Electronic Supplementary Information

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Fluorescein-derived carbon dots with chitin-targeting for ultrafast and superstable fluorescent imaging of fungi

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**Supplementary Figures**

**Figure S1:** Fluorescent intensities of FB-CDs under different synthetic parameters: (a) hydrothermal temperature, (b) hydrothermal time.

**Figure S2:** (a) Fluorescence spectra of FB-CDs and FB-33 at the same concentration (0.1 mg/mL). (b) Photographs of FB-33 and FB-CDs at the same concentration under UV light irradiation.
Figure S3: Three-dimensional fluorescence map of FB-CDs.

Figure S4: The absolute PLQY value of the FB-CDs, CA-CDs and FB-33.
Figure S5: UV-vis absorption spectra of the FB-CDs and FB-33 before and after UV irradiation for 4 h.

Figure S6: Fluorescence stability of FB-CDs dispersed in (a) FBS and (b) LB medium under continuous UV light irradiation for 40 min.
**Figure S7:** The changes of fluorescence intensities of (a) FB-CDs and (b) FB-33 solutions at different pH values (from 2 to 12). (c) Reversible fluorescence intensity of FB-CDs against pH from 3 to 11.

**Figure S8:** The fluorescence intensity of FB-33 (50 μg/mL) as a function of chitin mass.
**Figure S9:** The influence of ion on the chitin-targeted capability of FB-CDs.

**Figure S10:** Fluorescence images of HepG2 cells treated with FB-CDs and CA-CDs at the same concentration (100 μg/mL) for 10 min.
Figure S11: The biocompatibility of FB-CDs. (a) Growth curves of *S. cerevisiae* incubated with different concentrations of FB-CDs. The optical density value at 600 nm (OD\textsubscript{600}) was recorded. (b) Statistical histograms corresponding to (a). (c) Relative viabilities of HepG2 cells after treatment with different concentrations of FB-CDs and FB-33 for 12 h.

Figure S12: Fluorescence images of *schizophyllum commune* treated with FB-CDs (100 μg/mL) for different incubation times.
Figure S13: Fluorescence images of *schizophyllum commune* treated with different concentrations of FB-CDs for 30 s.

Figure S14: Long-term fluorescence images of *schizophyllum commune* incubated with FB-CDs for 30 s. The samples were exposed continuously for 30 min and the FL images were captured at different time points.
Figure S15: (a) Schematic illustration of the preparation of simulated clinical fungal sample. (b) Fluorescence images of simulated sample after treated with the FB-CDs.
## Supplementary Tables

**Table S1:** Comparison of FB-CDs with other fluorescent nanoagents.

| Materials               | Staining time (min) | Photostability (min) | Emission (nm) | PLQY (%) | Ref.    |
|-------------------------|---------------------|----------------------|---------------|----------|---------|
| s-N-CDs                 | unknown             | 15                   | 460           | 16       | [1]     |
| BbimDCN-OCDs           | 30                  | unknown              | 440           | 9.3      | [2]     |
| CDs−NH₂                 | 180                 | 120                  | 440           | 11.4     | [3]     |
| CDs                     | 120                 | 30                   | 450           | 12.96    | [4]     |
| CQDs-MNPs              | 30                  | 5                    | 522           | 16.2     | [5]     |
| CD-MB                   | 120                 | 30                   | 460           | 3.9      | [6]     |
| OPDA nanodots           | 360                 | 120                  | 450           | 6.4      | [7]     |
| o-PDANPs                | 120                 | 120                  | 455           | 1.4      | [8]     |
| Au NCs                  | 240                 | unknown              | 580           | unknown  | [9]     |
| FB-CDs                  | 0.5                 | 120                  | 440           | 51.6     | This work |

**Table S2:** Comparison of FB-CDs with common fluorescent molecules for fungi imaging.

| Materials                | Staining time (min) | Photostability (min) | Emission (nm) | Ref.    |
|--------------------------|---------------------|----------------------|---------------|---------|
| BFP protein              | 24 h                | Easy deactivation    | 445           | [10]    |
| CFP protein              | 24 h                | Easy deactivation    | 480           | [11]    |
| DAPI                     | 120                 | Easy quenching       | 461           | [12]    |
| Calcofluor White         | 120                 | 1                    | 472           | [13]    |
| Dansyl dye               | 60                  | 2                    | 520           | [14]    |
| ER Tracker Green         | 30                  | 2                    | 511           | [15]    |
| FB-CDs                   | 0.5                 | 120                  | 440           | This work |
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