Supporting Information

Carbon Dots Based Theranostic Platform for Dual-Modal Imaging and Free Radical Scavenging

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Table S1. Comparison of red-emitting Cdots published in the literature.

Precursors	Solvent	Preparation Approach	Purification	QY	ref.
polyacrylonitrile based carbon fibers	nitric acid	oxidation of carbon fibers in nitric acid	ultrafiltration for 48 h and dialyzed	20.7	[1]
p-phenylenediamine	ethanol	solvothermal at 160 °C for 12 h	column chromatography	26.1	[2]
polythiophene phenylpropionic acid	alkaline solution	hydrothermal at 240 °C for 36 h	filtered through Millipore 0.22 μm filter paper	2.3	[3]
ascorbic acid	oleylamine	heat at 280 °C for 4 h	centrifugation	14	[4]
citric acid	formamide	microwave reactor for heating at 160 °C for 1 h and 120 °C for another hour	precipitated with acetone overnight in a refrigerator (-20°C) and centrifugation	22.9	[5]
PEG800 and 2-((E)-2-((E)-2-chloro-3-((E)- 2-(1-(2-hydroxyethyl)-3,3-dimethylindolin-2-ylidene)-ethylidene)cyclohex-1-en-1-yl)vinyl)-1-(2-hydroxyethyl)-3,3-di-methyl-3H-indol-1-ium iodide	ethanol	solvothermal at 160 °C for 2 h	dialyzed against water for 1 d	5.7	[6]
glutathione	formamide	hydrothermal at 160 °C for 1 h	dialyzed against water for 1 week and filtered through Millipore 0.22 μm filter paper	16.8	[7]
p-phenylenediamine	ethanol	microwave reactor for 8 h	centrifugation and column chromatography	15	[8]
p-phenylenediamine and urea	water	hydrothermal at 160 °C for 10 h	column chromatography	23.81	[9]
2,5-diaminobenzenesulfonic acid and 4-aminophenylboronic acid hydrochloride	water	microwave reactor at 180 °C for 8 h	centrifugation and dialysis for 12 h	5.44	[10]
citric acid and 1,5-diaminonaphthalene	sulfuric acid	solvothermal at 200 °C for 1 h	centrifugation and dialysis for 1 week	12	[11]
spinach	ethanol/water	hydrothermal at 150 °C for 6 h	dialysis with a dialysis membrane for 3 days	15.3	[12]
citric acid and urea	formamide	solvothermal at 180 °C for 12 h	column chromatography and Sephadex column	4	[13]
citric acid, urea, and sodium fluoride	water	microwave reactor for 5 min	dialysis against double distilled water for 24	1.2	[14]
citric acid and urea	formamide	solvothermal at 140 °C for 12 h	centrifugation and added into the mixed solvent of petroleum ether and ethyl to obtain the solid	12.9	[15]
o-phenylenediamine and dithiothretiol	chloroform	Solvothermal 160 °C for 12 h	column chromatography	23%	[16]
L-cystine and o-phenylenediamine	ethanol	Solvothermal 220 °C for 12 h	Centrifugation, cylindrical filtration membrane and spin-dry.	35.7%	[17]

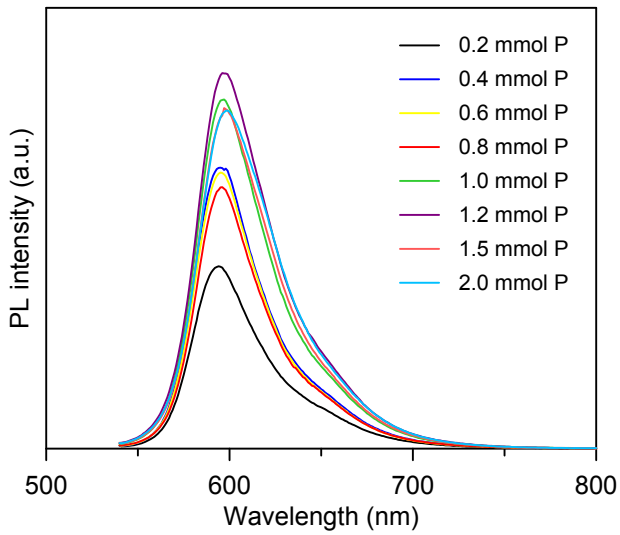
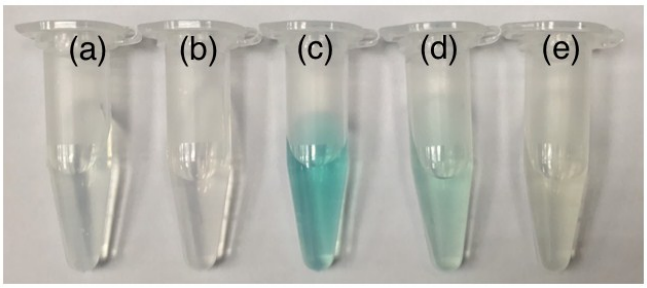


Figure S1. Photoluminescence spectra of P@Cdots prepared with different amounts of phosphoric acid.



PMn@CDs	−	−	−	+	+
TMB	+	+	+	+	+
H_2O_2	+	−	+	+	+
$FeSO_4$	−	+	+	+	+

Figure S2. The photographs of the reaction system (a) TMB + H_2O_2, (b) TMB + $FeSO_4$, (c) TMB + H_2O_2 + $FeSO_4$, (d) PMn@CDs (8 μg/mL) + TMB + H_2O_2 + $FeSO_4$, and (e) PMn@CDs (16 μg/mL) + TMB + H_2O_2 + $FeSO_4$, respectively.

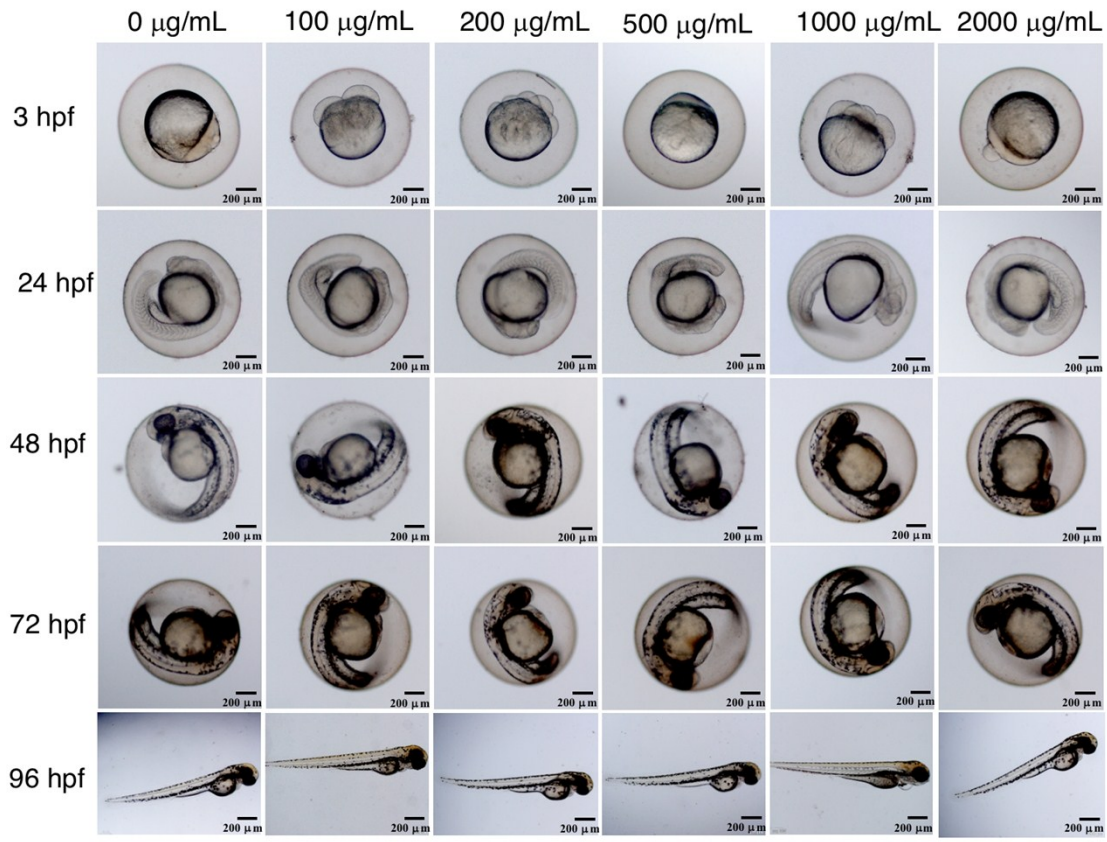


Figure S3. Optical images of zebrafish embryonic development incubated with different concentrations of PMn@Cdots/HA.

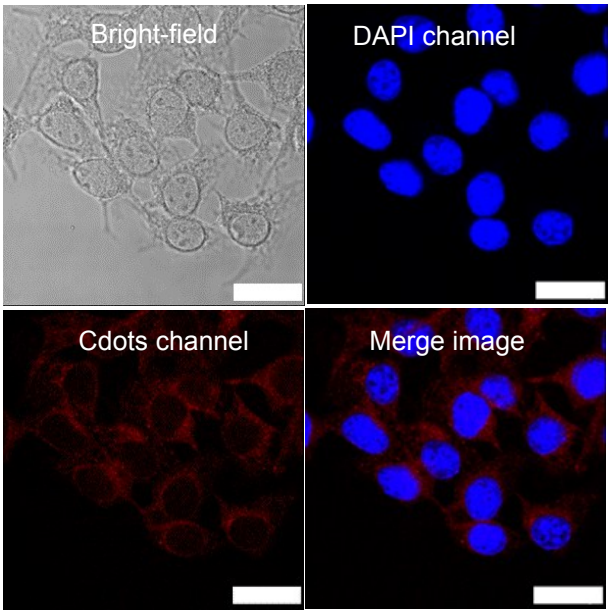


Figure S4. Confocal microscopy images of B16F1 cells pretreated with free HA (300 ppm), then incubated with PMn@Cdots/HA for 24 h at 37°C, fixed with 75% alcohol, and followed by being stained with DAPI for nucleus. Bright-field image outlines the position of cells; DAPI channel represents the nuclear regions; Cdots channel shows the location of the PMn@Cdots/HA; merge image represents the combination of DAPI and Cdots channels. For all the images, the scale bars represent 20 μm.

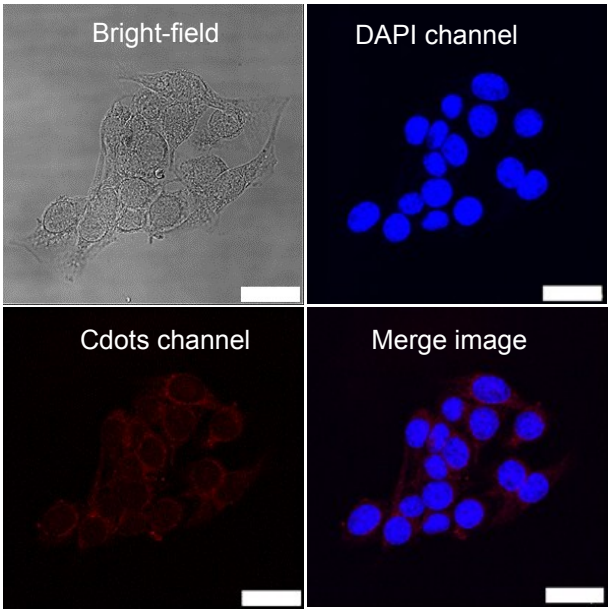


Figure S5. Confocal microscopy images of B16F1 cells incubated with PMn@Cdots for 24 h at 37°C, fixed with 75% alcohol, and followed by being stained with DAPI for nucleus. Bright-field image outlines the position of cells; DAPI channel represents the nuclear regions; Cdots channel shows the location of the PMn@Cdots; merge image represents the combination of DAPI and Cdots channels. For all the images, the scale bars represent 20 μm.

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