Supplementary material

Iron-doped Cu_2O nanozyme enables highly sensitive colorimetric detection of vitamin E in serum

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Actual sample testing

The concentration of vitamin E in human serum samples was detected using the specimen addition method to evaluate the practical application ability of the colorimetric sensor in real samples. Serum was diluted at a ratio of 1:100 for analysis, and an equal volume of methanol was added for vortex mixing. After centrifugation at 12,000 rpm for 10 min, the supernatant was collected for use. This step removed macromolecular interferents from the serum. A certain amount of vitamin E (20, 40, 60 μM) was added to the serum. Then, the UV-vis absorption spectrum of the oxidation product TMB (ox TMB) was measured.

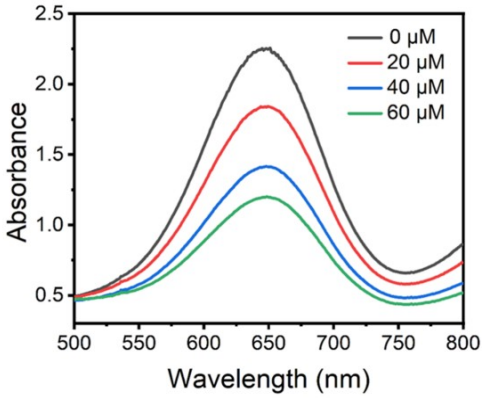

Fig. S1 UV-vis absorption spectra of the oxidation product ox TMB in human serum samples after addition of different concentrations of vitamin E.

Characterization of the compound

Summary of atomic percentages of Cu, C, O, N, and Fe elements, indicating the successful incorporation of Fe into the Cu_2O lattice.

Table S1 EDS elemental mapping results of Fe-Cu_2O nanozyme.

Element	Atom. [%]
Cu	34.68
C	32.48
O	22.05
N	9.89
Fe	0.90
Total	**100.00**

The results obtained from Table S2 showed a recovery rate range of 97.58% to 99.6%. The results indicated that the Fe-Cu_2O-based colorimetric sensor had good accuracy for the detection of vitamin E in serum samples.

Table S2 The results of the standard addition method for measuring the vitamin E content in actual serum samples.

Sample	Added (μM)	Detected (μM)	Recovery (%)
1	20.00	19.92	99.6
2	40.00	35.68	97.58
3	80.00	73.41	91.76