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Large-scale synthesis of Carbon Quantum Dots for Efficient Luminescent Solar Concentrators

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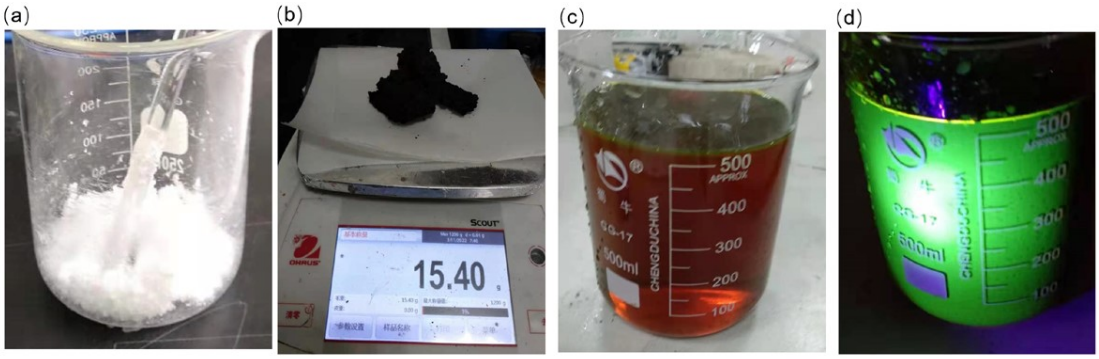

Fig. S1 (a) The mixture of the CA (5 g), $CaCl_2$ (5 g) and urea (10 g); (b) The slurry (15.4 g) after the solid-state reaction; (c-d) The dispersed C-dots in methanol under room light (c) and UV illumination (d).

Fig. S2 The solid powder after reaction using CA (200 g), $CaCl_2$ (200 g) and urea (400 g) as precursors.

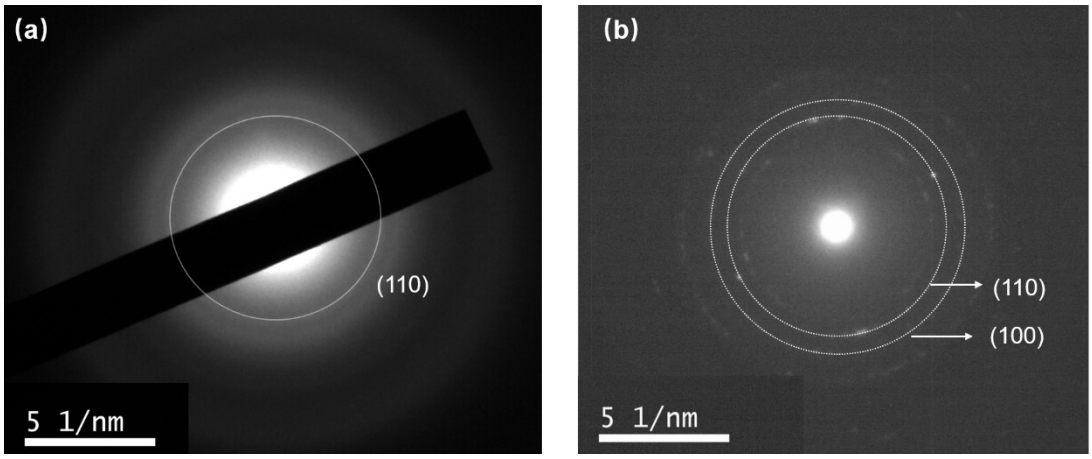

Fig. S3 SAED pattern of C-dots produced by (a) CaCA and (b) CA+$CaCl_2$. The C-dots have a typical cubic carbon structure (#75-0222).

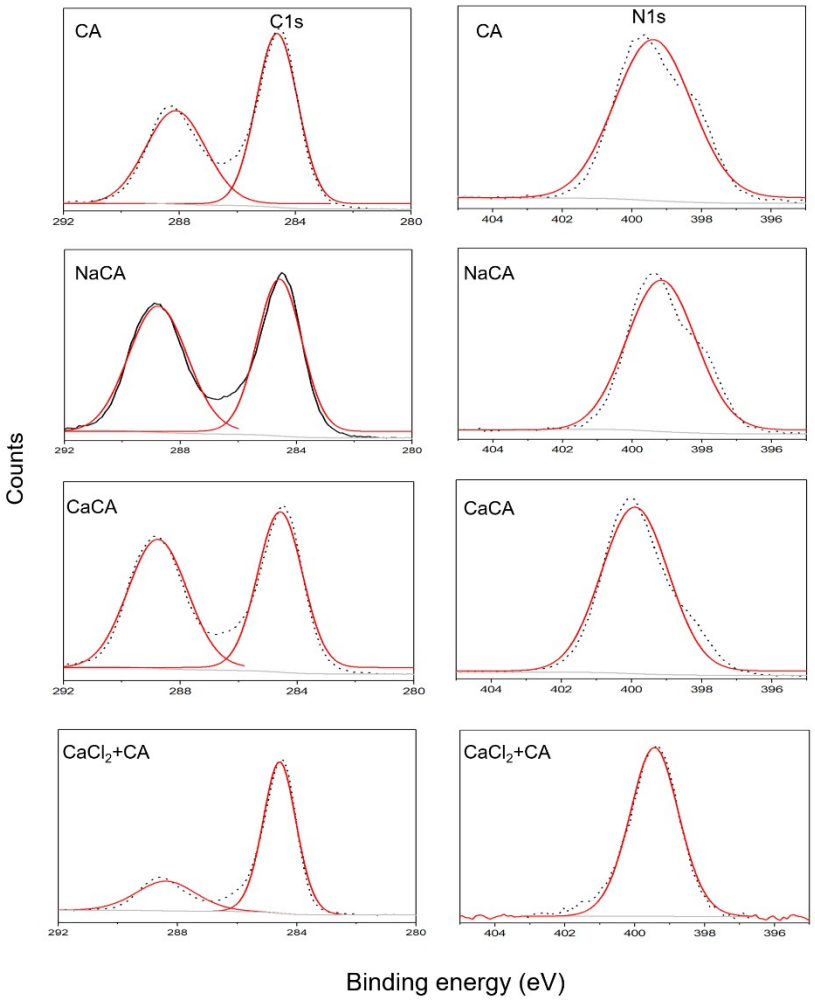

Fig. S4 High resolution C1s and N1s spectra of the C-dots produced with different precursors.

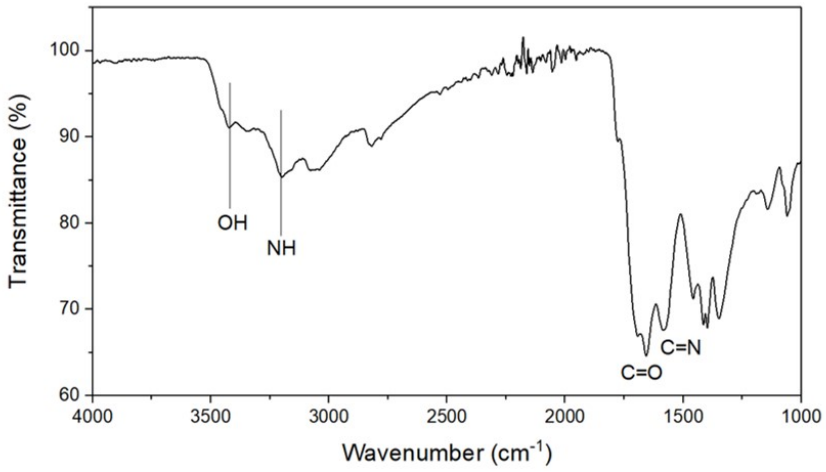

Fig. S5 FT-IR spectrum of the C-dots produced using CaCA/urea as precursors.

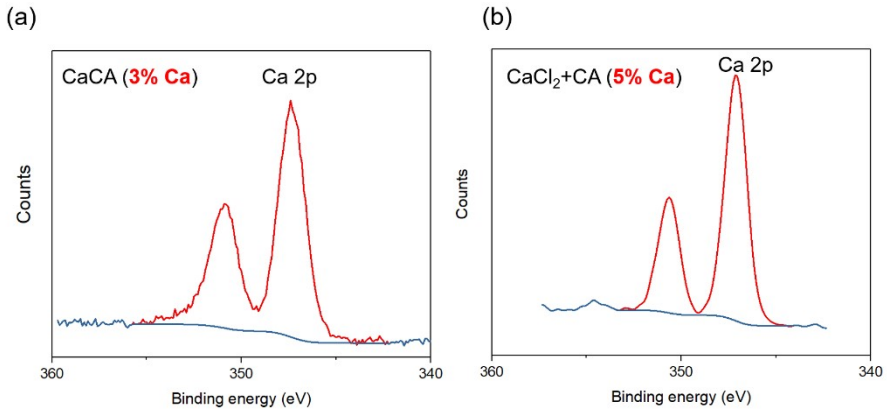

Fig. S6 High resolution Ca 2p spectra of the C-dots produced with different precursors.

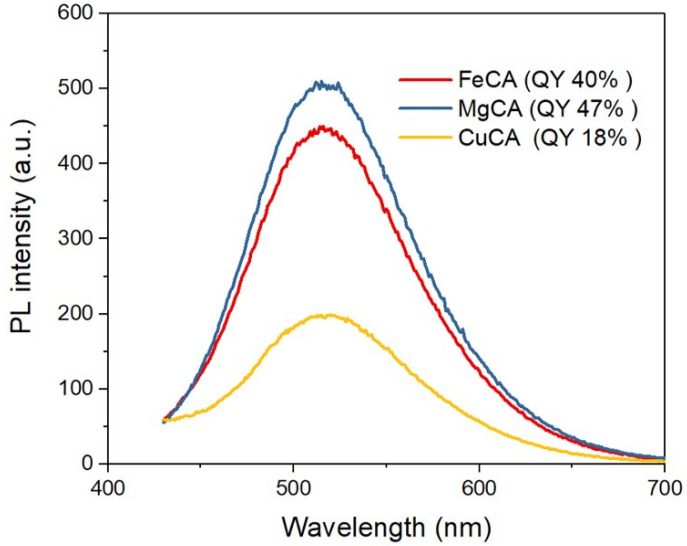

Fig. S7 PL spectra of the C-dots produced using FeCA/urea, MgCA/urea and CuCA/urea as precursors.

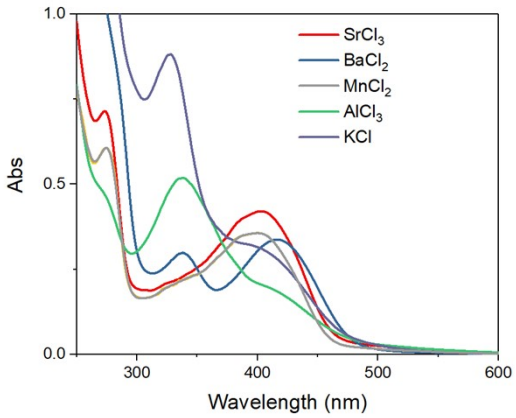

Fig. 8 Absorption of C-dots synthesized using different metal chloride. The purified C-dots were dispersed in water for measurements.

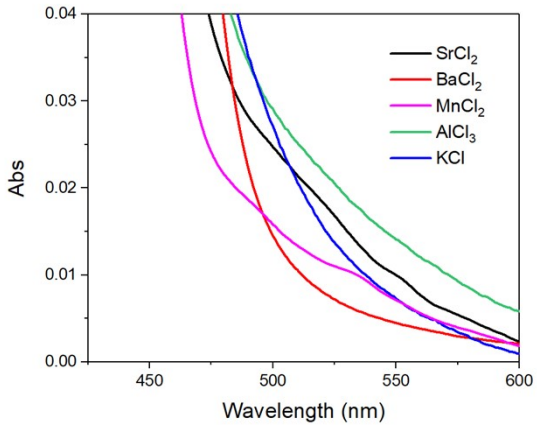

Fig. 9 High resolution absorption of C-dots in the emission range.

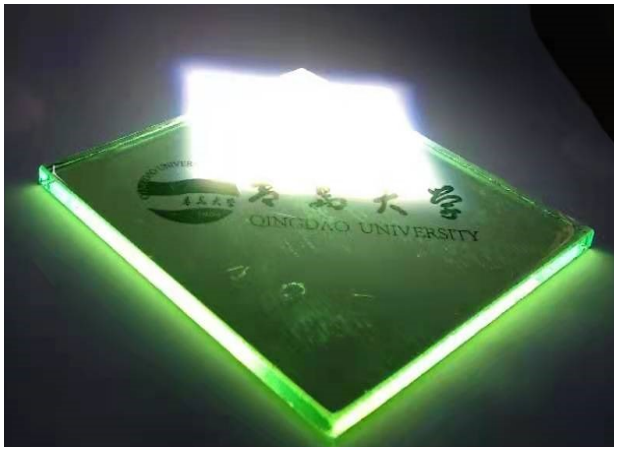

Fig. S10 Photographs of the LSC based on C-dots synthesized using CaCA/urea as precursors under one sun (100 mW/cm^2) illumination. LSC dimensions, 10 × 10 × 0.43 cm^3.

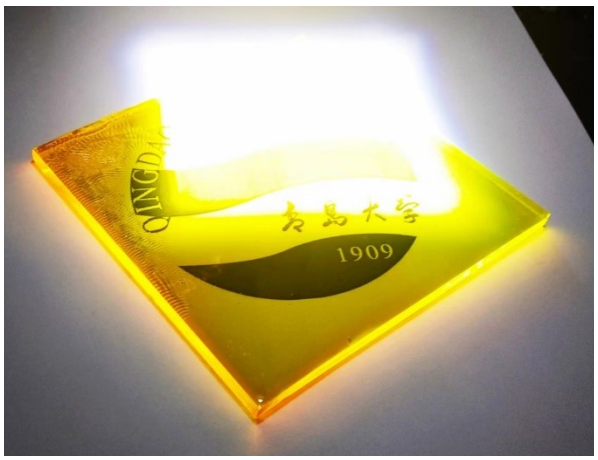

Fig. S11 Photographs of the LSC based on C-dots synthesized using CA/urea/$MnCl_2$ as precursors under one sun (100 mW/cm^2) illumination. LSC dimensions, 10 × 10 × 0.43 cm^3.

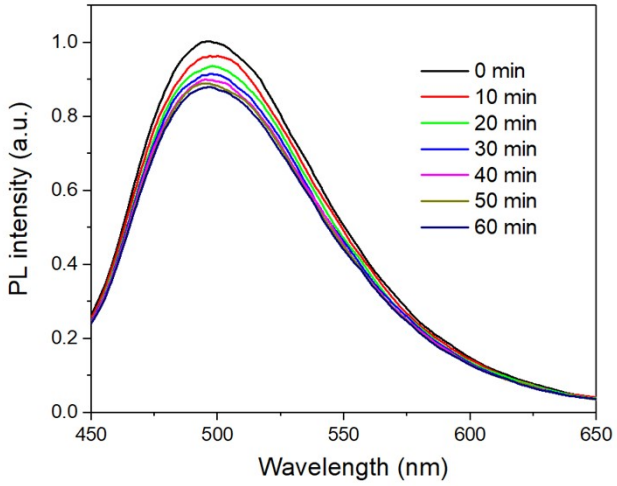

Fig. S12 The PL spectrum of the LSC based on the C-dots produced by CA/urea. The LSC was illuminated by the UV light for different time.

Table S1 The calculated cost of the C-dots produced by solid-state reaction. The calculation only considers the cost of chemicals used for the synthesis.

	Price $/Kg	Link
CaCA	60	https://www.aladdin-e.com/zh_cn/c194985.html
CA	20	https://www.aladdin-e.com/zh_cn/c112635.html
Urea	14	https://www.aladdin-e.com/zh_cn/u111897.html
$CaCl_2$	14	https://www.aladdin-e.com/zh_cn/c399250.html
$BaCl_2$	20	https://www.aladdin-e.com/zh_cn/b111752.html
C-dots (CaCA)	368	
C-dots (CA+$CaCl_2$)	83	

For the C-dots using CaCA (~520 g) and urea (~400 g), the yield is 11%, the price of C-dots is 0.4 $/g.

For the C-dots using CA, urea and $CaCl_2$, the yield is 25%, the price of C-dots is 0.08$/g.
For the C-dots using CA, urea and $BaCl_2$, the yield is 25%, the price of C-dots is 0.1$/g.