Supporting Information

A fluorescence-switchable carbon dot for reversible turn-on sensing of molecular oxygen

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cell experiment

MTT Assay for the Cell Cytotoxicity. Firstly, HeLa cells were inoculated into the 96-well plate and cultured for 24 h. Then DMEM was replaced with 100 μL new DMEM with RCDs of different concentrations (0, 10, 20, 30, 40 and 50 μg/mL). After further culturing for 24 h, 10 μL MTT was added to incubate for 6 h, and replace the medium with 100 mL DMSO. After shaking evenly, the cell viability was carried out at 490 nm by SPARK multifunctional microporous plate (Tecan Austria GmbH).

Cellular imaging. HeLa cells were inoculated into the culture dish (1 mL per dish) per well and were incubated 24 h in the incubator (37 ℃ and 5% CO_2). After then, the DMEM was replaced with fresh DMEM (1 mL) with CDs (10 μg/mL) and incubated for 30 min. Pictures were obtained by Leica laser scanning confocal microscope SP-8X (LSCM) at 496 nm excitation leading to an obtained emission spectral band between 550 and 650 nm.

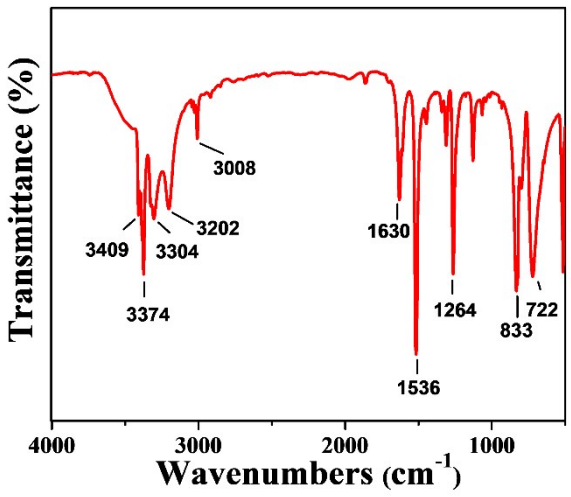

Figure S1. FTIR spectra of p-Phenylenediamine.

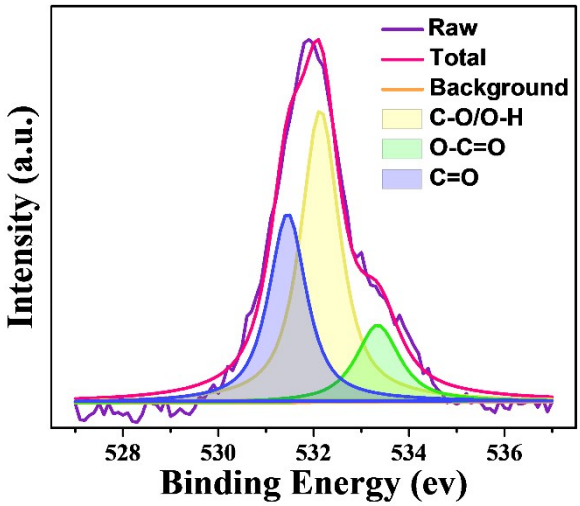

Figure S2. High resolution XPS spectra of O 1s peak.

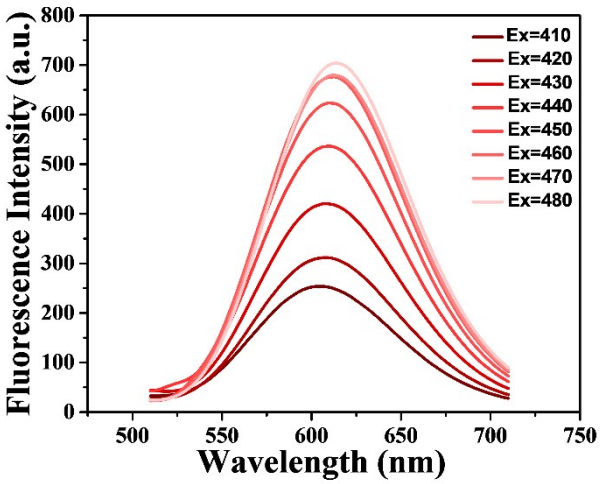

Figure S3. Fluorescence emission spectra of RCDs in PBS (pH 7.4) under different excitation wavelengths.

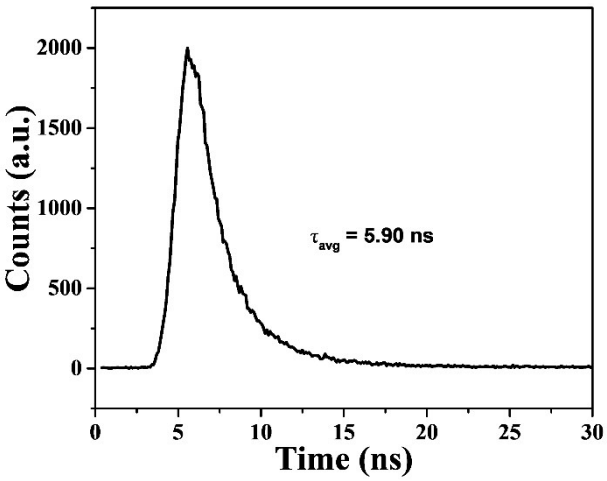

Figure S4. The lifetime decay curve of RCDs in ethanol solutions.

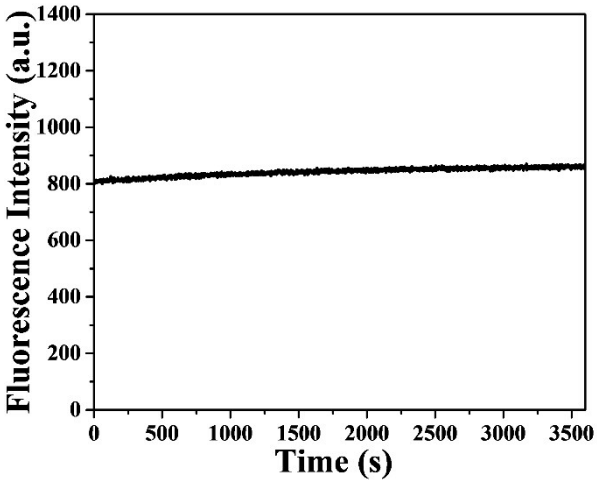

Figure S5. Photo-stability of RCDs in PBS (pH 7.4) under continuous excitation at 496 nm for one hour.

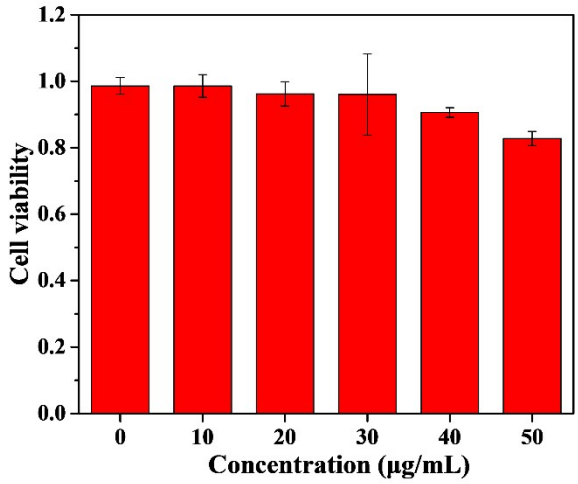

Figure S6. Cell viability of HeLa cells in different concentrations of RCDs.

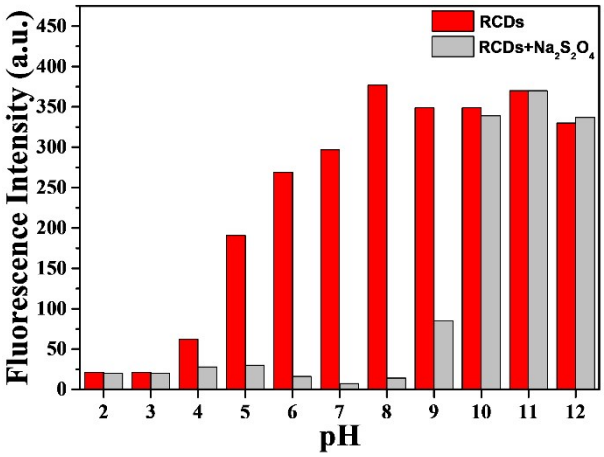

Figure S7. Fluorescence intensity at 615 nm of RCDs (2.5μg/mL) in absence and presence of $Na_2S_2O_4$ (200μM) at various pH.

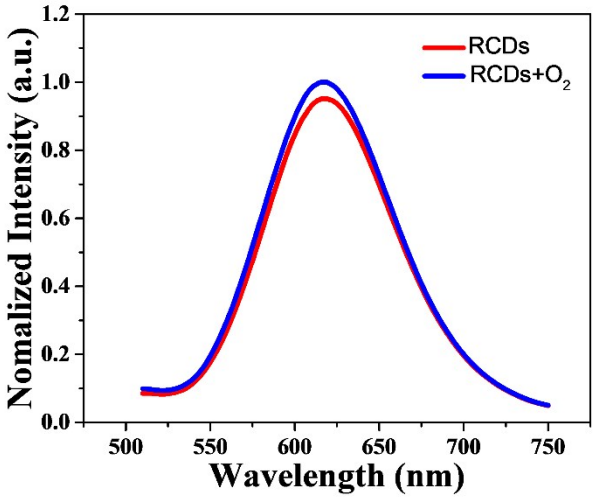

Figure S8. Fluorescence spectra of of RCDs and RCDs with O_2.

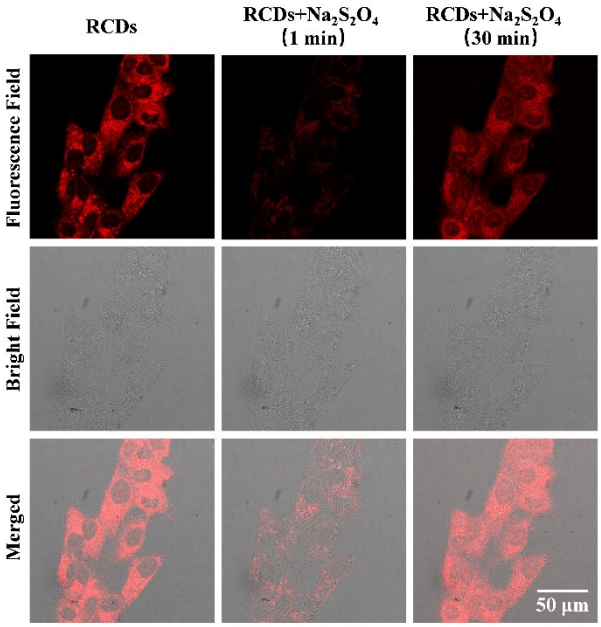

Figure S9. The fluorescence-switchable property of RCDs in HeLa cells. Confocal images of HeLa cells stained with RCDs (10 μg mL^{-1}) for 30 min and $Na_2S_2O_4$ (500 μM) incubated for different times (1min and 30min). (λex = 496 nm, λem = 550-650 nm). Scale bar: 50 μm.

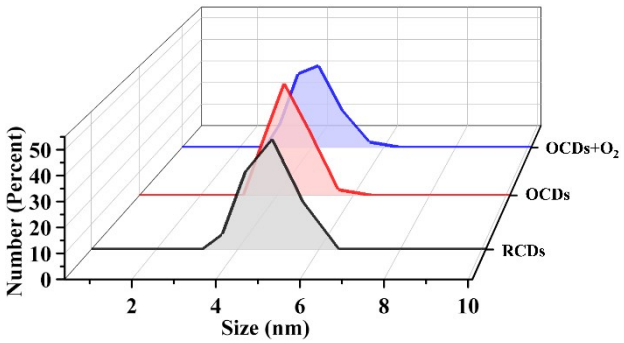

Figure S10. The dynamic light scattering (DLS) particle size analysis of RCDs, OCDs, OCDs with O_2.

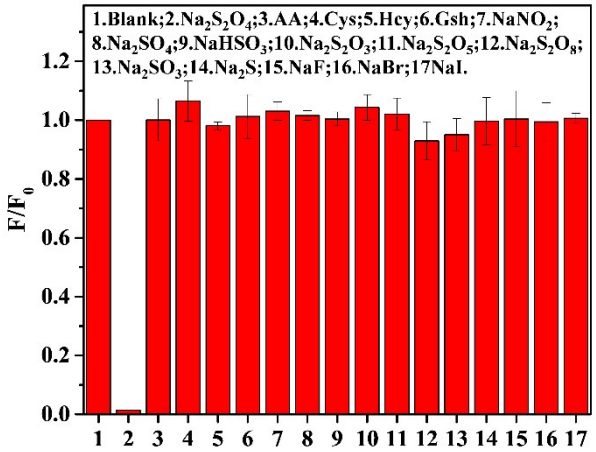

Figure S11. Fluorescence intensity at 615 nm of RCDs (2.5 μg/mL) treated with various analytes. Concentration: AA, GSH, 1 mM; other species, 200 μM. λ_{ex} = 496 nm.

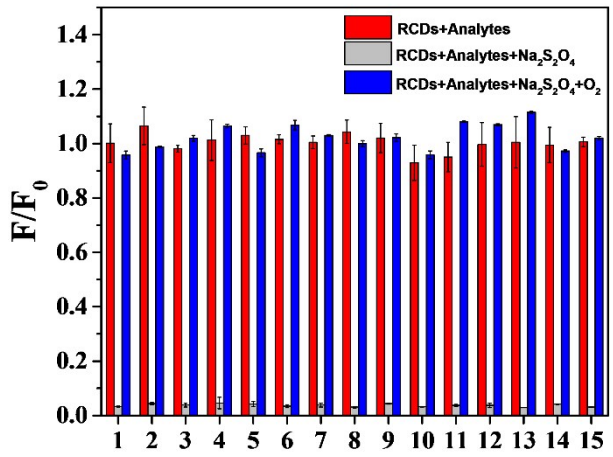

Figure S12. The fluorescence-switchable property of RCDs (2.5 μg/mL) in the presence of different analytes (1. AA; 2. Cys; 3. Hcy; 4. Gsh; 5. $NaNO_2$; 6. Na_2SO_4; 7. $NaHSO_3$; 8. $Na_2S_2O_3$; 9. $Na_2S_2O_5$; 10. $Na_2S_2O_8$; 11. Na_2SO_3; 12. Na_2S; 13. NaF; 14. NaBr; 15. NaI.). Concentration: AA, GSH, 1 mM; other species, 200 μM. λ_{ex} = 496 nm.

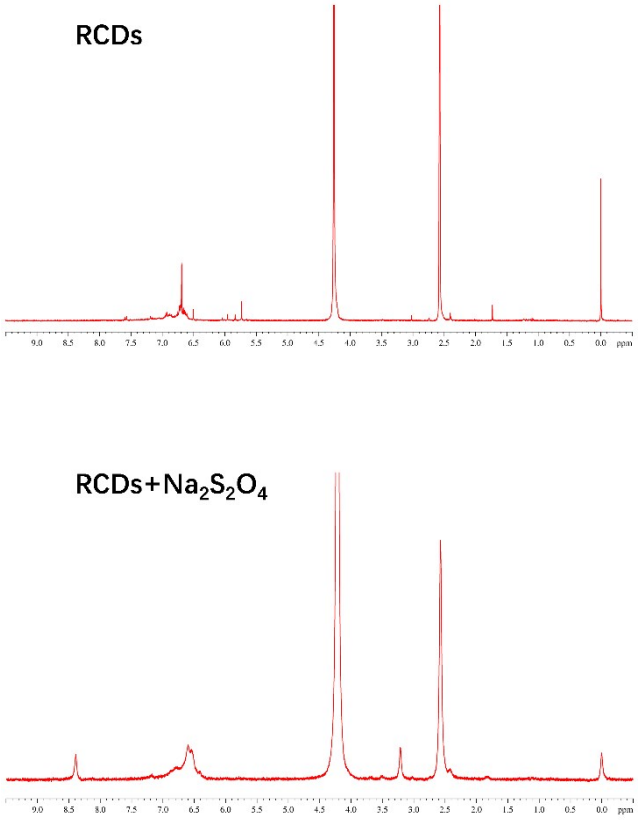

Figure S13. In situ ^{1}H NMR analysis of a chemical reduction of RCDs using $Na_2S_2O_4$ in $(CD_3)_2SO/D_2O$ mixed solvent system.

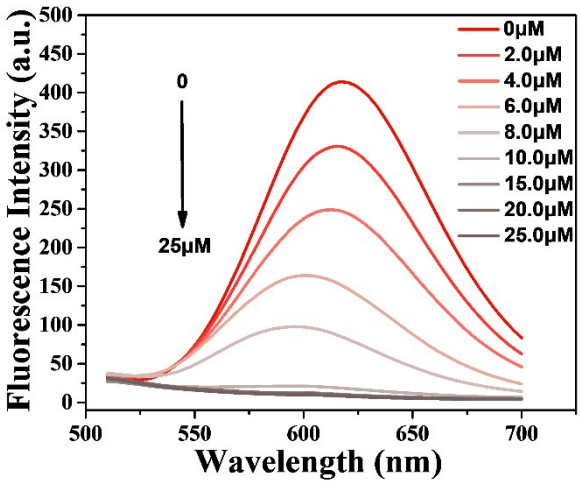

Figure S14. Fluorescence spectra of RCDs (2.5 μg/mL) with di□erent concentration of $Na_2S_2O_4$ in PBS (pH 7.4), λ_{ex} = 496 nm.

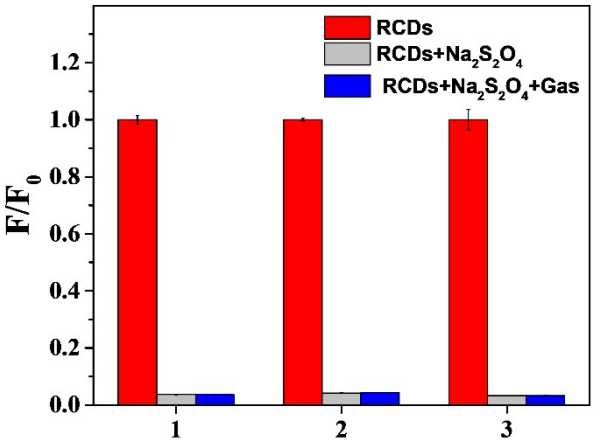

Figure S15. Fluorescence intensity at 615 nm of RCDs (2.5μg/mL), OCDs and OCDs with different gases (1. Ar; 2. CO_2; 3. N_2.).

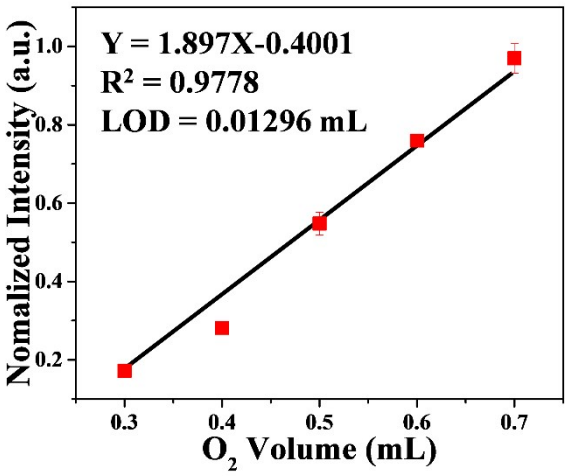

Figure S16. Fluorescence intensity of OCDs solution at 615 nm in the presence of di□erent contents of oxygen gas. λ_{ex} = 496 nm.

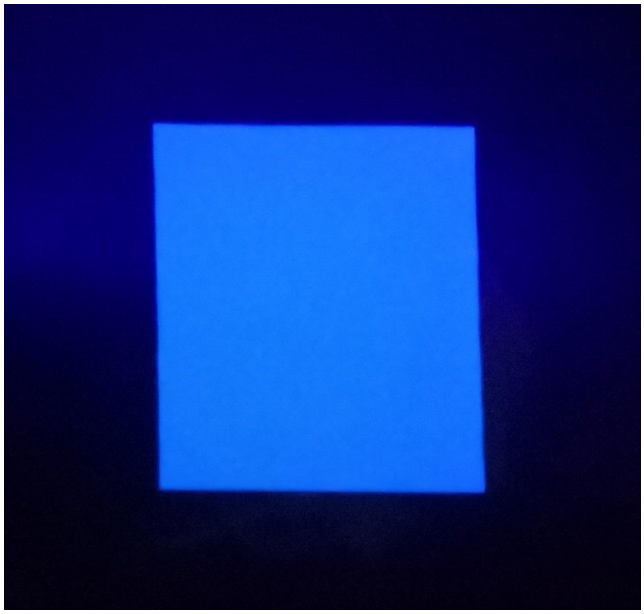

Figure S17. Ordinary filter paper under 365 UV lamp.

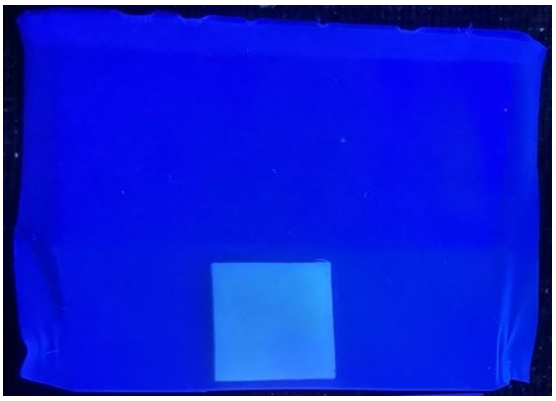

Figure S18. Ordinary filter paper in the package under 365 UV lamp.

Graphical abstract