

Electronic Supplementary Information

A preparation strategy of carbon dots with multicolor and embedded in silicone for latent fingerprints and detection of AcO⁻

Tingzhong Li,^a Qinglu Yu,^b Zhuang Du,^c Jie Gao,^c Dong Lu,^d Rui Liang,^e and Guoxing Sun^{*ab}

^a Zhuhai UM Science & Technology Research Institute, Zhuhai 519031, China.

^b Joint Key Laboratory of the Ministry of Education, Institute of Applied Physics and Materials Engineering, University of Macau, Macau SAR, 999078, China.

^c Guangzhou Lushan New Materials Co., Ltd., Guangzhou 510640, China.

^d Guangzhou HKUST Fok Ying Tung Research Institute, Guangzhou 510640, China

^e Department of Engineering Science, Faculty of Innovation Engineering, Macau University of Science and Technology, Macau SAR, 999078, China.

Corresponding author: gxsun@um.edu.mo

Table of Contents

- 1. Fig. S1** Photographs of CDs before and after being wrapped with organic silicon (heat them at 70 °C to curing). ① blank sample (pure KH560), ② contrast sample (KH560+urea+CA, without CDs), ③-⑤ sample of b-CDs, y-CDs and r-CDs.
- 2. Fig. S2** (A) photostability of s-y-CDs and y-CDs under UV lamp. (B) Photography of s-y-CDs soaked in ionic solution for 24 hours. Ionic solution concentration: 0.4M; excitation wavelength: 365 nm.
- 3. Fig. S3** The fluorescence stability of y-CDs in different temperature(A), pH(B). CDs solution concentration: 0.1mg/mL. excitation wavelength: 360 nm (y-CDs).
- 4. Fig. S4** The fluorescence of (A)b-CDs, (B)y-CDs and (C)r-CDs in different solution. CDs solution concentration: 0.1mg/mL. excitation wavelength: 351 nm (b-CDs), 360 nm (y-CDs), 500 nm (r-CDs).
- 5. Fig. S5** FTIR spectra of (A)KH560, b-CDs, s-b-CDs, os-b-CDs, (B)KH560, y-CDs, s-b-CDs, os-y-CDs, (C)KH560, r-CDs, s-r-CDs, os-r-CDs, (D) b-CDs, y-CDs, r-CDs.
- 6. Fig. S6** TEM (A-C) and particle size distributions (A'-C') of b-CDs, y-CDs and r-CDs.
- 7. Table S1** The Functional groups of CDs powders in XPS analysis.
- 8. Fig. S7** (A) Photographs and (B) gray value/distribution curve of os-b-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.
- 9. Fig. S8** (A) Photographs and (B) gray value/distribution curve of os-y-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.
- 10. Fig. S9** (A) Photographs and (B) gray value/distribution curve of os-r-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, (PE) and label under UV light, respectively.

11. **Fig. S10** (A) Photographs and (B) gray value/distribution curve of stamp-pad ink stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.

12. **Fig. S11** Photograph of γ -CDs in water and addition of different ion (300 μ M) under daylight and UV lamp. CDs solution concentration: 0.1mg/mL; excitation wavelength: 365 nm.

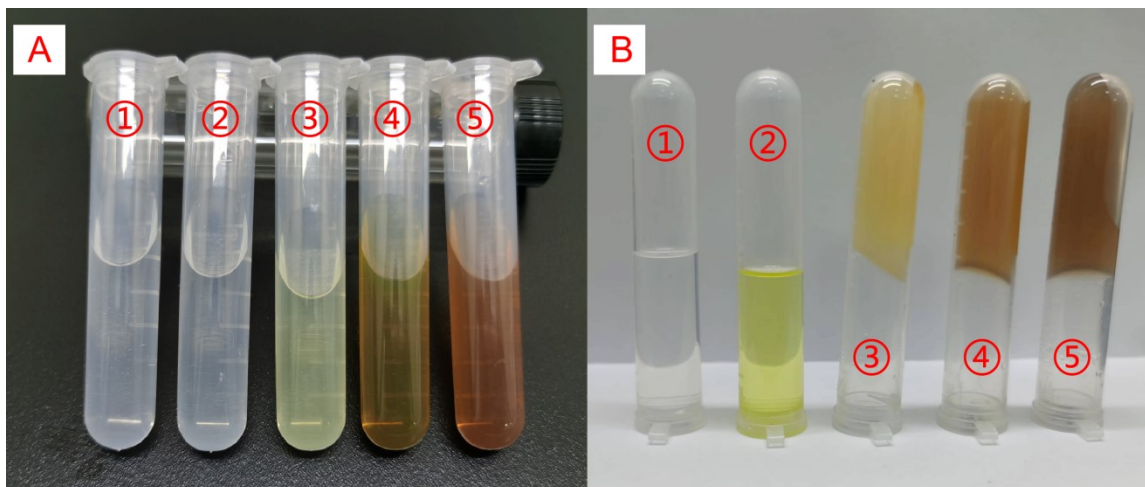


Fig. S1 Photographs of CDs before and after being wrapped with organic silicon (heat them at 70 °C to curing). ①blank sample (pure KH560), ②contrast sample (KH560+urea+CA, without CDs), ③-⑤ sample of b-CDs, γ -CDs and r-CDs.

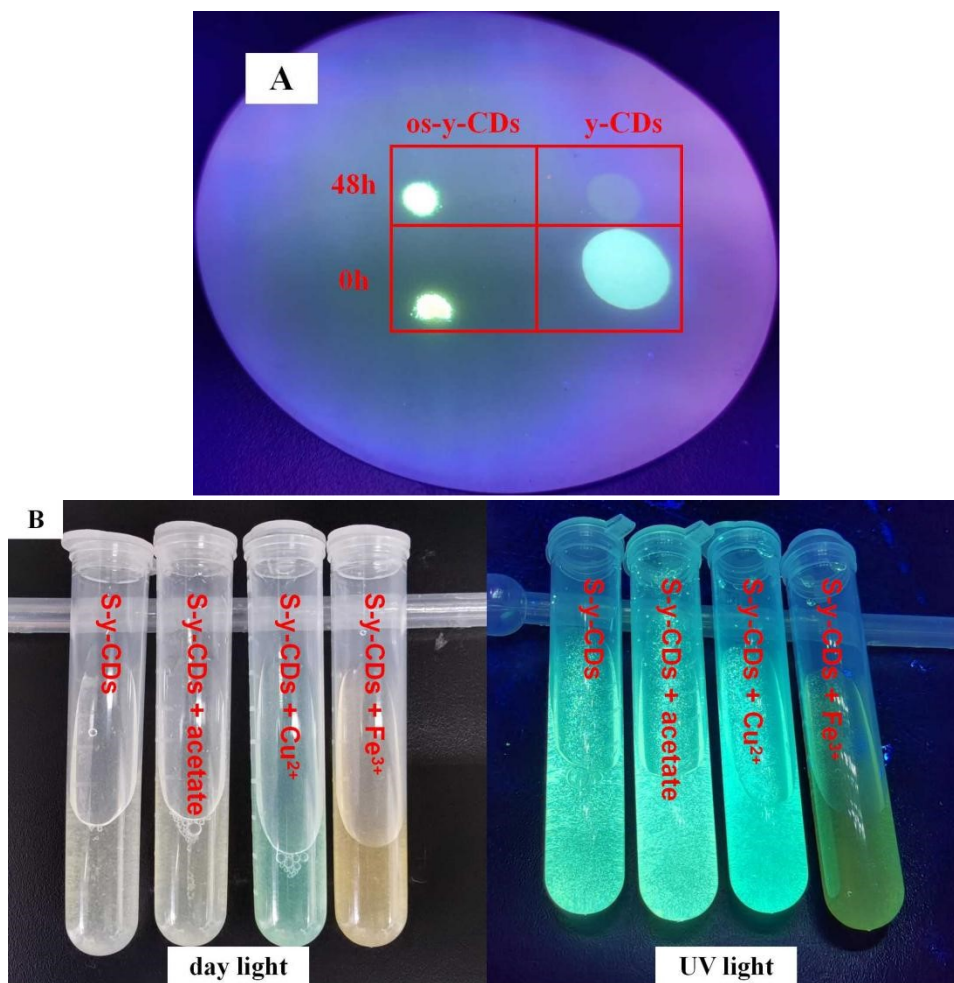


Fig. S2 (A) photostability of s-y-CDs and y-CDs under UV lamp. (B) Photography of s-y-CDs soaked in ionic solution for 24 hours. Ionic solution concentration: 0.4M; excitation wavelength: 365 nm.

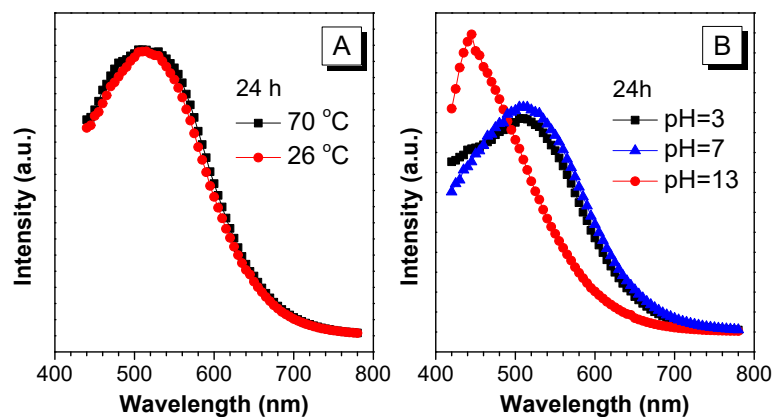


Fig. S3 The fluorescence stability of γ -CDs in different temperature(A), pH(B). CDs solution concentration: 0.1mg/mL. excitation wavelength: 360 nm (γ -CDs).

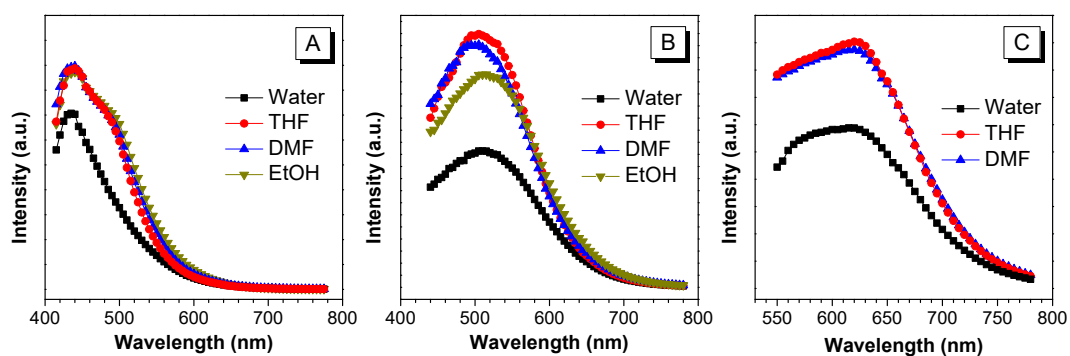
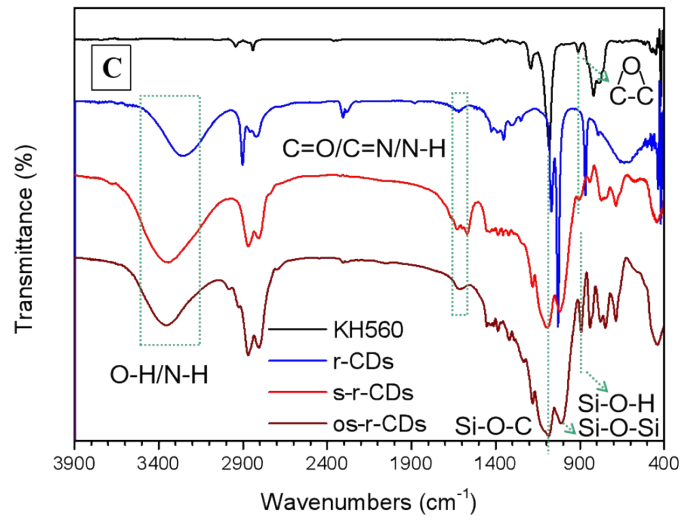
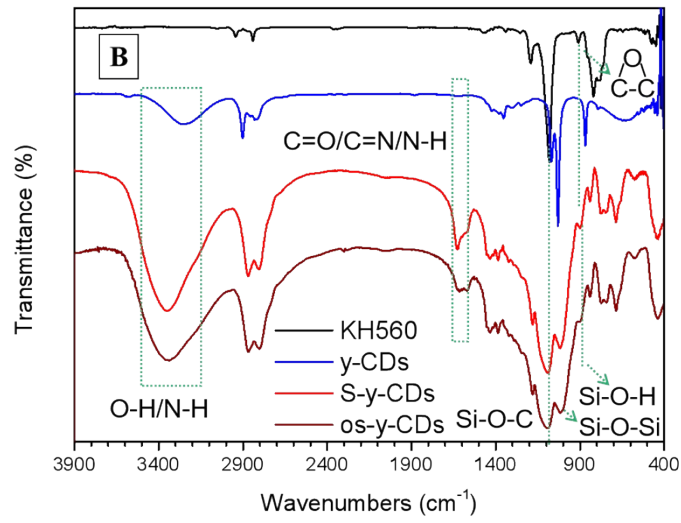
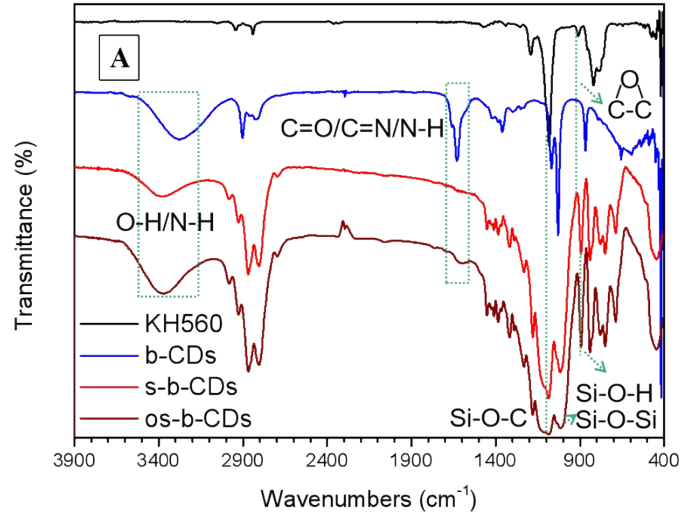


Fig. S4 The fluorescence of (A)b-CDs, (B) γ -CDs and (C)r-CDs in different solution. CDs solution concentration: 0.1mg/mL. excitation wavelength: 351 nm (b-CDs), 360 nm (γ -CDs), 500 nm (r-CDs).



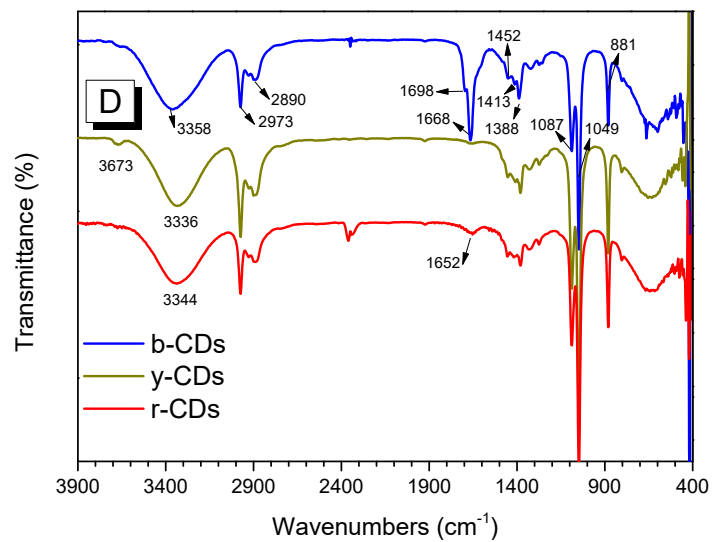


Fig. S5 FTIR spectra of (A)KH560, b-CDs, s-b-CDs, os-b-CDs, (B)KH560, y-CDs, s-b-CDs, os-y-CDs, (C)KH560, r-CDs, s-r-CDs, os-r-CDs, (D)b-CDs, y-CDs, r-CDs

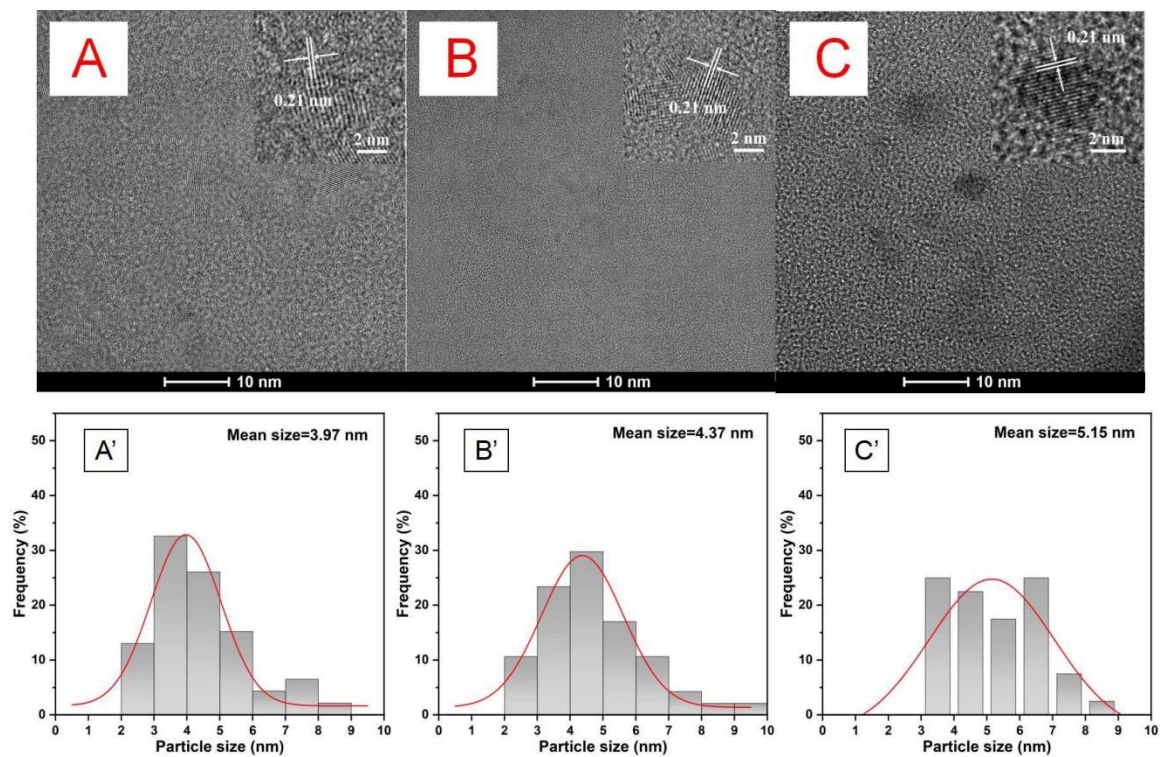


Fig. S6 TEM (A-C) and particle size distributions (A'-C') of b-CDs, y-CDs and r-CDs.

Table S1 The Functional groups of CDs powders in XPS analysis.

Element	Functional group	b-CDs	y-CDs	r-CDs
C1s	C-C/C=C	32.68%	23.68%	34.66%
	C-N	20.85%	20.28%	29.83%
	C-O	7.97%	16.62%	12.76%
	C=O/C=N	4.50%	27.72%	8.48%
	COOH	33.99%	11.69%	14.27%
N1s	Pyridinic N	24.49%	26.95%	28.68%
	Amino N	49.72%	35.29%	24.74%
	Pyrrolic N	16.75%	26.01%	27.17%
	GraphiticN	9.05%	11.75%	19.40%
O1s	C-O	67.73%	55.12%	54.46%
	C=O	32.27%	44.88%	45.54%

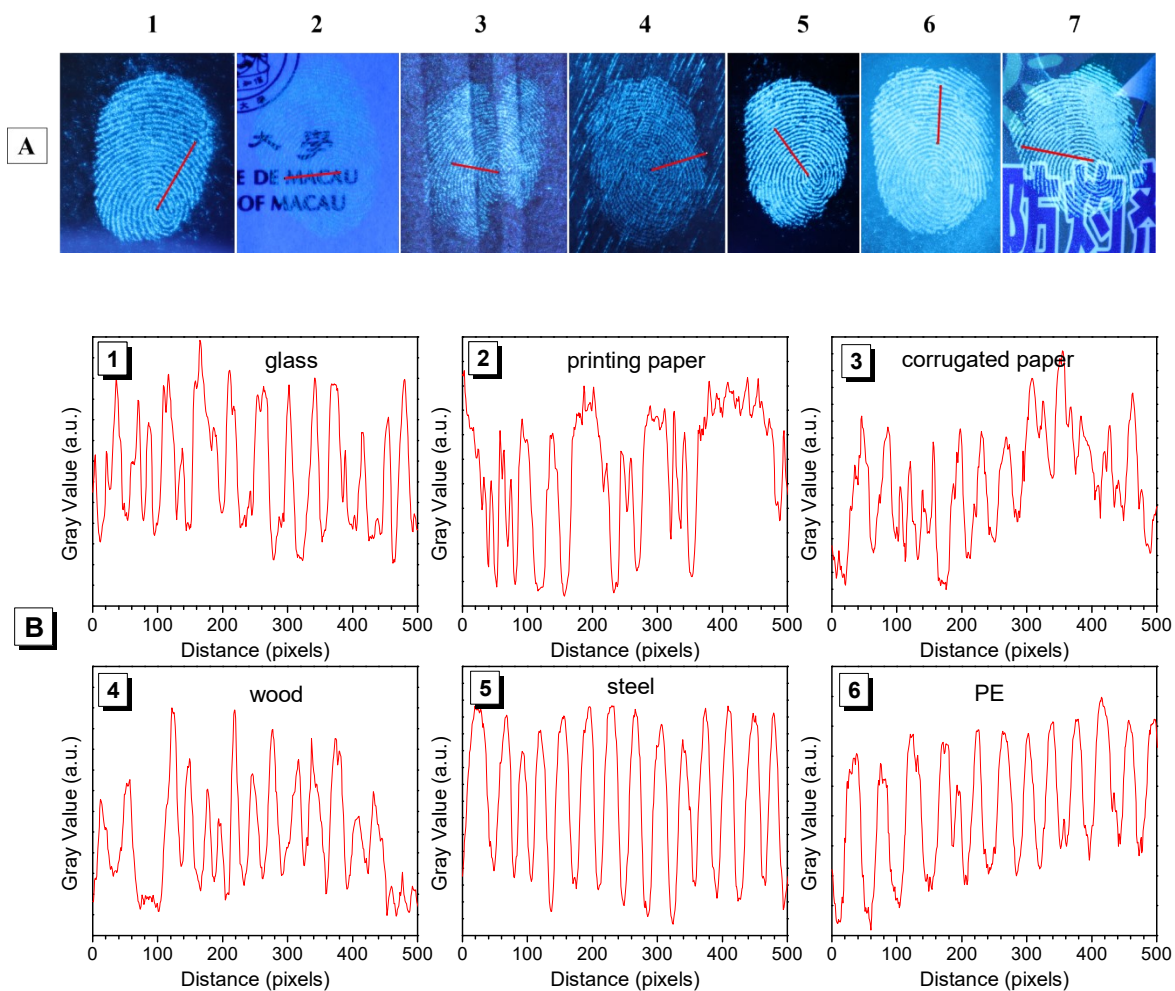


Fig. S7 (A) Photographs and (B) gray value/distribution curve of os-b-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.

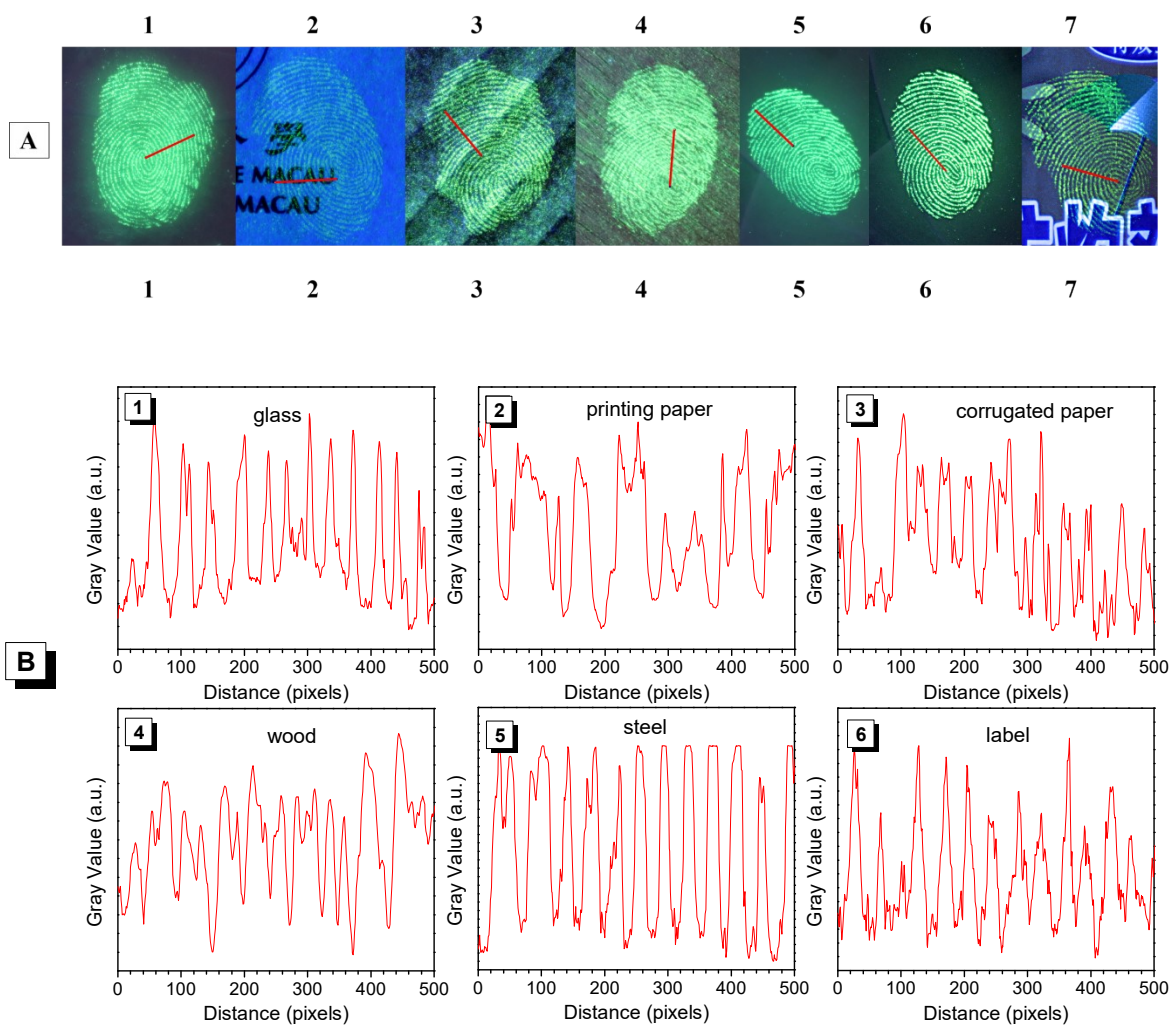


Fig. S8 (A) Photographs and (B) gray value/distribution curve of os-y-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.

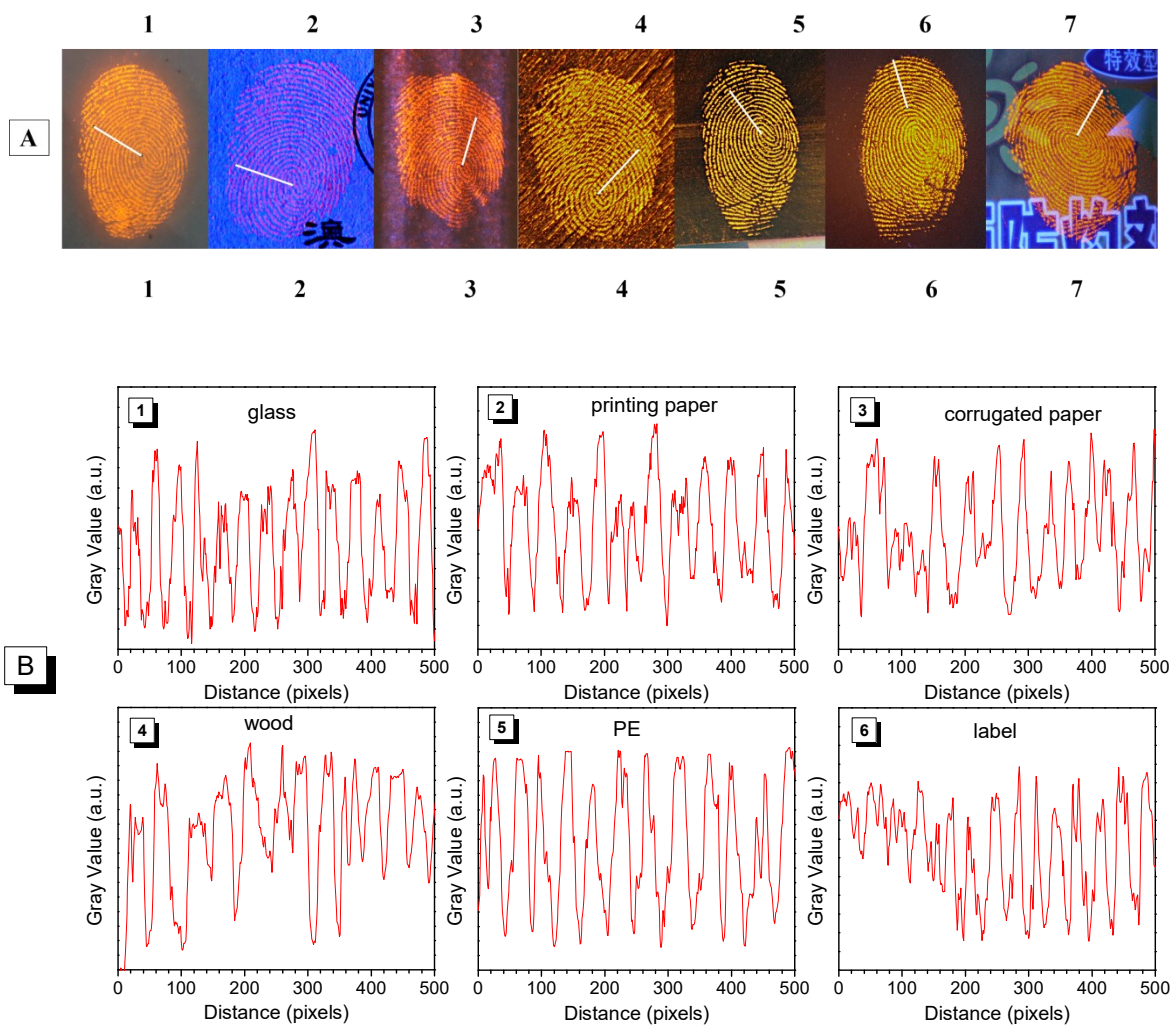


Fig. S9 (A) Photographs and (B) gray value/distribution curve of os-r-CDs powder stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, (PE) and label under UV light, respectively.

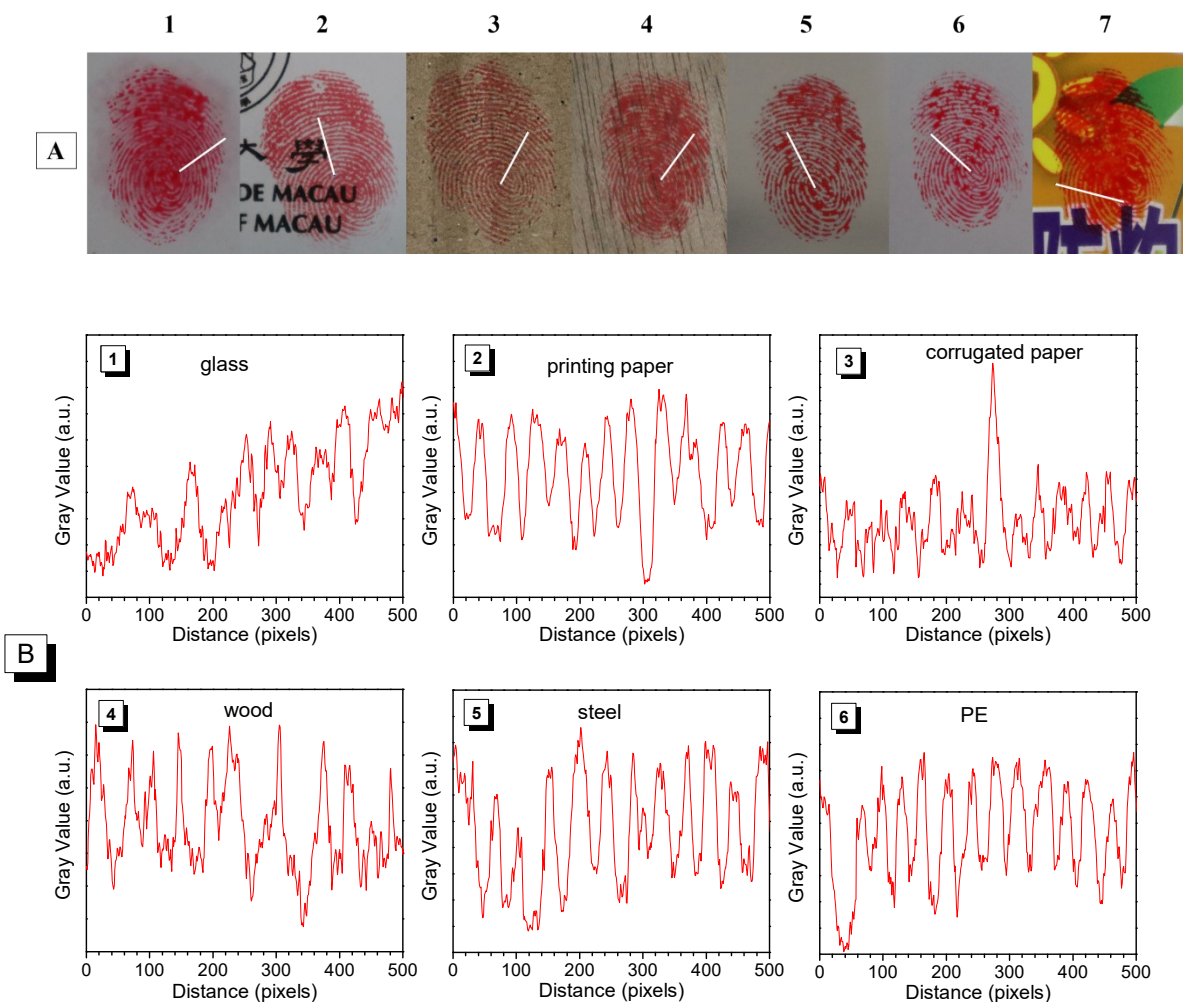


Fig. S10 (A) Photographs and (B) gray value/distribution curve of stamp-pad ink stained fingerprints on glass sheet, printing paper, corrugated paper, wood, steel, PE (and label) under UV light, respectively.

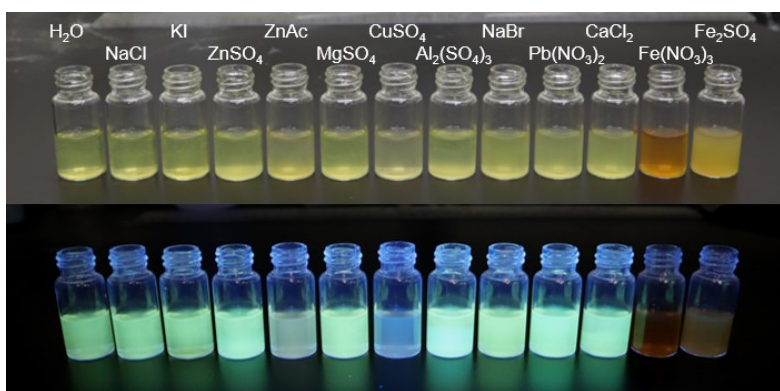


Fig. S11 Photograph of y-CDs in water and addition of different ion (300 μ M) under daylight and UV lamp. CDs solution concentration: 0.1mg/mL; excitation wavelength: 365 nm.