

Electronic Supplementary Information

One-pot synthesis of photoluminescent carbon dots by carbonization of cyclodextrin and their application in Ag⁺ detection

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Table S1. Fluorescence quantum yield and product yield of C-dots from different carbohydrates.

| Samples | Quantum yield | Yield |
|----------------|---------------|-------|
| β-Cyclodextrin | 13.5% | 34% |
| Fructose | 11.5% | 8% |
| Glucose | 7.5% | 13% |
| Citrate | — | — |

Table S2. The yield of C-dots from β-cyclodextrin at different temperatures

| Temperature (°C) | 50 | 60 | 70 | 80 | 90 |
|------------------|----|----|----|----|----|
| Yield (%) | 0 | 16 | 34 | 23 | 11 |

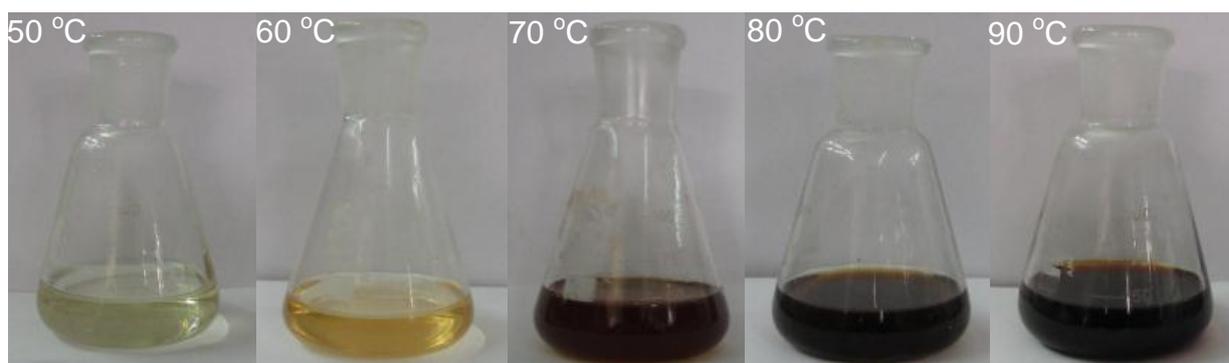


Figure. S1. Photographs of solutions with β -cyclodextrin (2 g), hydrochloric acid (15 mL, 36-38 wt.%) and deionized water (15 mL) at different temperatures for 4 h.

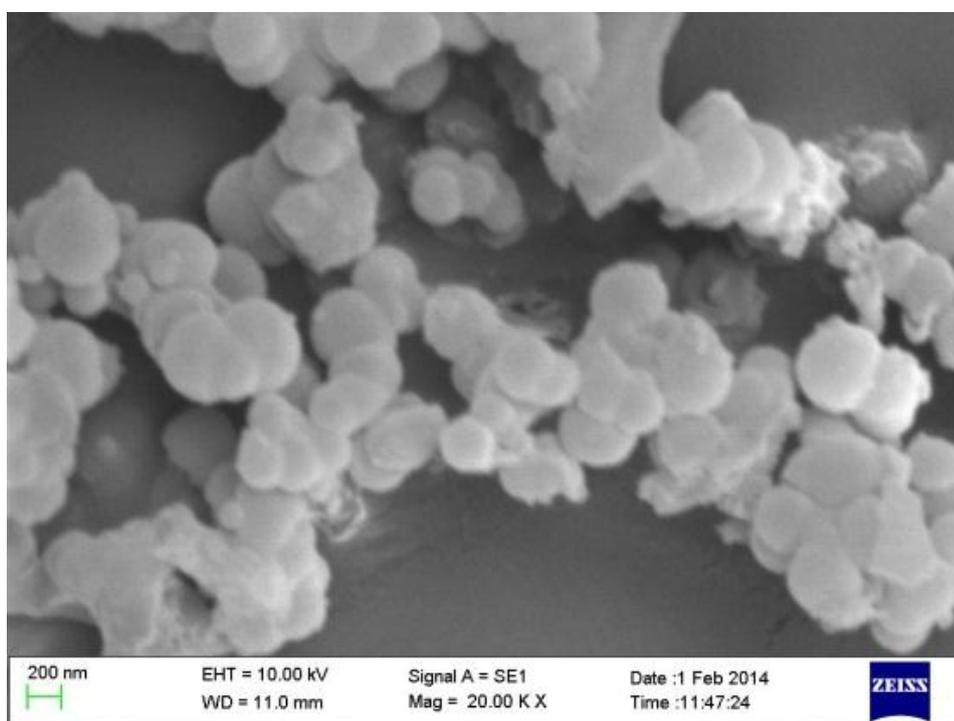


Figure. S2. Carbon spheres formed by further dehydration and aggregation of C-dots.

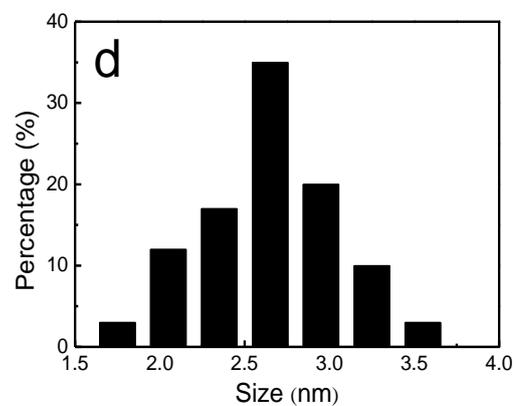
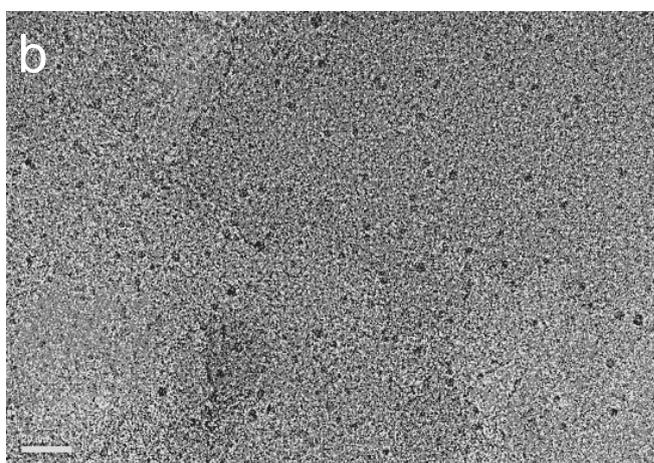
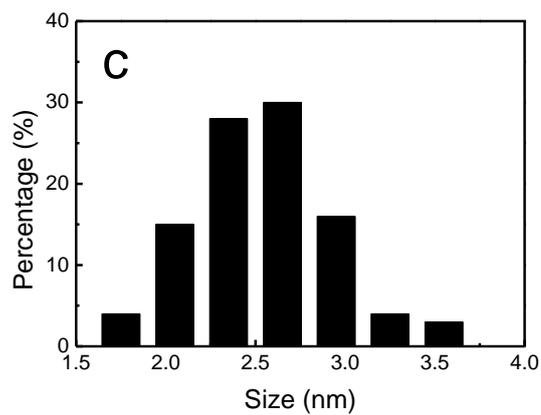
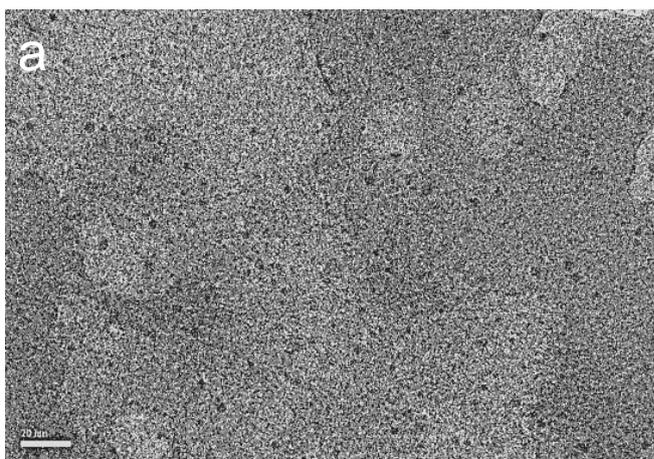


Figure. S3. (a,b) TEM images and (c,d) size histograms (counting 100 particles at least) of C-dots synthesized from α and γ -cyclodextrins, respectively. Scale bars in a,b: 20 nm..

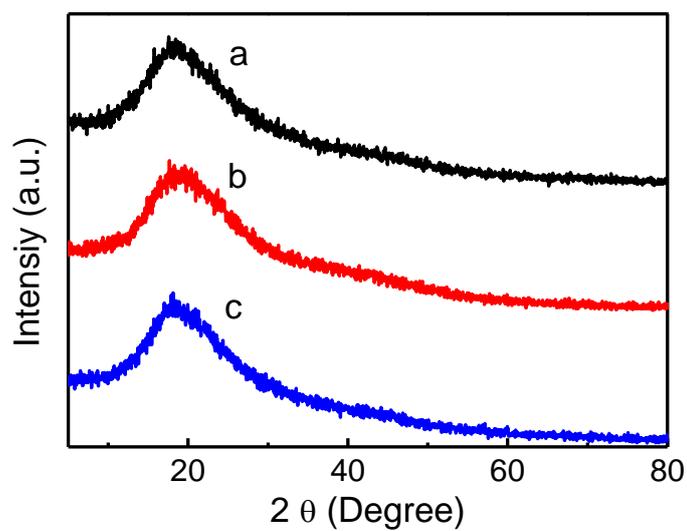


Figure. S4. (a-c) XRD patterns of C-dots synthesized from α , β and γ -cyclodextrins, respectively.

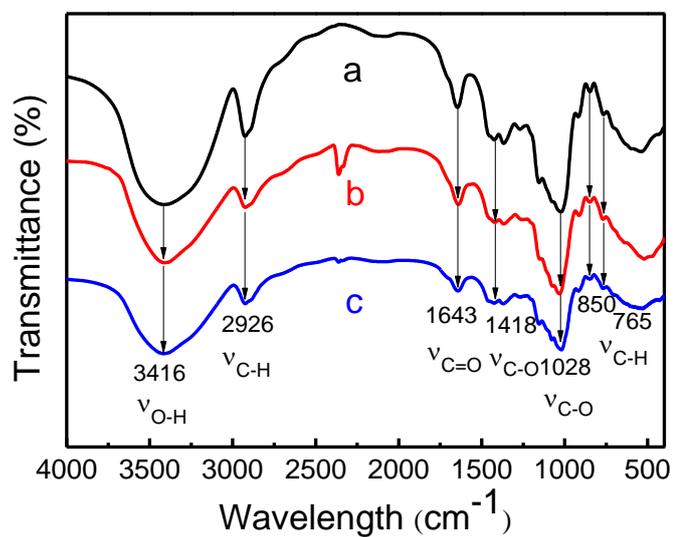


Figure. S5. (a-c) FT-IR spectra of C-dots synthesized from α , β and γ -cyclodextrins, respectively.

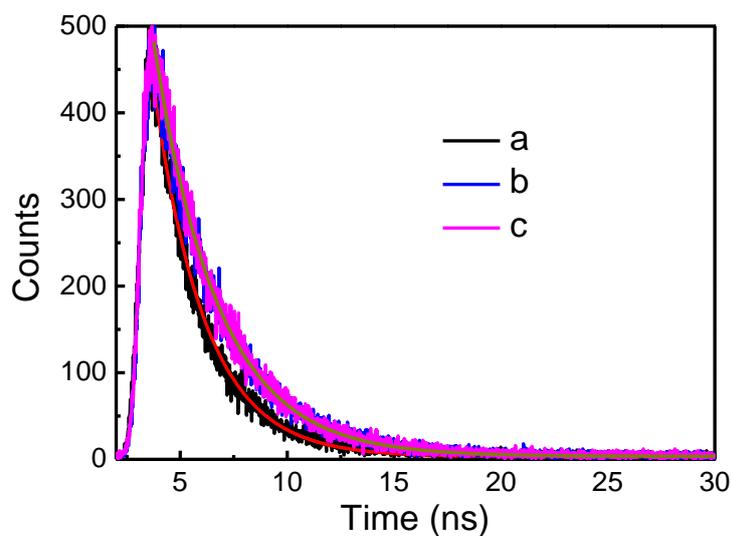


Figure. S6. (a-c) Fluorescence decay profiles of C-dots synthesized from α , β and γ -cyclodextrins, respectively.

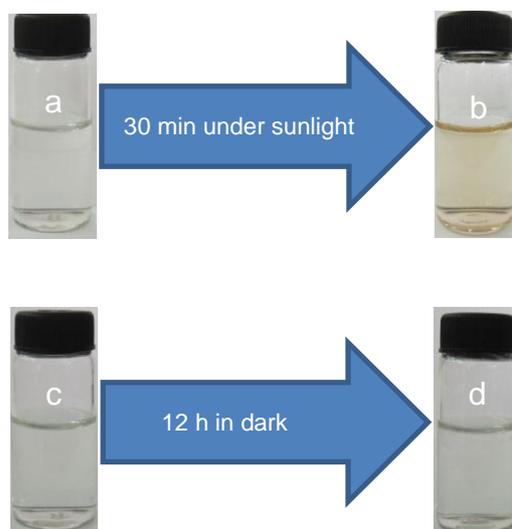


Figure. S7. (a, b) Photographs of C-dots (200 mg/L) and AgNO_3 (200 μM) mixture before and after reaction under sunlight for 30 min. (c,d) Photographs of C-dots (200 mg/L) and AgNO_3 (200 μM) mixture before and after reaction in dark for 12h.

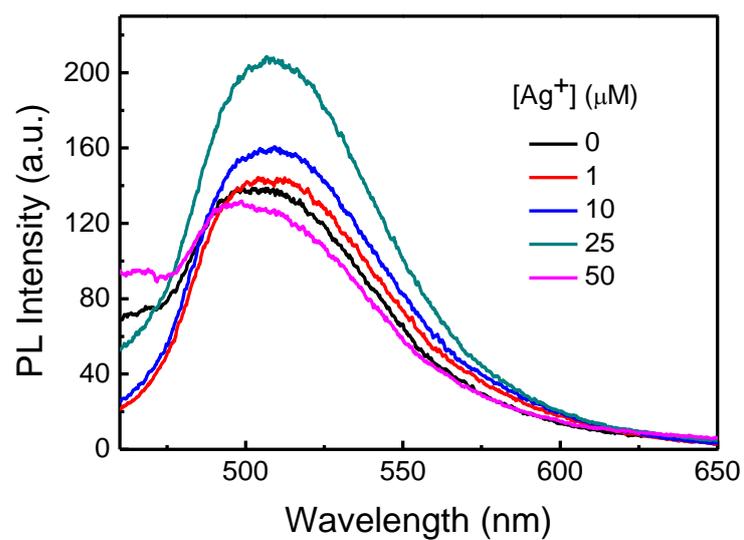


Figure. S8. Representative FL emission spectra of aqueous solutions of C-dots (100 mg/L) and AgNO_3 with different concentrations (0-25 μM) after 30 min under sunlight.

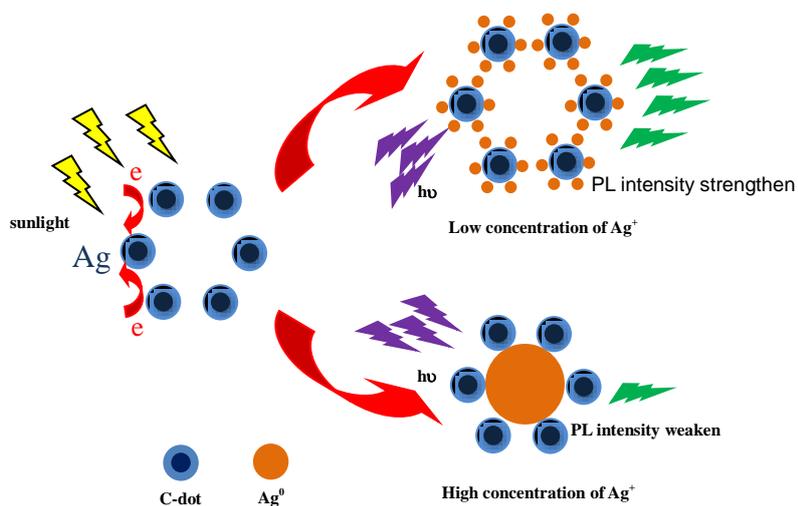


Figure. S9. Schematic representation of reduction of Ag^+ to Ag^0 by C-dots under sunlight.

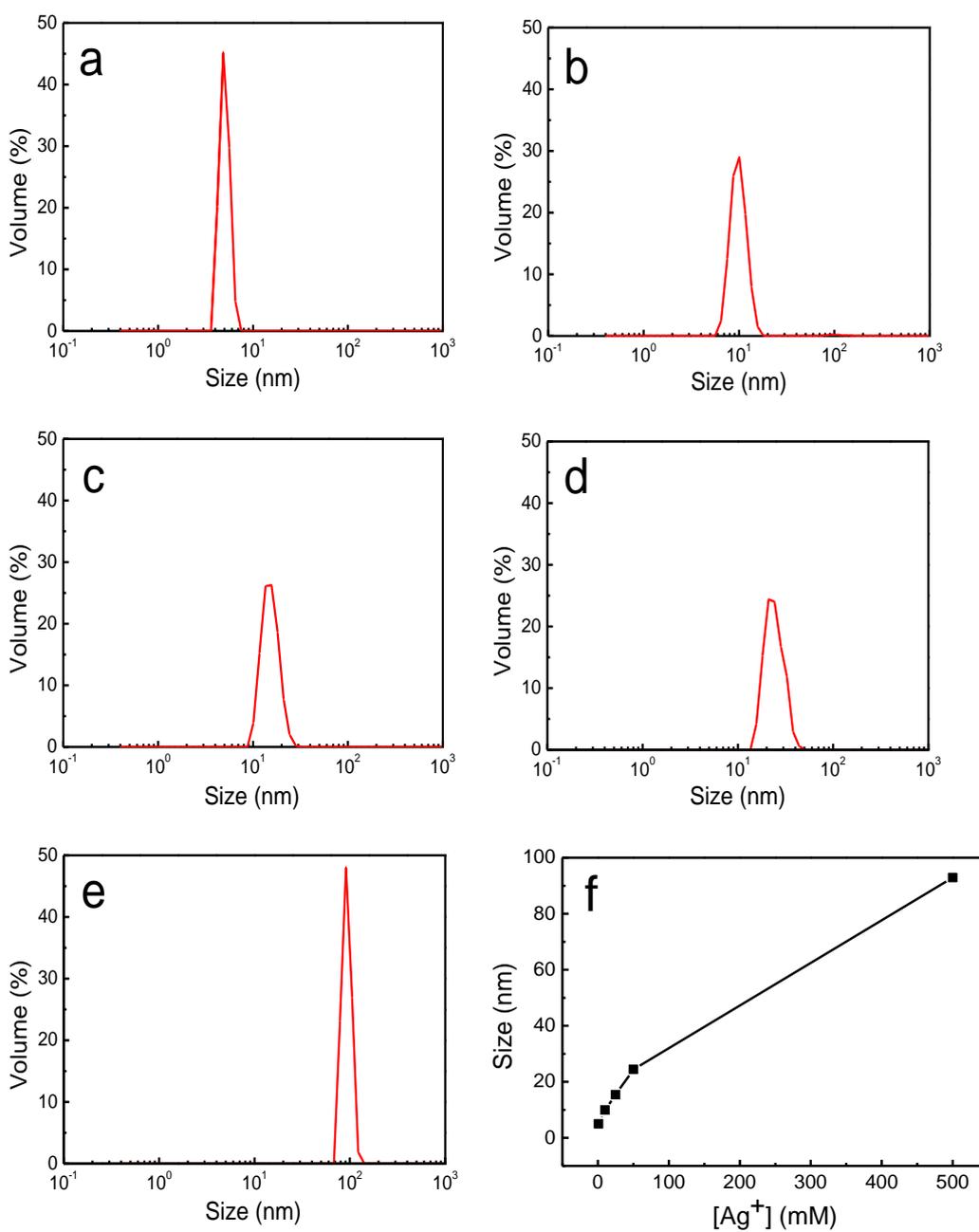


Figure. S10. Size distribution of C-dots (100 mg/L) with different concentrations of AgNO_3 after 30 min under sunlight: (a) 1, (b) 10, (c) 25, (d) 50, (e) 500 μM . (f) The relationship between the average particle size and AgNO_3 concentration.