

Simple Synthesis of Carbon Dots/Organosilicon Composites with Tunable Solid-State Emission and Size for Accurate Latent Fingerprint Identification

Xiyue Cao ^a, Jiashi Chen ^a, Yue Chen ^a, Xuanfeng Jiang ^a, Wen Fan ^a, Huijuan Ma ^b, Zhengguang Sun ^{*a}
and Yuan Zhan ^{*a}

a. Key Laboratory for the Green Preparation and Application of Functional Materials, Ministry of
Education, Hubei Key Laboratory of Polymer Materials, School of Materials Science and Engineering,
Hubei University, Wuhan 430062, China.

b. Hubei Three Gorges Laboratory, Yichang 443000, China.

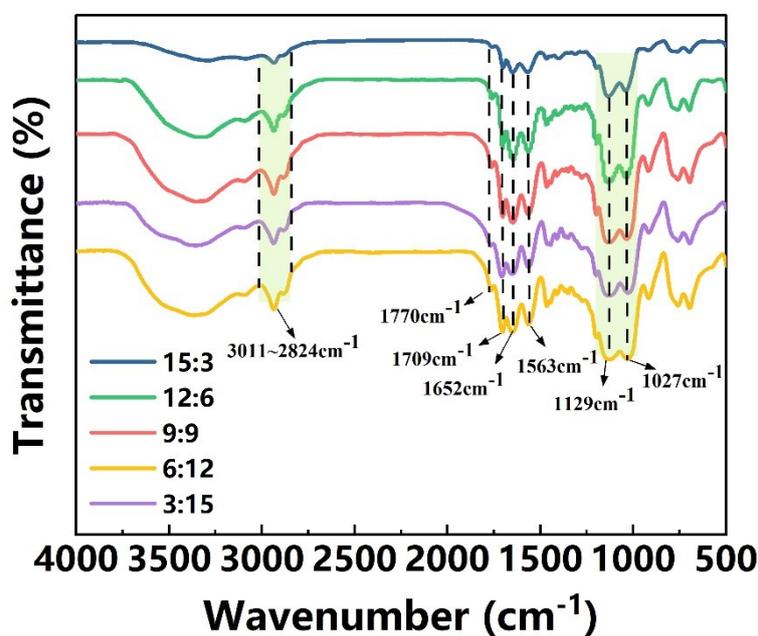


Fig. S1. FT-IR image of CDs-OSi at different H₂O/EtOH volume ratios.

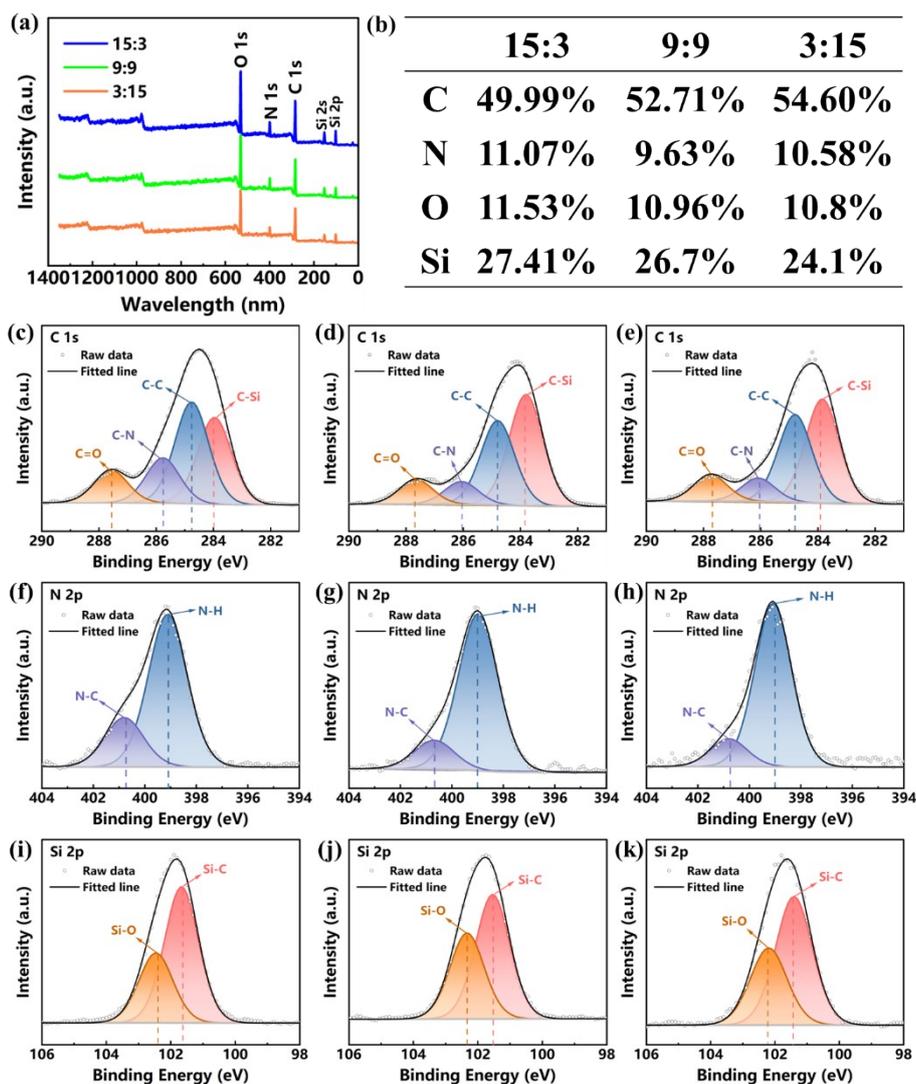


Fig. S2. (a) The full survey of XPS spectra and (b) component element content of CDs-OSi. The high resolution XPS C 1s, N 1s and Si 2p spectra of the CDs-OSi prepared at H₂O/EtOH volume ratios of (c-d)15:3, (f-h) 9:9 and (i-k) 3:15.

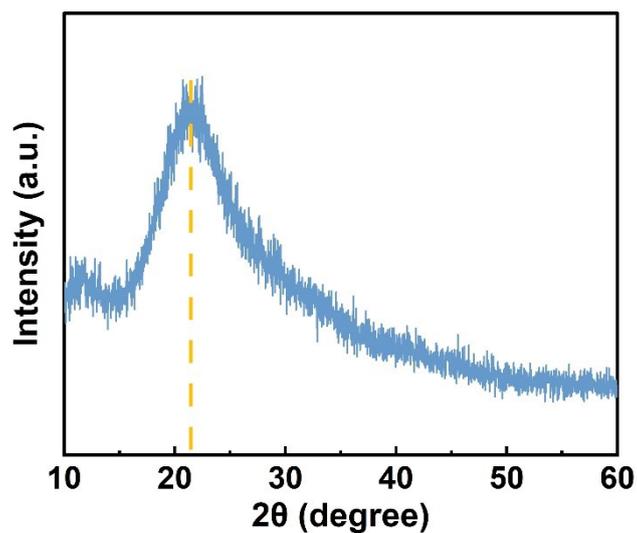


Fig. S3. The XRD pattern of the CDs-OSi composites prepared at H₂O/EtOH volume ratios of 15:3.

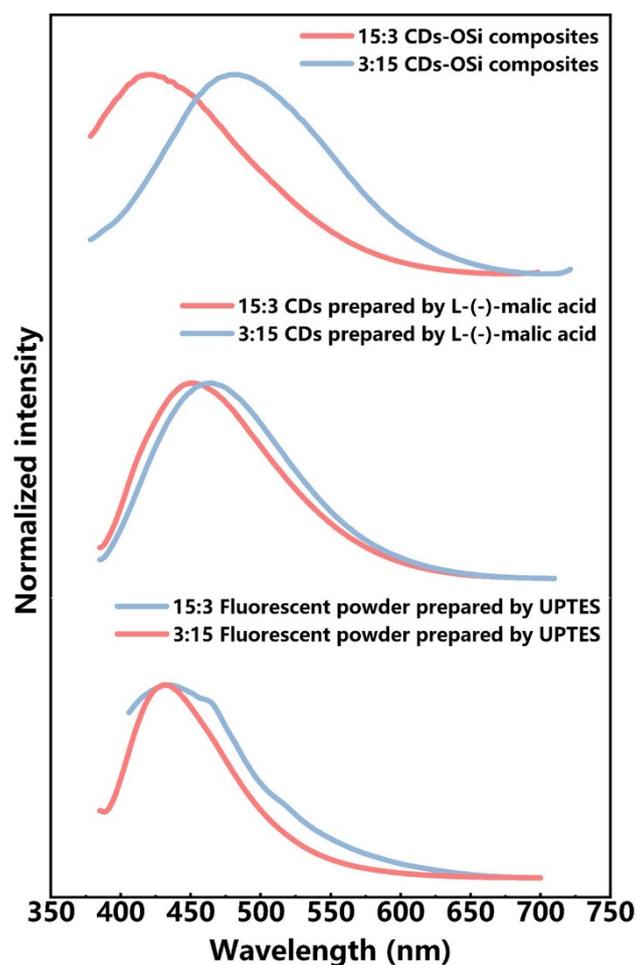


Fig. S4. The PL emission spectra of CDs-OSi composites, CDs and fluorescent powder prepared at H₂O/EtOH volume ratios of 15:3 and 3:15 under 365 nm.

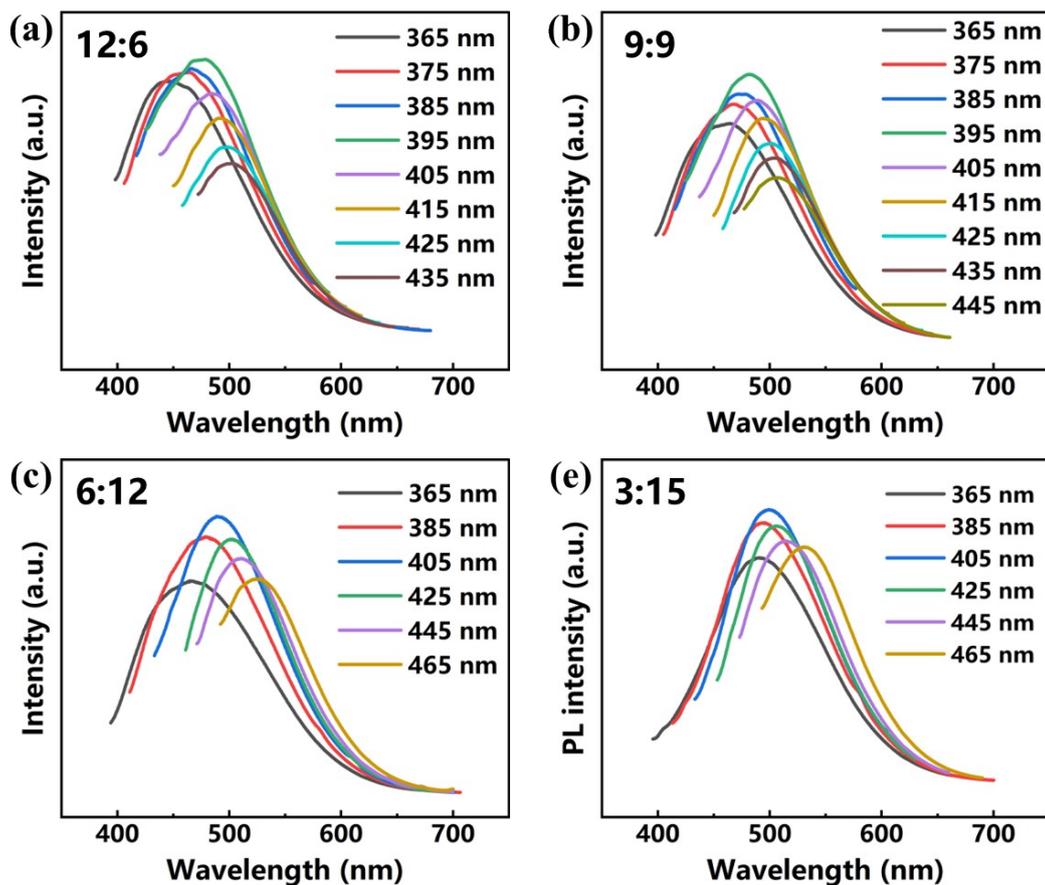


Fig. S5. The PL emission spectra of CDs-OSi at different H₂O/EtOH volume ratios of (a) 12:6, (b) 9:9, (c) 6:12, and (d) 3:15 under different excitation wavelengths.

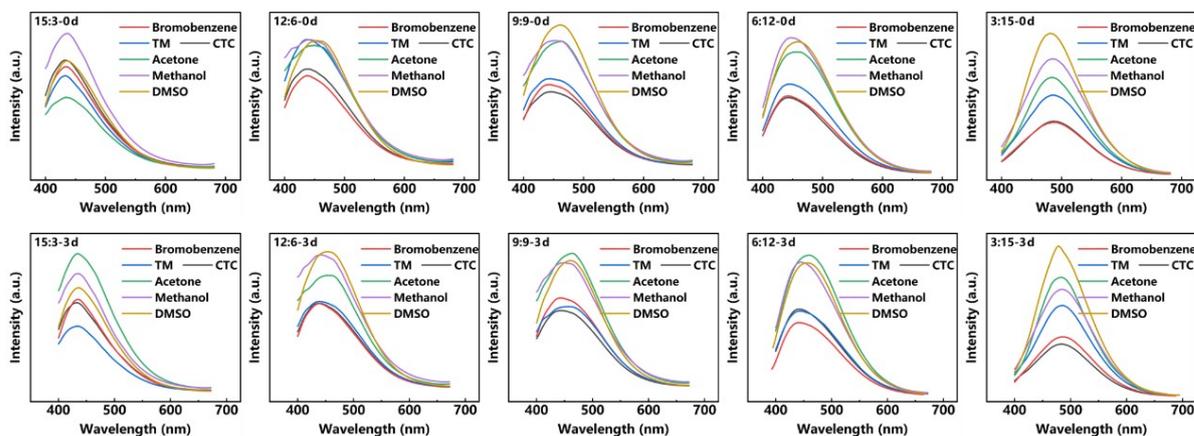


Fig. S6. The PL emission spectra of CDs-OSi at different H₂O/EtOH volume ratios in various organic solvents at the beginning and after three days.

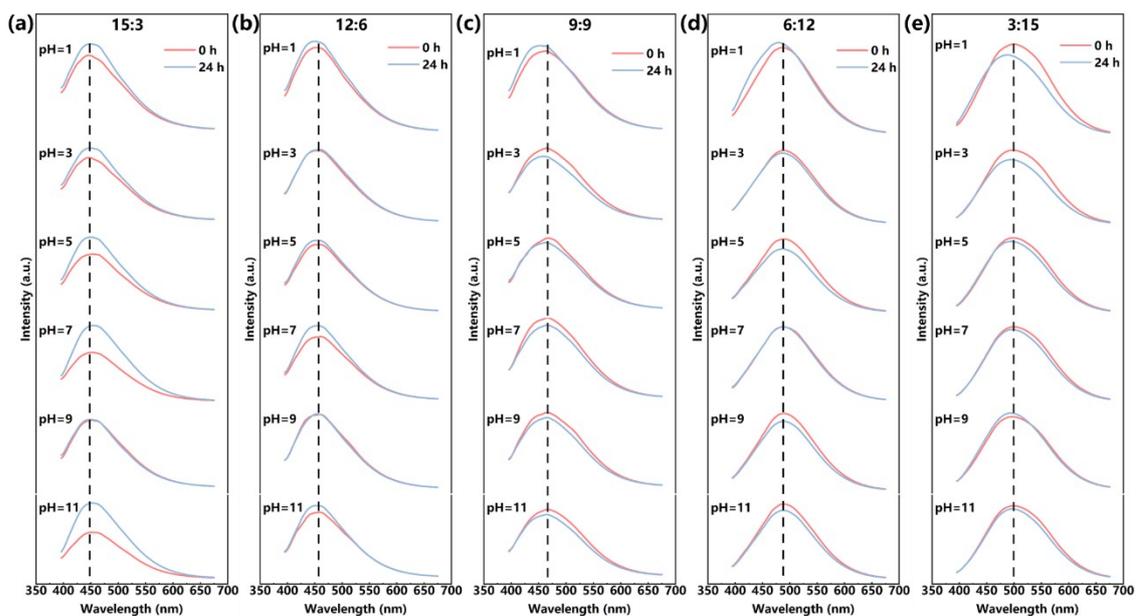


Fig. S7. The PL emission spectra of CDs-OSi treated in the pH range of 1-11 at the beginning and after 24 h.

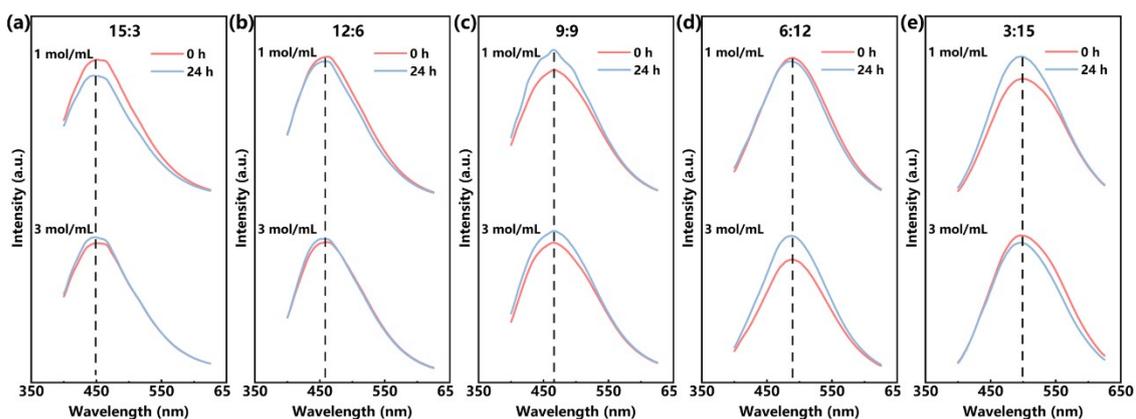


Fig. S8. The PL emission spectra of CDs-OSi treated in 1 mol/mL or 3 mol/mL of KCl solution at the beginning and after 24 h.

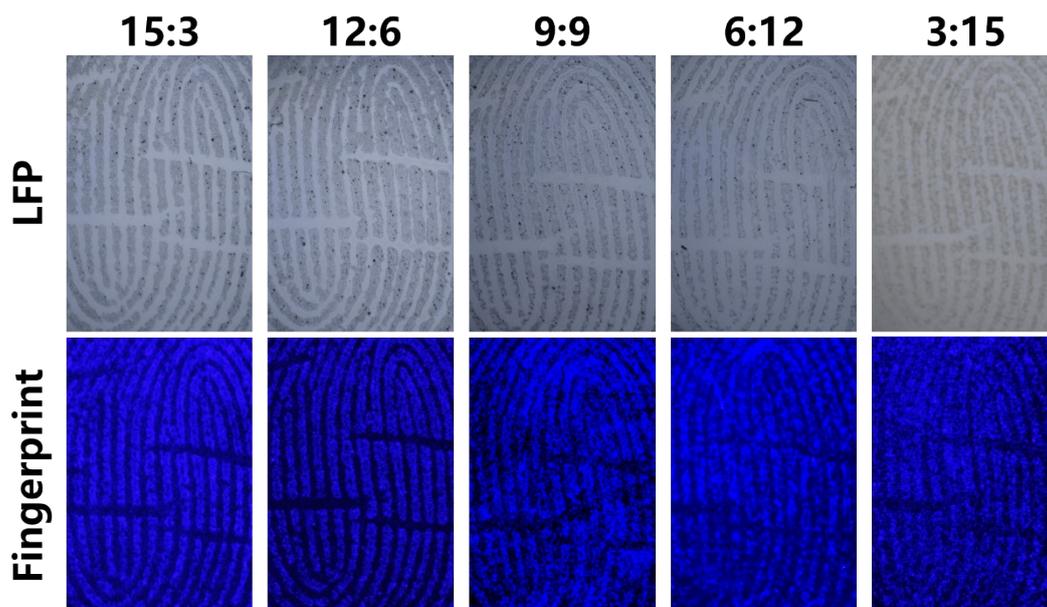


Fig. S9. The parts images of the LFPs and their fingerprint patterns after 5 days of at 40 °C by using stereoscopic microscope.

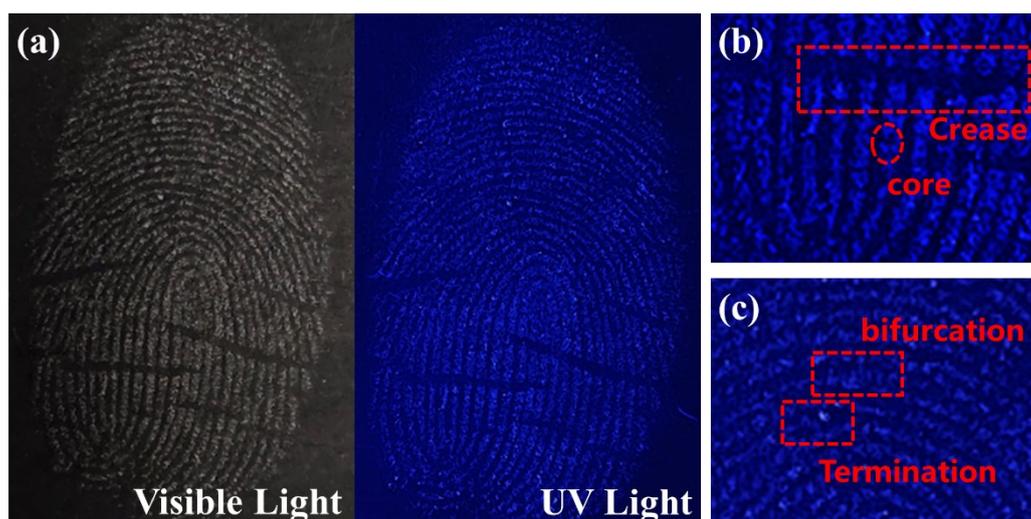


Fig. S10. The fingerprints developed by CDs-OSi composites prepared with H₂O/EtOH volume ratio of 12:6 and captured by iPhone. (a)The optical images and (b, c) the image detail characteristics of the fingerprints treated by the flowed EtOH.

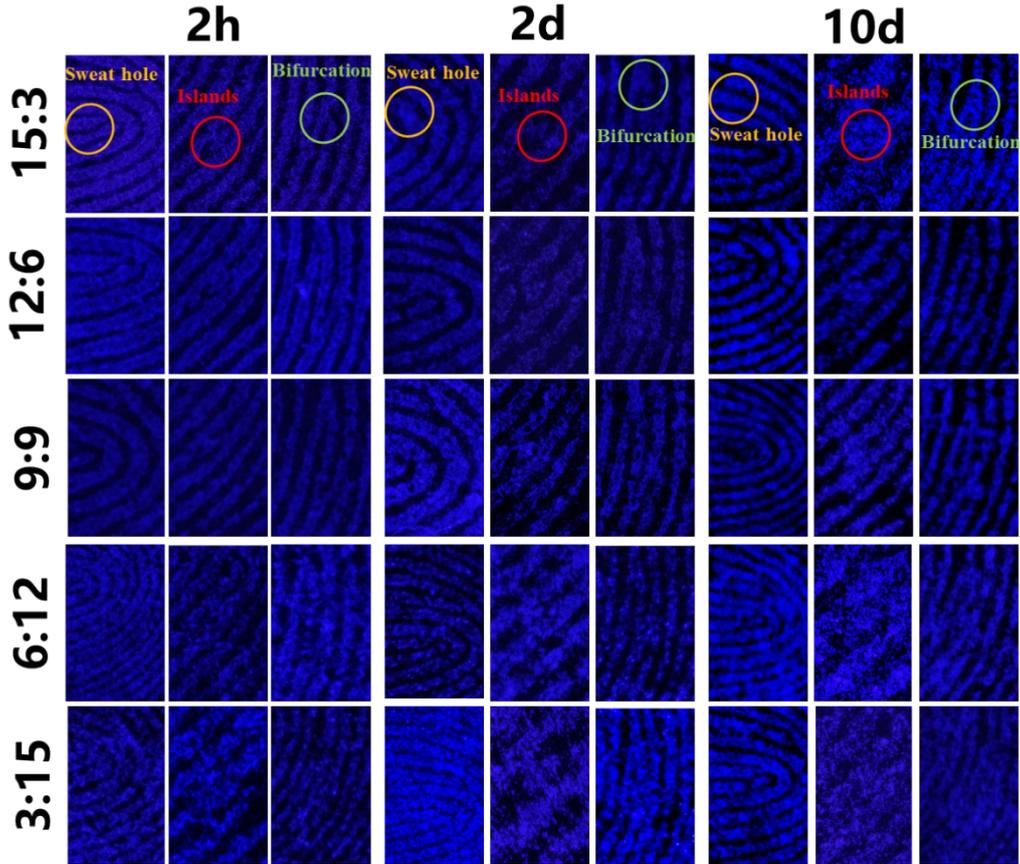


Fig. S11. The level 2 and level 3 observed on glass at different times and captured by using stereoscopic microscope.

Table S1. The fitted lifetimes and the corresponding parameters of the CDs-OSi composites.

	15:3	12:6	9:9	6:12	3:15
A_1	2.26	0.99	2.95	2.19	1.37
τ_1 [ns]	22.55	18.24	15.64	14.39	13.59
A_2	3.01	2.06	3.02	3.19	2.369
τ_2 [ns]	10.09	8.35	5.70	5.39	4.989
τ_{ave} [ns]	17.90	13.42	12.94	11.21	10.25

Table S2. The comparison of different CDs and their compounds for identification of LFP.

Precursor	Synthesis procedure	State	Stability	Color	Pattern integrity	Identifiable level	Identifiable aged fingerprint	Ref.
L-(-)-malic acid, UPTES	One step	Solid	Photobleaching/organic solvent/high temperature/acid/alkali resistance and salt tolerance	From blue to green	Good	Level 1,2 and 3	10 days	This work
Tween 80	Two steps	Solution	-	White	Average	Level 1 and 2	-	1
Pyromellitic acid, urea	One step	Solid	-	Blue	Poor	Level 1 and 2	-	2
Tartaric acid and triethylene tetramine	Two steps	Solid	-	Green	Good	Level 1,2 and 3	10 days (fair integrity)	3
Citric acid, urea and chitosan	Two steps	Solid	Photobleaching resistance and salt tolerance	Red	Good	Level 1 and 2	-	4

Note: Tween 80 = polyoxyethylene sorbitan monooleate; “-” = not mentioned in the article.

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