Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Detection of tyrosine and monitoring tyrosinase activity using an enzyme cascade-triggered colorimetric reaction

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Table S1 Betalamic acid for the detection of Tyr in artificial urine

Tyr		10% AU	
Added (μM)	**Found (μM)**	**RSD (%)**	**Recovery (%)**
20	19.18	3.01	95.90
40	40.55	0.18	101.39
80	73.26	1.88	91.85
100	88.85	1.20	88.85

Table S2 2-AIPA-BX for the detection of Tyr in artificial urine

Tyr		10% AU	
Added (μM)	**Found (μM)**	**RSD (%)**	**Recovery (%)**
5	5.02	26.58	100.39
10	12.09	2.53	120.89
15	12.57	5.23	117.12
20	22.69	8.21	113.47

Table S3 Comparison of various methods for the detection of Tyr

Method	Linear Range (μM)	LOD (μM)	Analysis duration	Ref.
Fluorometric Assay	0.11-11	0.068	30 min	[1]
Quenching-Chemiluminescence	0.2-20	0.181	3 min	[2]
Phenylalanine Ammonia-Lyase Assay	80-640	5.0	2 h	[3]
Enzyme Cascade-triggered Colorimetric Reaction	5-100	1.102	30 min	This work

Table S4 Comparison of various methods for the detection of tyrosinase

Method	Linear Range (U/mL)	LOD (U/mL)	Analysis duration	Ref.
Electrochemical Sensor	2.5-10	1	20 min	[4]
Fluorometric Assay	0.40-7.0	0.10	2 h	[5]
Colorimetric Assay	0.5-2.5	0.5	1 h	[6]
Enzyme Cascade-Triggered Colorimetric Reaction	1-10	0.072	1 h	This work

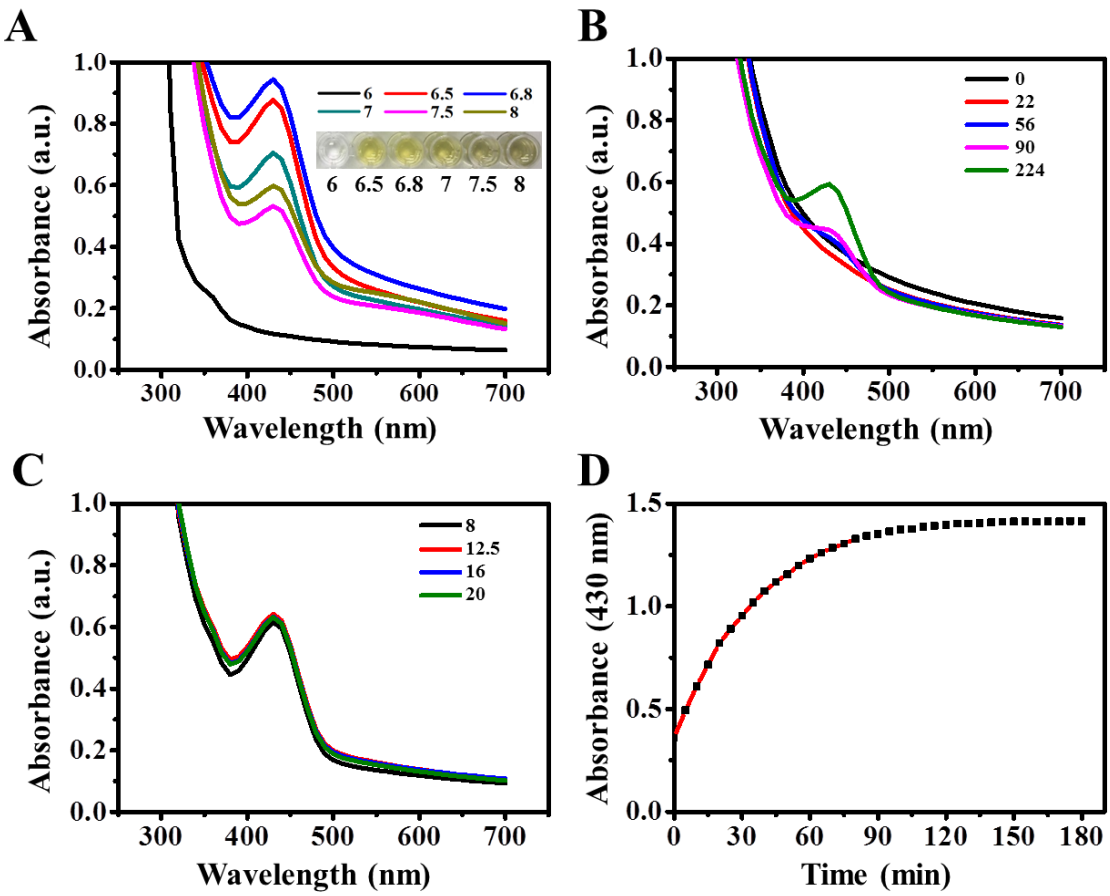

Figure S1 (A) Enzyme cascade reaction mixture was assessed under various pH values with Tyr at 100 μM. (B) Absorption spectra of the reaction mixtures were recorded with various concentrations of tyrosinase (0, 22, 56, 90, and 224 μM) and DOD at 8 μM. (C) Absorption spectra of the reaction mixtures were recorded with various concentrations of DOD (8, 12.5, 16, and 20 μM) and tyrosinase at 224 μM. (D) Absorbance intensities at 430 nm over reaction time-course in the presence of Tyr at 100 μM.

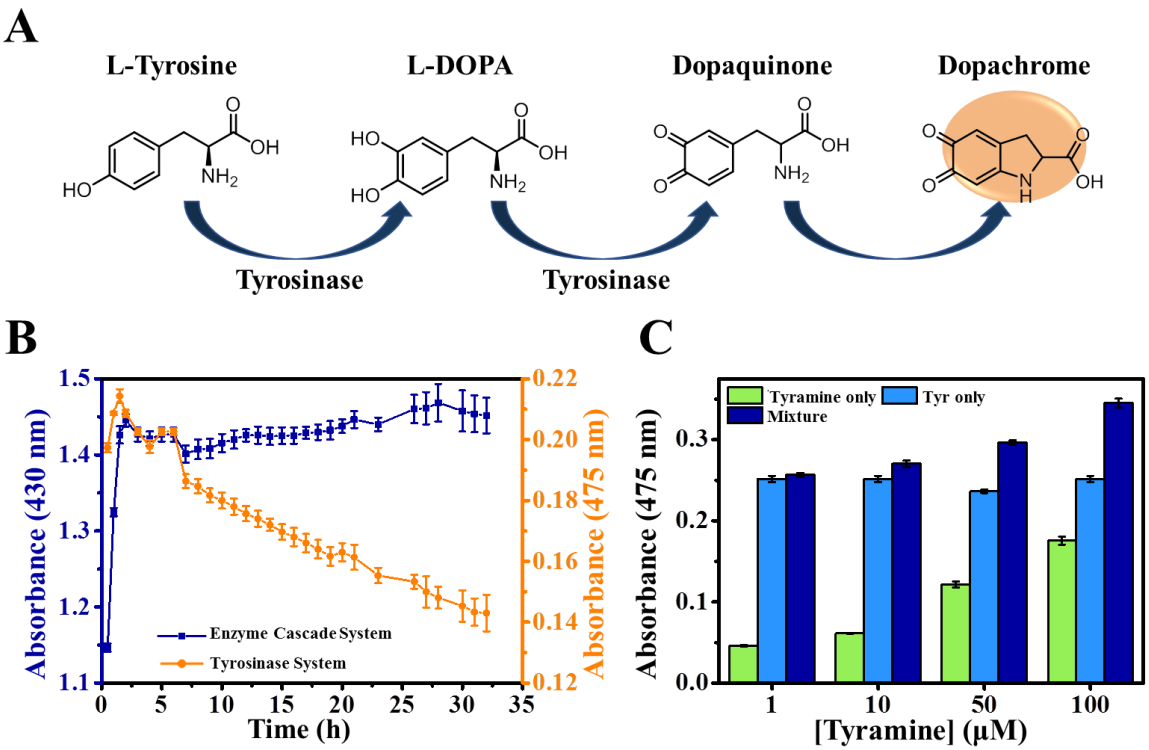

Figure S2 (A) Schematic diagram of dopachrome synthesis. (B) Absorbance intensities at 430 nm (blue line) of the enzyme cascade system and at 475 nm (orange line) of tyrosinase system over reaction time-course in the presence of Tyr at 100 μM. (C) The intensities of λ_{475} in the co-presence of 100 μM Tyr and 1/10/50/100 μM tyramine.

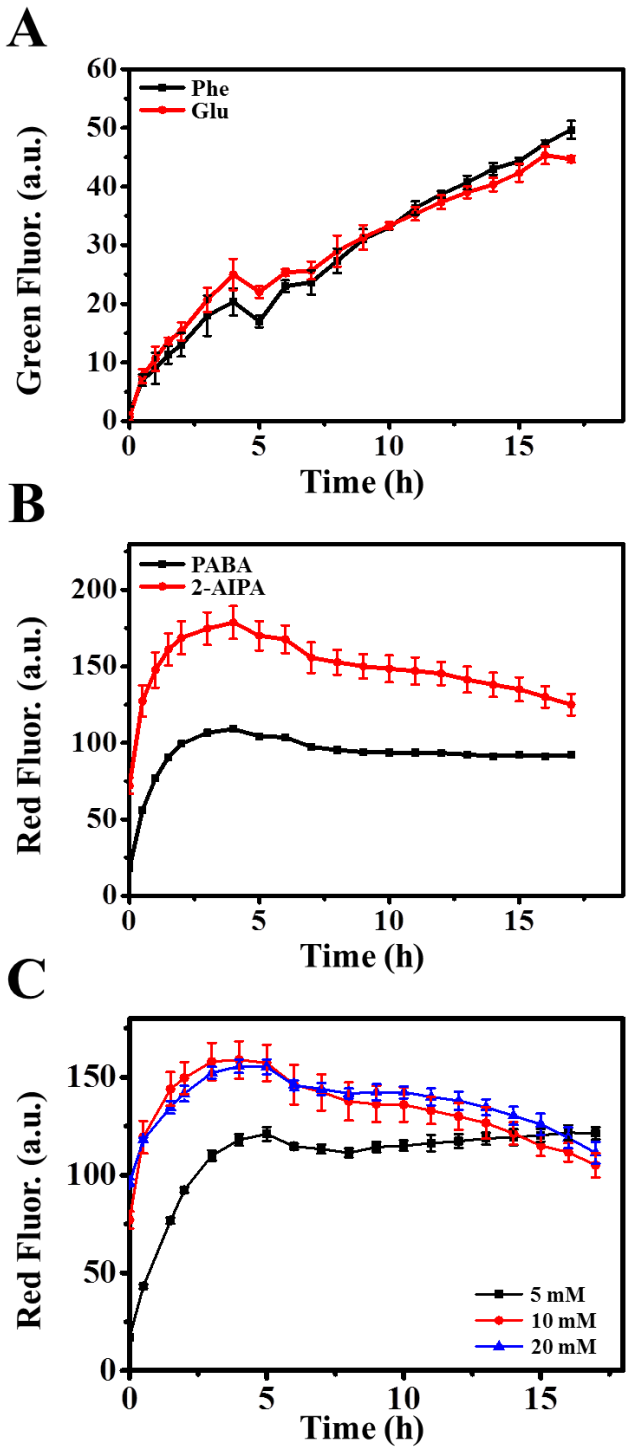

Figure S3 (A) The green fluorescence intensities of Phe- and Glu-betaxathins and (B) the red fluorescence intensities of PABA- and 2-AIPA-betaxanthins at various time points over the reactions. Tyr solution (50 μM) was mixed with amines at 10 mM for the production of betaxanthin molecules. (C) The red intensities of 2-AIPA-betaxanthins with various concentrations of 2-AIPA (5, 10, and 20 mM) over reaction time-course of enzyme cascade in the presence of Tyr at 50 μM.

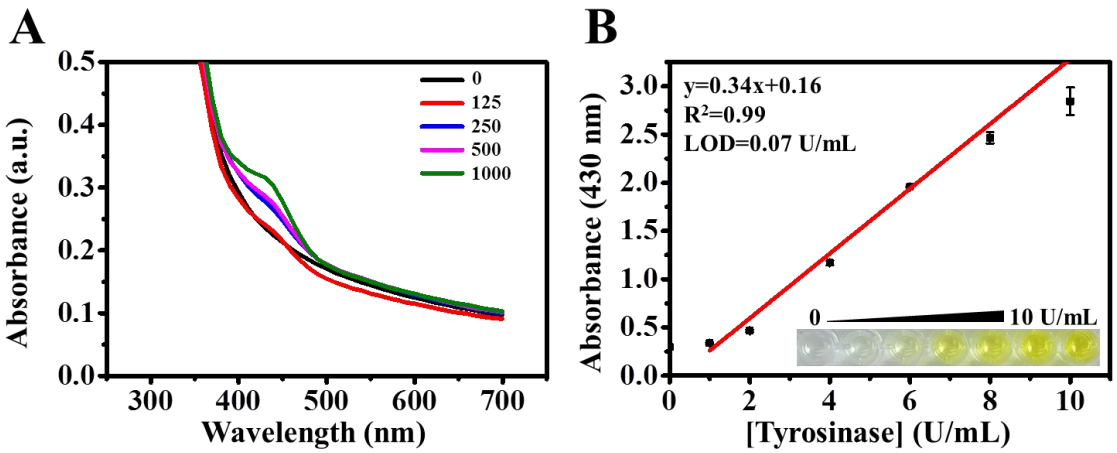

Figure S4 (A) Absorption spectra of the reaction mixtures were recorded with various concentrations of Tyr (0, 125, 250, 500, and 1000 μM) in the presence of DOD at 12.5 μM and tyrosinase at 1.5 U/mL after incubation for a period of 1 h. (B) The linear range for tyrosinase was between 1 and 10 U/mL, and LOD was 0.07 U/mL. The corresponding photograph under the natural light in the presence of tyrosinase.

References

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