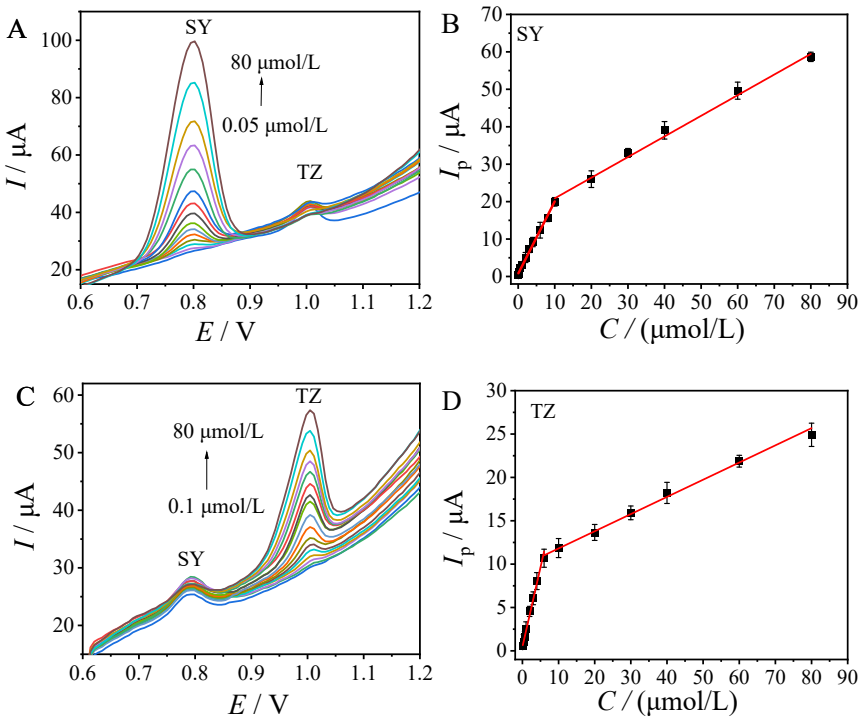

Fig. S5 DPV responses on 3DrGO-MoS_2/GCE for (A) SY in the presence of TZ (2 μmol/L) and (C) TZ in the presence of SY (2 μmol/L). Calibration curves of (B) SY and (D) TZ.

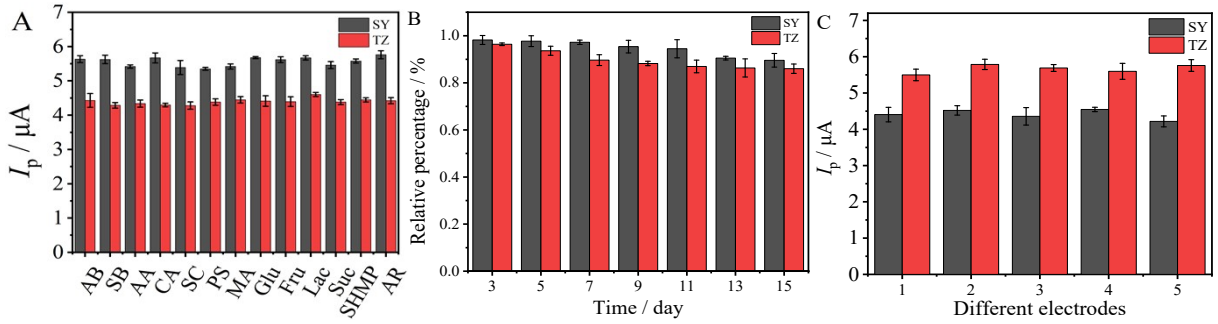

Fig. S6 (A) Effects of different interfering substances on the simultaneous determination of SY and TZ in acetate buffer (pH = 5.0) by DPV technology at 3DrGO-MoS_2/GCE; (B) The relative percentage of SY and TZ at different storage times; (C) the oxidation currents of SY and TZ at different electrodes. Acetate buffer (AB), Sodium besylate (SB), ascorbic acid (AA), citric acid (CA), sodium citrate (SC), potassium sorbate (PS), maltoseascorbic acid (MA), Glucose (Glu), fructose (Fru), lactose (Lac), sucrose (Suc), potassium hexametasulfate (SHMP) and allura red (AR).