Electronic Supplementary Material (ESI) for Nanoscale Advances.

Dual fluorescence hollow silica nanofibers for *in situ* pH monitoring using an optical fiber

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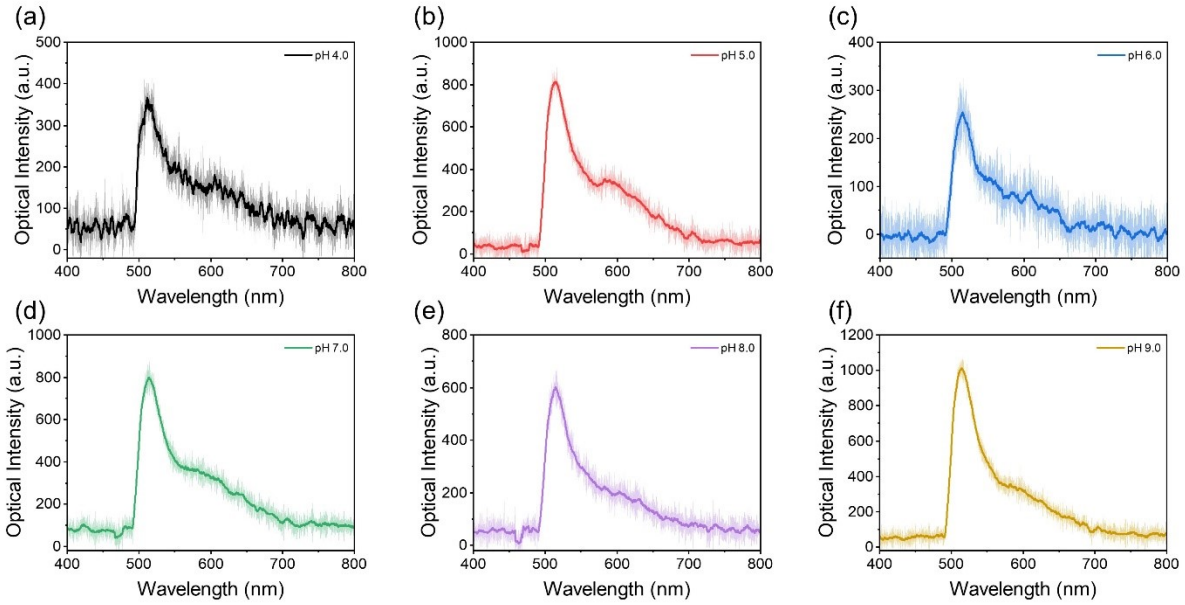

Fig. S1 The pH response of the dual fluorescence hSNFs. The individual optical spectra measured in colorless pH 4.0 (a), pH 5.0 (b), pH 6.0 (c), pH 7.0 (d), pH 8.0 (e), pH 9.0 (f) buffer solutions with error bars (the shaded area).

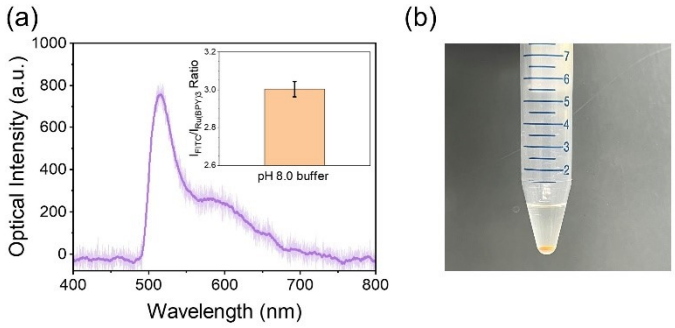

Fig. S2 Effect of storage on stability of the dual fluorescence hSNFs. (a) The optical spectra of the dual fluorescence hSNFs in pH 8.0 buffer solution after storage in dark for one month. The inserted figure represents the $I_{FITC}/I_{Ru(BPY)_3}$ ratio. (b) The image of the dual fluorescence hSNFs in ethanol after storage in dark for one month.

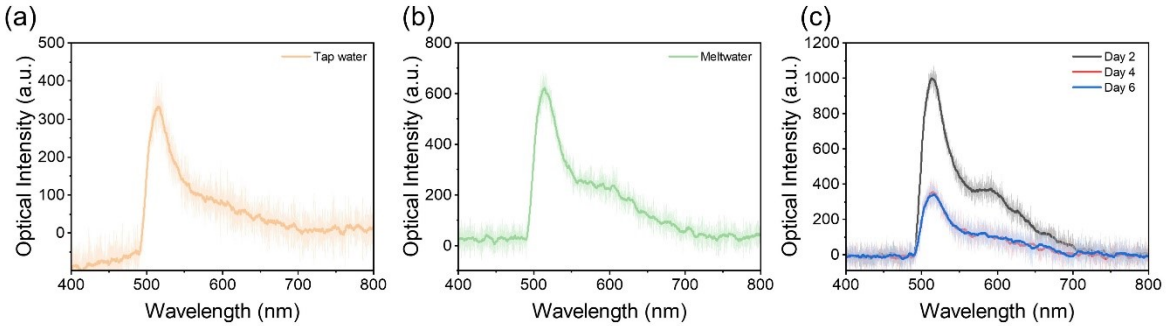

Fig. S3 The optical spectra of real samples with error bars (the shaded area). (a) The optical spectra of tap water. (b) The optical spectra of meltwater. (c) The optical spectra of cell culture media at different days.

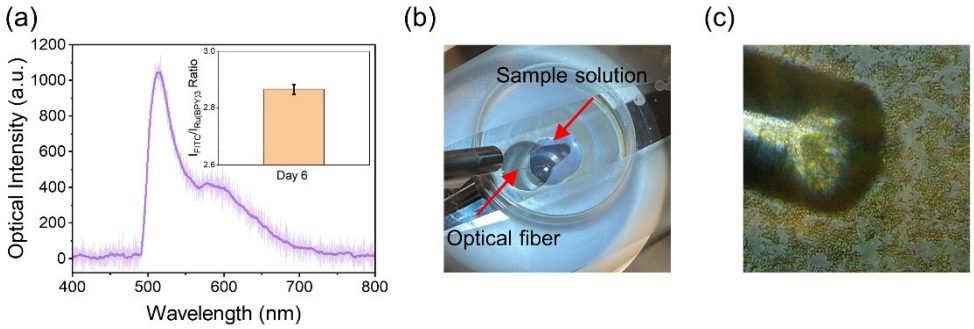

Fig. S4 Tiny sample size testing. (a) The optical spectra of 50 μL hiPSC-CMs culture media at day 6. The inserted figure represents the $I_{FITC}/I_{Ru(BPY)_3}$ ratio. (b) The image of the experimental setup. (c) The microscope image of the tilted optical fiber tip positioned above the hSNFs in the 50 μL sample solution.

Table S1. Major fluorescent pH sensor developed in recent years

Reference	Tsou et al.[1]	Chen et al.[2]	Song et al.[3]	Fulaz et al.[4]	Tsou et al.[5]	Hu et al.[6]	Shangguan et al.[7]	Yuan et al.[8]	Gotor et al.[9]	This work
Year	2013	2015	2017	2019	2014	2015	2016	2020	2017	2022
Device	Confocal microscopy		Fluorescence microscope		Fluorometer				Smartphone	Fiber-optic spectrometer
System	2 dyes in nanoparticles	Small molecular	Carbon dots	2 dyes in nanoparticles	2 dyes in nanoparticles	2 dyes in nanoparticles	Carbon dots	Small molecular	13 dyes on strip	2 dyes in nanofibers
Portability	Low	Low	Low	Low	Low	Low	Low	Low	High	High
Excitation light	3	2	1	2	2	2	1	1	11	1
pH range	4.5-8.5	6.18-8.38	1.5-5.0	3.5-8.5	3.2–9.0	3.8-7.4	5.2-8.8	3.0-5.5	0−14	4.0-9.0
Linearity	Fair	Fair	Good	Fair	Fair	Fair	Good	Good	Good	Good
Reversibility	n/a	Yes	Yes	Yes	n/a	n/a	Yes	Yes	n/a	Yes
Immobilization	No	No	No	No	No	No	No	No	Yes	Yes

Reference

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