Supplementary Information

for

Facile synthesis of boronic acid-decorated carbon nanodots as optical nanoprobes for glycoprotein sensing

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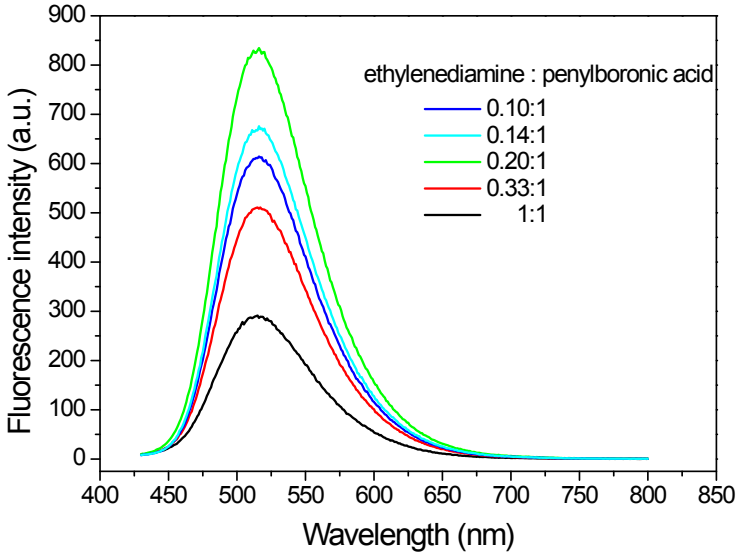

Fig. S1. Fluorescence spectra of CNDs synthesized with different molar ratios of ethylenediamine and phenylboronic acid.

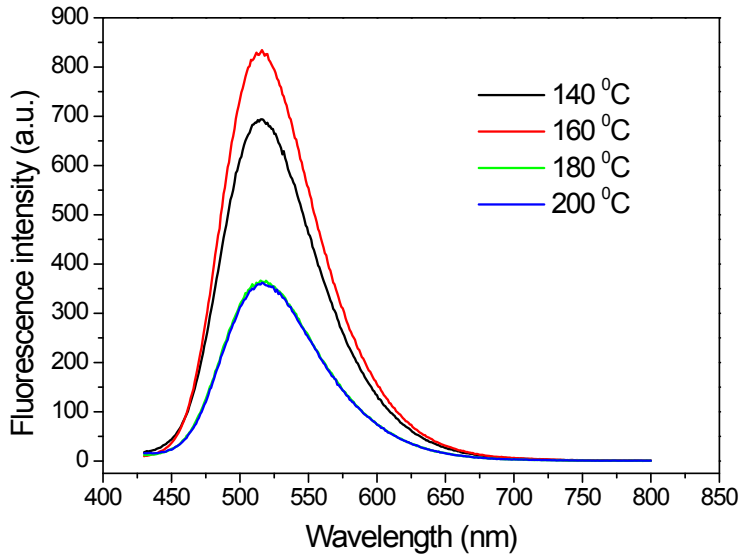

Fig. S2. Fluorescence spectra of CNDs synthesized at different temperatures.

The fluorescence Quantum yield measurements:

The quantum yield (φ) of the N-doped CNDs was estimated by comparing the curve slope of the integrated luminescence intensities and the absorbance values of the CNDs with those of fluorescein in 0.1 M NaOH (φ = 0.95). Specifically, the absorbance values of different concentrations of CNDs and fluorescein were measured at 410 nm. Fluorescence spectra of the corresponding concentrations of CNDs and fluorescein were also recorded at an excitation wavelength of 410 nm to obtain the integrated luminescence intensity, which is the area under the photoluminescence emission curve in the wavelength range from 430 to 800 nm. The quantum yield of the CNDs was calculated using the following equation:

$$\varphi_x = \varphi_{st} \times \frac{K_x}{K_{st}} \times \frac{\eta_x^2}{\eta_{st}^2},$$

in which the subscripts *st* and *x* denoted the fluorescein standard and CNDs, respectively; φ was the fluorescence quantum yield; K was the slope determined by the curve of integrated luminescence intensities and the absorbance values; and η was the refractive indices (both are 1.33). To minimize the reabsorption effects, we kept the absorbance at 410 nm below 0.1.

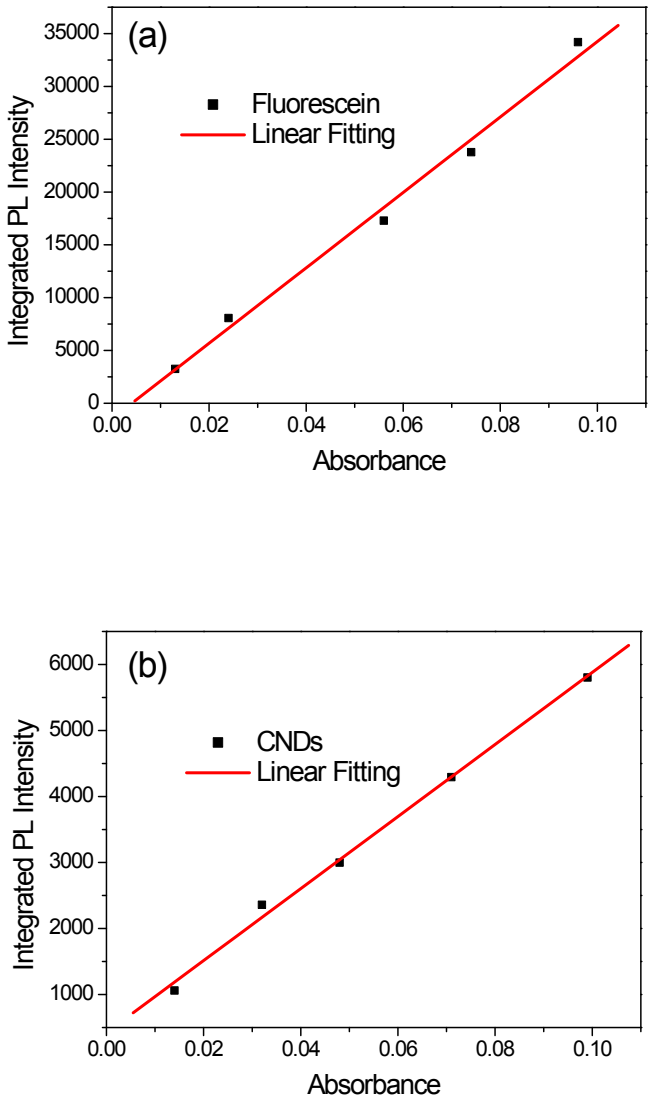

Fig. S3. Plots of the integrated PL intensity of (a) fluorescein in 0.1 M NaOH, and (b) boronic acid-functionalized CNDs in water as a function of optical absorbance at 410 nm.

Table S1. Quantum yield of the as-prepared CND samples.

	Fluorescein	CDs
Slope	357048.2	54579.8
Refractive Index	1.33	1.33
QYs (%)	95	14.5

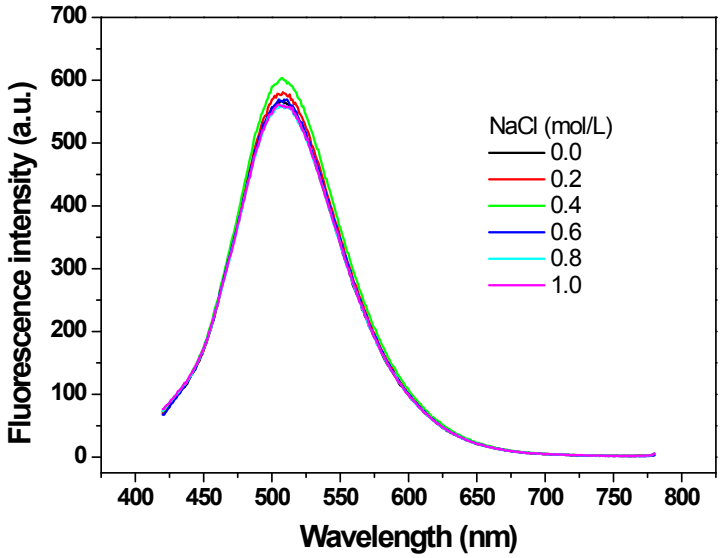

Fig. S4. Fluorescence spectra of CNDs upon the addition of NaCl solutions of different concentrations.

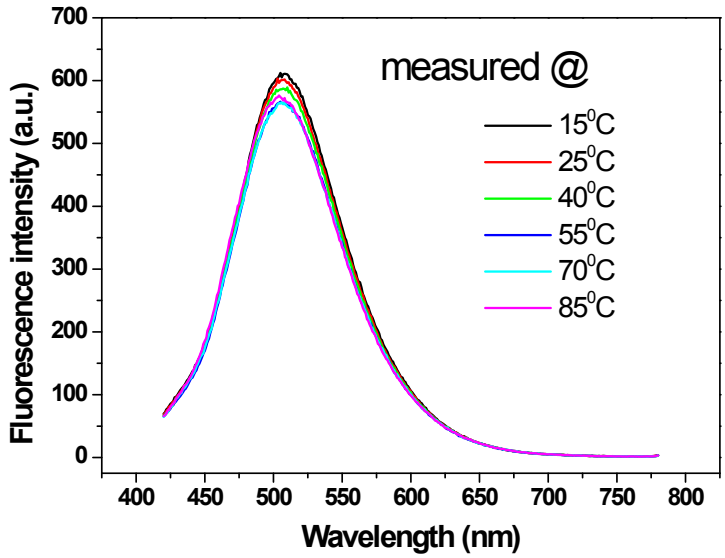

Fig. S5. Fluorescence spectra of synthesized CNDs at various temperatures.

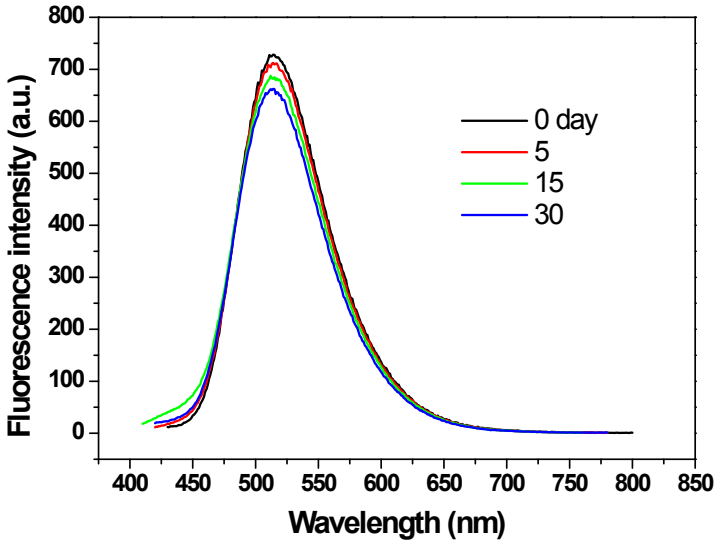

Fig. S6. Fluorescence spectra of synthesized CNDs after different periods of storage.

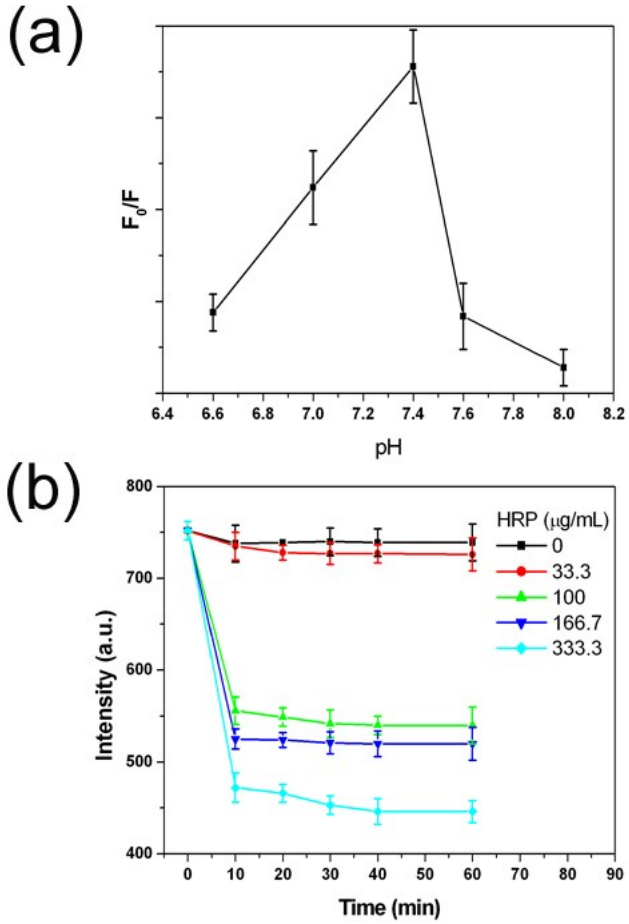

Fig. S7. (a) Effects of pH on the detection of HRP. F_0 and F represent the fluorescence intensities of CNDs at 514 nm in the absence and presence of HRP, respectively. HRP concentration: 333.3 μg/mL. (b) Effects of incubation time on the fluorescence intensities of the CND system.

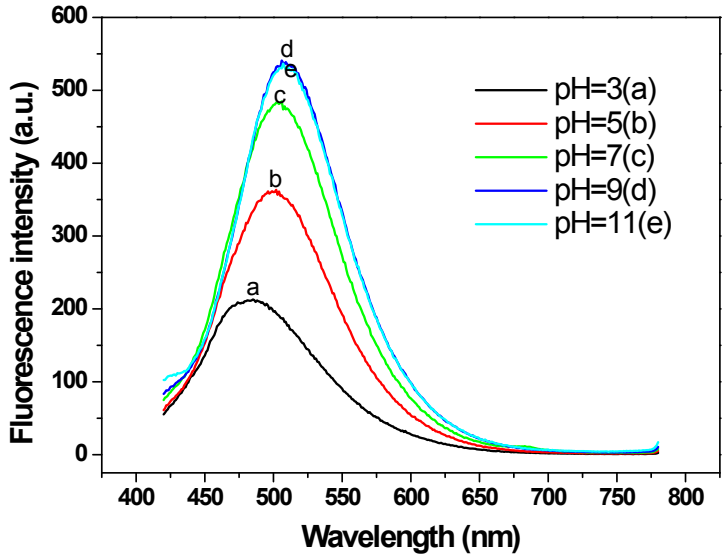

Fig. S8. Fluorescence spectra of synthesized CNDs in 10 mM phosphate buffer solutions of various pH values ranging from 3 to 11.

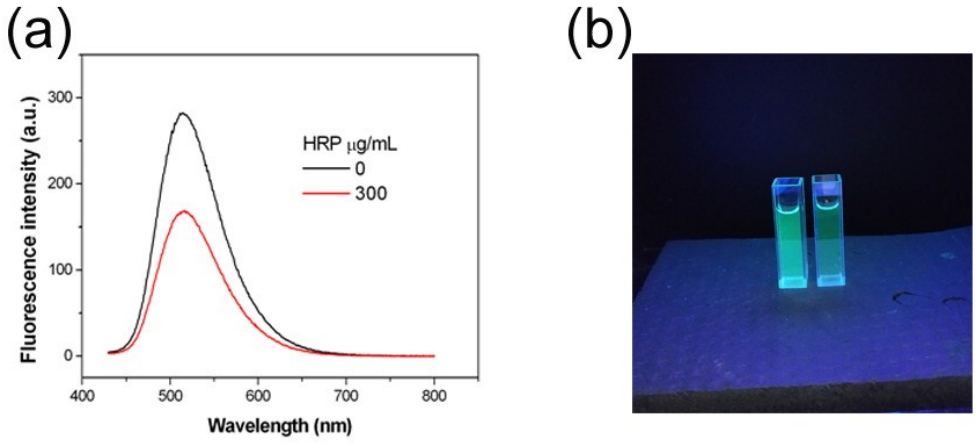

Fig. S9. (a) The Fluorescence spectra of synthesized CNDs before and after the addition of 300 μg/mL HRP. (b) The images of CND solution before (left) and after (right) the addition of 300 μg/mL HRP under 365 nm ultraviolet light.

Table S2. HRP assay in human urine.

samples	added HRP (μg/mL)	found HRP (μg/mL)	recovery (%)
1	3.55	3.67	103
2	142	128	90
3	330	310	94