Supplementary material – *Analyst*

Catalytic effect of conductive dyes for an improved analytical performance of electrochemical sensor for piperine determination in black pepper

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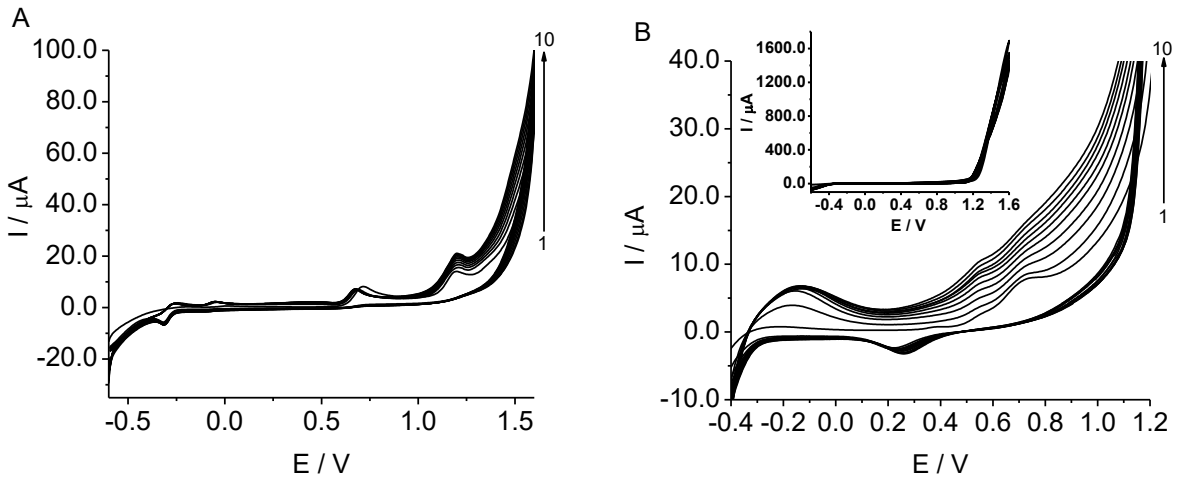

Fig. S1. CVs of electrochemical polymerization of 0.35 mmol L^{-1} MUX (A) and BCG (inset B) on CPE surface by 10 repetitive scans within a potential range of -0.6 to 1.6 V at 100 mV s^{-1}. A magnified view of the CVs of BCG electropolymerization is shown under B.

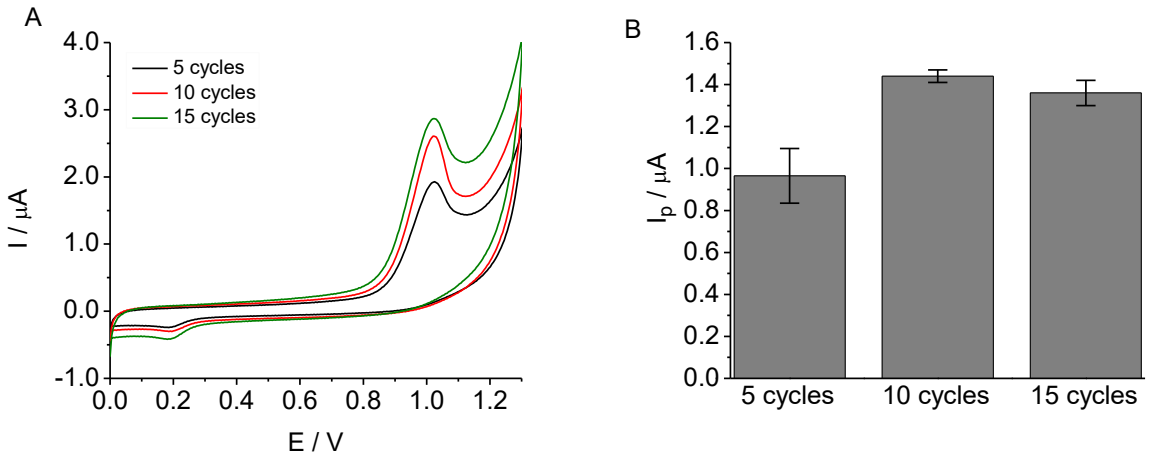

Fig. S2. CVs of PIP (3.47 µmol L^{-1}) on the PMUX/CPE prepared by 5–15 cycles of electropolymerization (A). The influence of electropolymerization cycle numbers on corresponding peak currents of 3.47 µmol L^{-1} PIP in B-R buffer solution pH 6.0 at PMUX/CPE (B). The error bars were constructed as standard deviations of three repeated measurements.

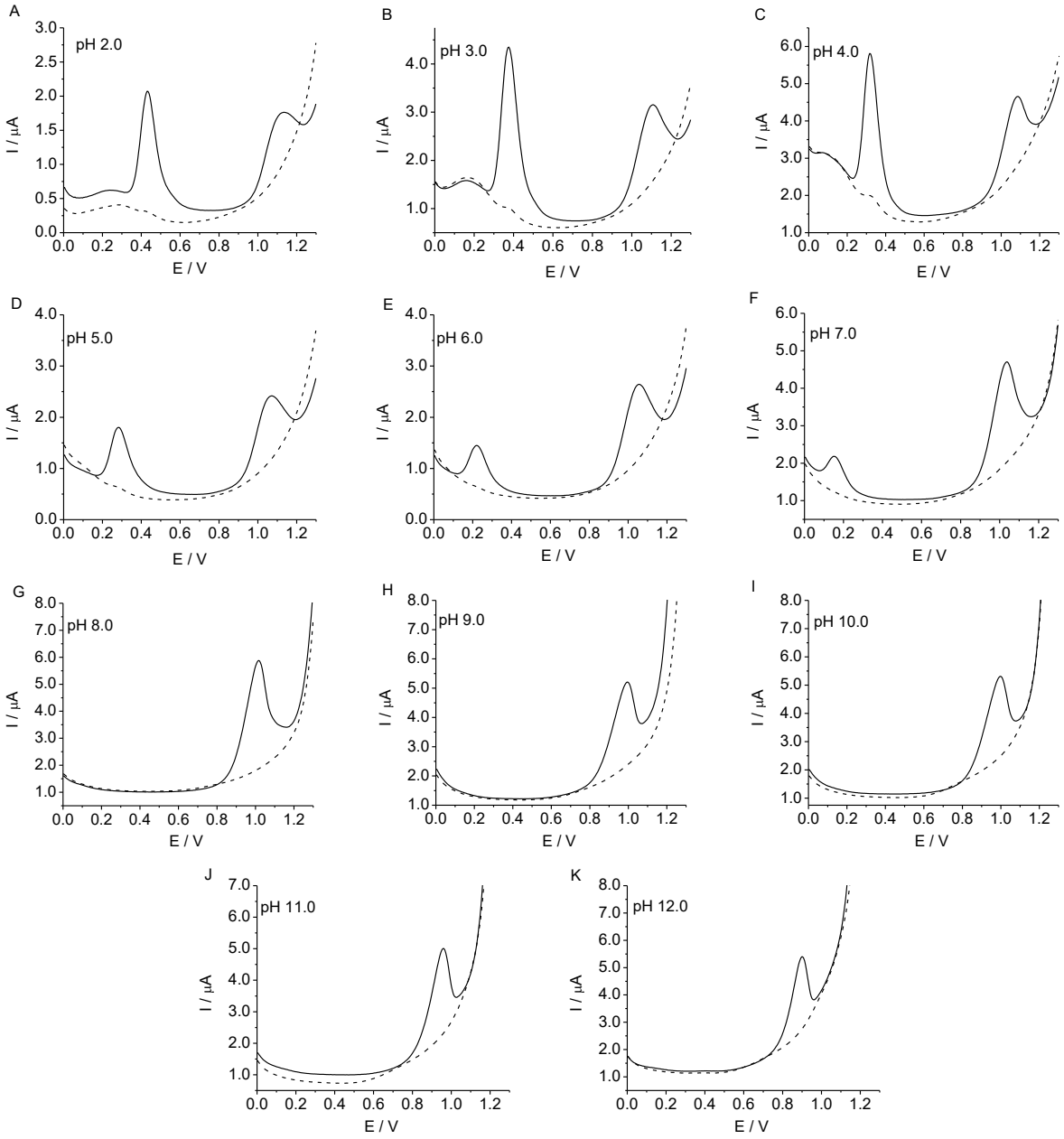

Fig. S3. SWVs of oxidation process of PIP (1.75 μmol L^{-1}) recorded using PMUX/CPE at all studied pHs of B-R buffer solution: pH 2.0 (A), pH 3.0 (B), pH 4.0 (C), pH 5.0 (D), pH 6.0 (E), pH 7.0 (F), pH 8.0 (G), pH 9.0 (H), pH 10.0 (I), pH 11.0 (J), pH 12.0 (K). The dashed lines illustrate the appropriate voltammograms of the baseline.

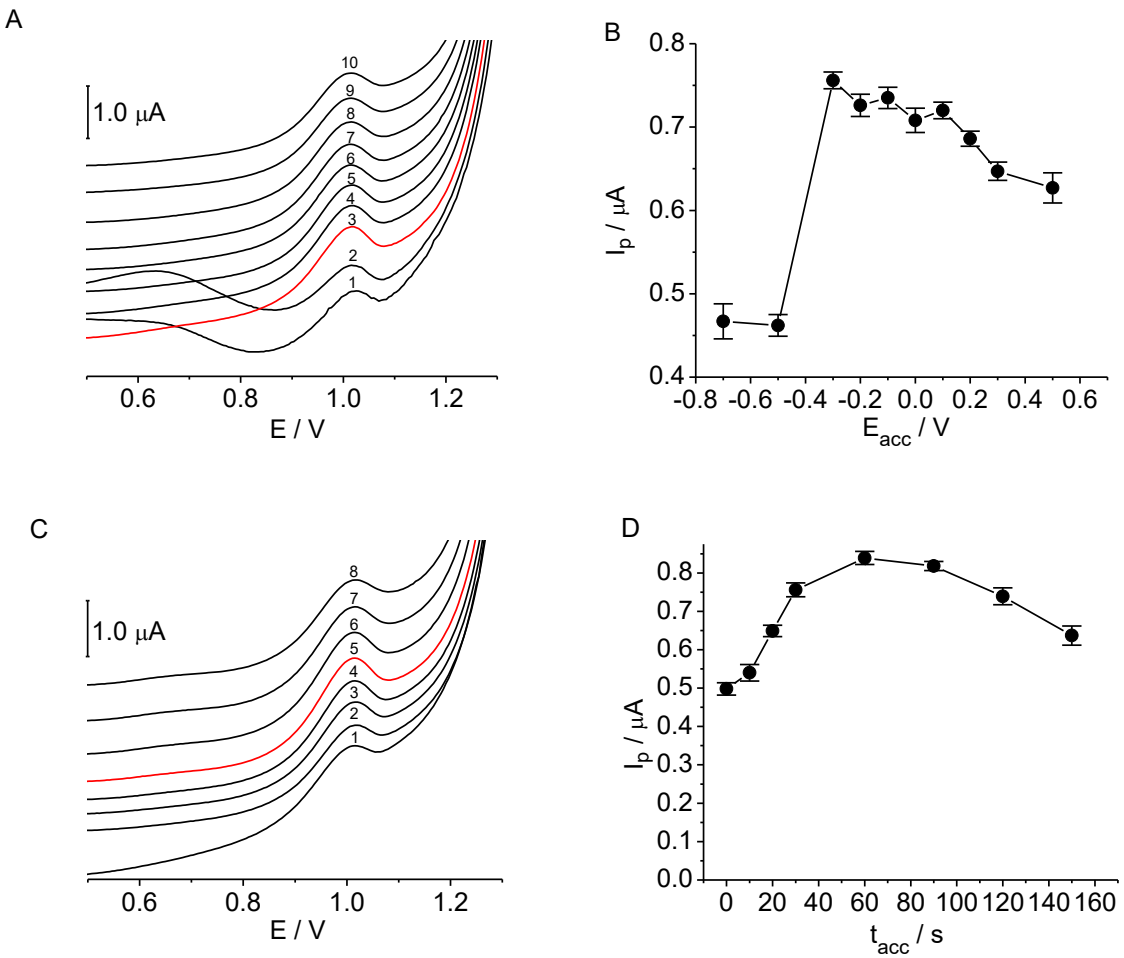

Fig. S4. SW-AdSV curves of PIP (0.52 μmol L^{-1}) obtained at pH 8.0 using PMUX/CPE at t_{acc} = 30 s and different E_{acc} (curves 1-10: -0.7 V; -0.5 V; -0.3 V; -0.2 V; -0.1 V; 0.0 V; 0.1 V; 0.2 V; 0.3 V; 0.5 V) (A) and at E_{acc} = -0.3 V and different t_{acc} (curves 1-8: 0 s; 10 s; 20 s; 30 s; 60 s; 90 s; 120 s; 150 s) (C). Influence of E_{acc} (t_{acc} = 30 s) (B) and t_{acc} (E_{acc} = -0.3 V) (D) on PIP (0.52 μmol L^{-1}) signal intensity using PMUX/CPE. The error bars were constructed as standard deviations of three repeated measurements.

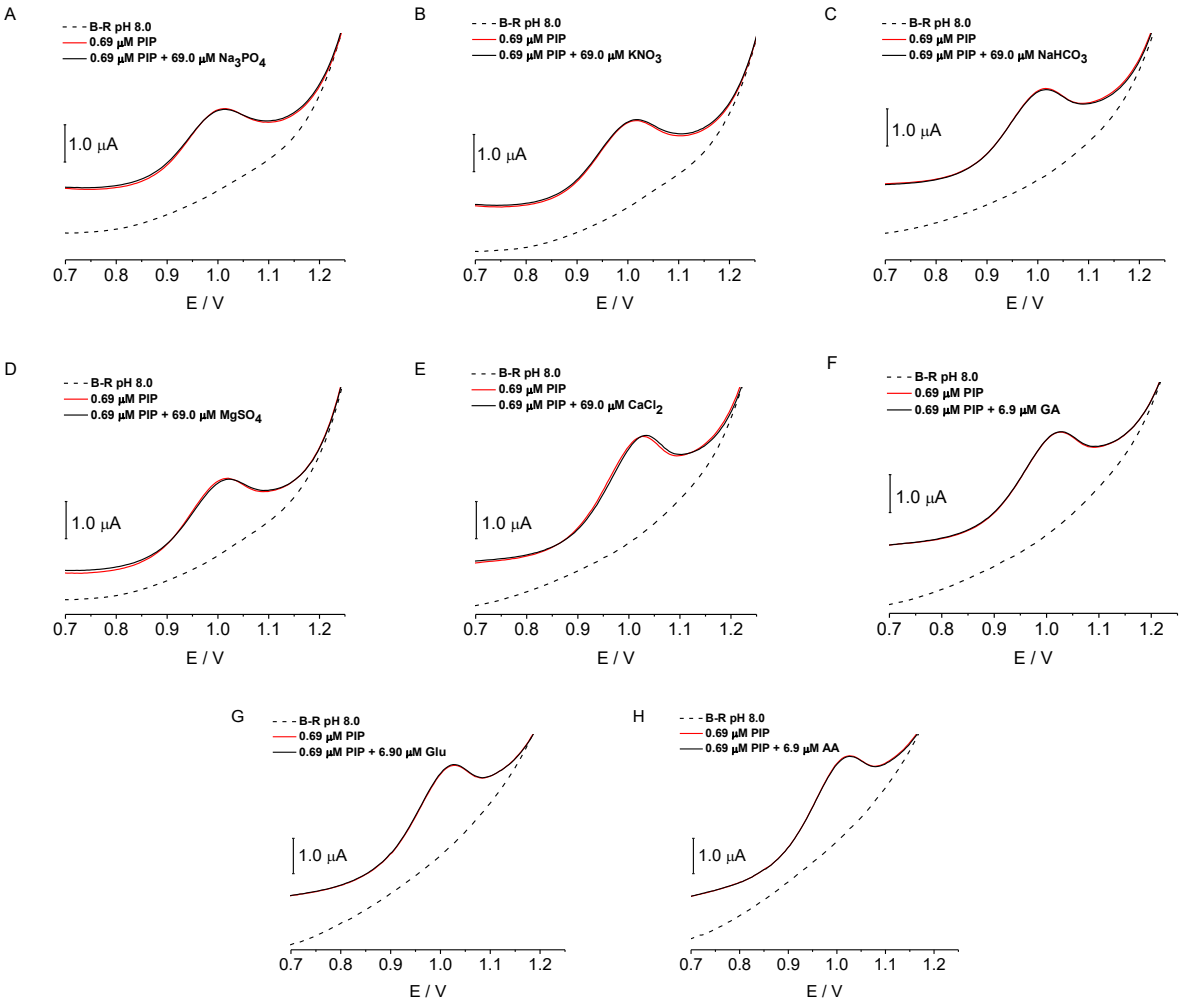

Fig. S5. SW-AdSV signals of PIP (0.69 µmol L^{-1}) at pH 8.0 in the absence and in the presence of Na_3PO_4 (A), KNO_3 (B), $NaHCO_3$ (C), $MgSO_4$ (D), $CaCl_2$ (E), GA (F), Glu (G), AA (H) recorded using PMUX/CPE. The dashed lines illustrate the appropriate voltammograms of the baseline.

Table S1. The impact of some possible interfering substances (69.0 or 6.9 μmol L^{-1}) on the determination of 0.69 μmol L^{-1} PIP in B-R buffer solution pH 8.0 at PMUX-CPE

Interference	Interference/PIP molar ratio	Effect on PIP peak intensity (%)
Na^+	300	<2.94
K^+	300	<0.92
Ca^{2+}	100	<0.72
Mg^{2+}	100	<4.59
HCO_3^-	100	<0.93
NO_3^-	100	<0.92
Cl^-	200	<0.72
PO_4^{3-}	100	<2.94
SO_4^{2-}	100	<4.59
Gallic acid (GA)	10	<0.85
Glucose (Glu)	10	<1.61
Ascorbic acid (AA)	10	<0.80

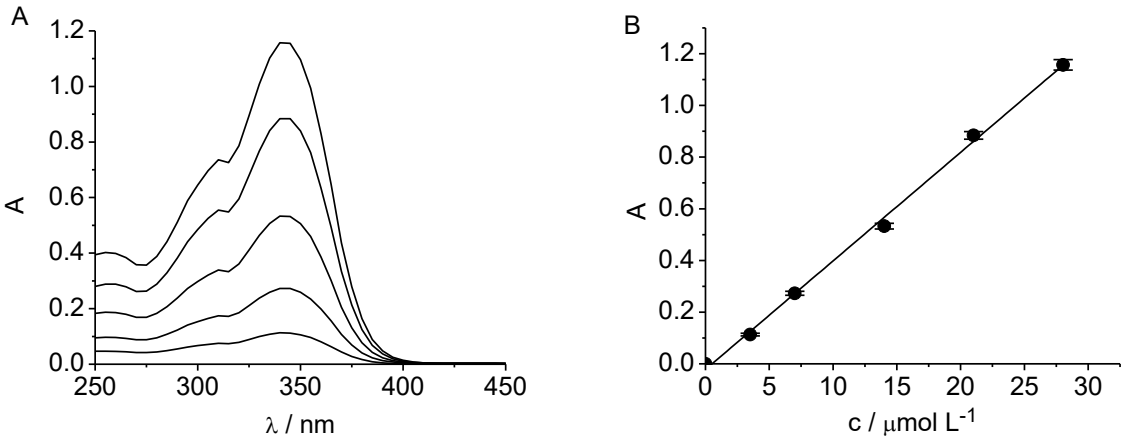

Fig. S6. UV–Vis absorption spectra of PIP (3.50-28.04 μmol L^{-1}) (A) and the corresponding calibration curve (B). The error bars were constructed as standard deviations of three repeated measurements.

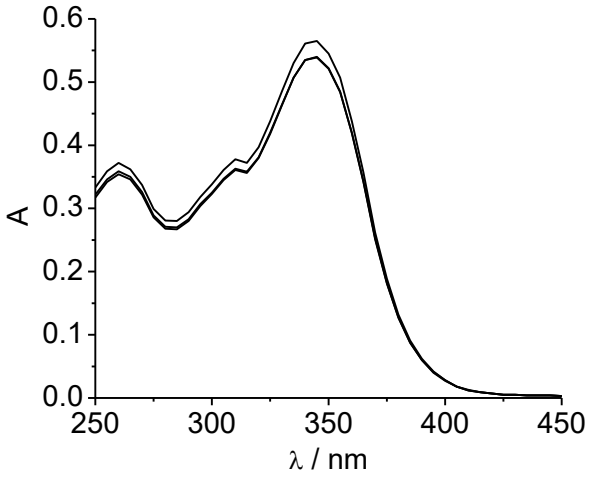

Fig. S7. UV–Vis absorption spectra of black pepper sample (n=3)