Electronic Supplementary Material (ESI) for Analyst.

Supporting Information for:

Carbon quantum dots directly generated from electrochemical oxidation of graphite electrode in alkaline alcohols and the applications for specific ferric ion detection and cell imaging

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Experimental

Atomic absorption spectrophotometer (AAS) equipped with hollow cathode lamp (HCL) was used for iron determination. The optimum conditions for AAS were applied as follow: wavelength 248.3 nm; HCL current 10 mA; acetylene flow rate 0.5 L/min; air flow rate 4.0 L/min; slit width 0.2 nm.

After the acid pretreatment by hydrochloric acid, iron (Fe^{3+}) at different concentrations (0, 10, 20, 30 and 40 μM) was spiked into the tap water, respectively. The spiked water samples were determined by AAS method under the above analytical conditions. Concentrations of Fe^{3+} were calculated by the standard curve method [S1].

[S1] M. Yaman, G. Kaya, *Anal. Chim. Acta.,*2005, **540**, 77-81.

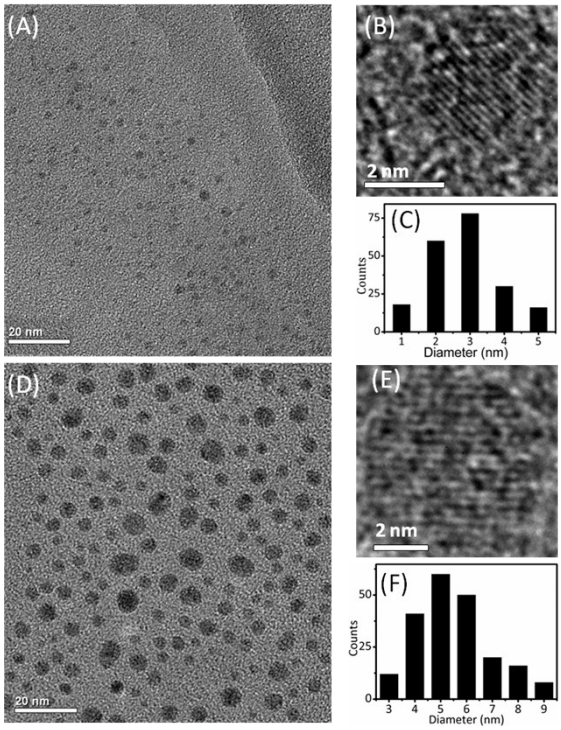

Fig. S1 (A, D) TEM and (B, E) HRTEM images as well as (C, F) size distribution of the colourless CQDs obtained from the potentials of 3 V and 7 V, respectively.

Table S1. Comparison of the working conditions, quantum yield and characteristics of different EC methods for CQDs generation.

Working electrode	Electrolyte	Voltage	Time	Quantum yield	Advantages and disadvantages	References
Graphite electrode	NaOH/ ethanol/H_2O	5 V	3 h	10.8 %	Green, low cost, good reproducibility, but it needed relatively longer time.	this work
3D Graphene	Ionic liquid (IL) $BMIMPF_6$ in acetonitrile	5 V	100 s	/	Shorter time was required for synthesis, but high-cost carbon source was needed.	48
Carbon fibers	acetonitrile containing 0.1 M tetrabutylammonium perchlorate	0.5-2.5 V	2 h	/	Size-selective preparation of C-dots can be achieved only by adjusting the applied potentials, but the used electrolyte is not environment-friendly.	2
Graphite rods	IL [apmim][BF_4] and water	12 V	4 h	11.3 %	IL functionalized carbon nanodots were synthesized, but the IL is relatively high-cost	38
Graphite rods	Ultrapure water	15-60 V	120 h	/	Facile, additive-free, but it needed longer time and higher potentials.	7
Carbon paste electrodes with different compositions	0.1M NaH_2PO_4 aqueous solution	9 V	6 h	/	Shifting and non-shifting fluorescence emissions were observed by changing the compositions of the parent Electrodes, but relatively higher voltage and longer time were needed	33

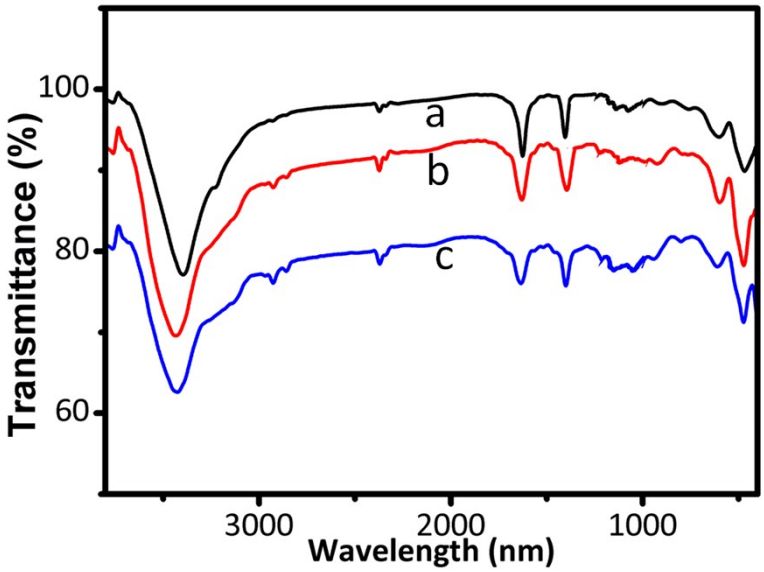

Fig. S2 The FTIR spectra for CQDs upon addition with ions of (a) Cu^{2+}, (b) Cd^{2+} and (c) Ni^{2+}.