

# Colorimetric Detection of Chromium(VI) Ions in Water Using Unfolded-Fullerene Carbon Nanoparticles

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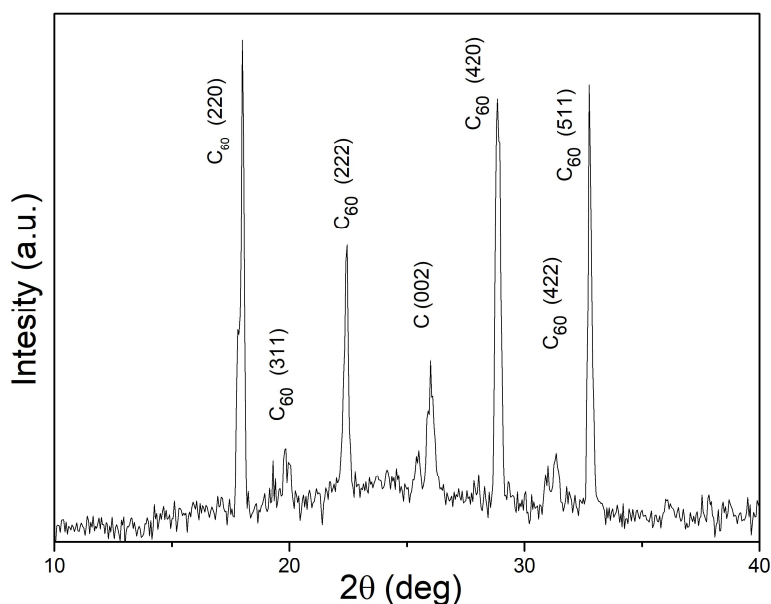
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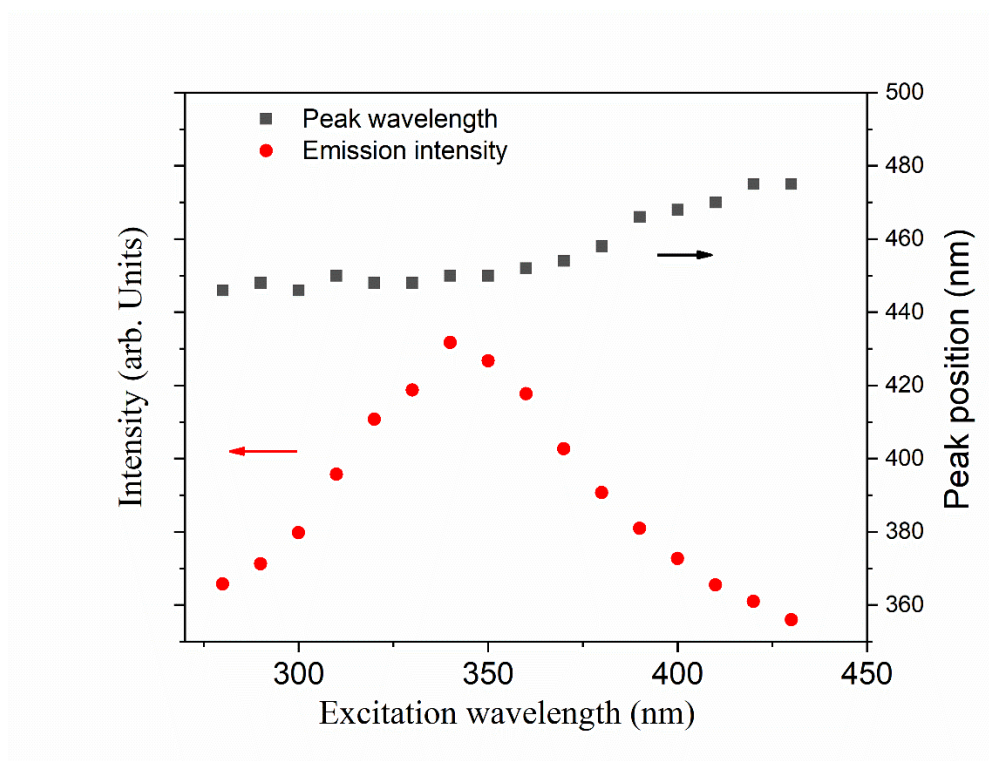
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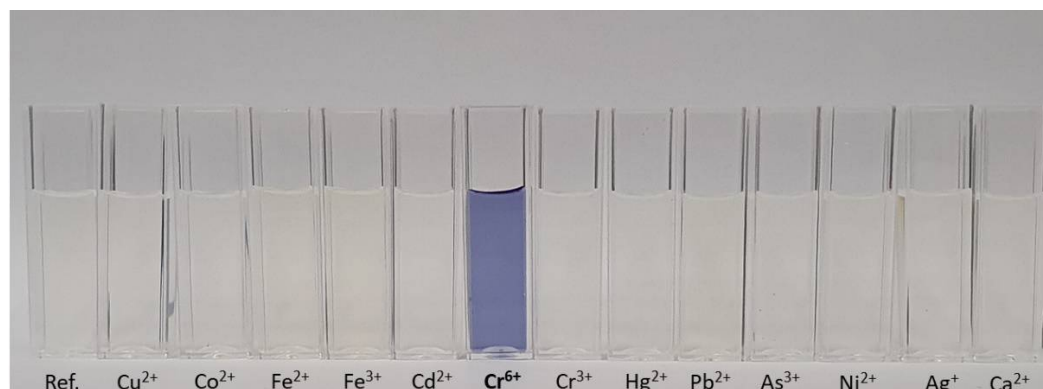
**Figure S1.** X-ray powder diffraction pattern of synthesized N-CDs.

**Table S1.** Main IR peaks of the pristine fullerene-C<sub>60</sub>, mixture water-THF (W-THF) N-CDs-W, N-CDs-W-THF and corresponding assignments; s=strong, m=medium, w=weak, br=broad, sp=sharp, sh=shoulder.

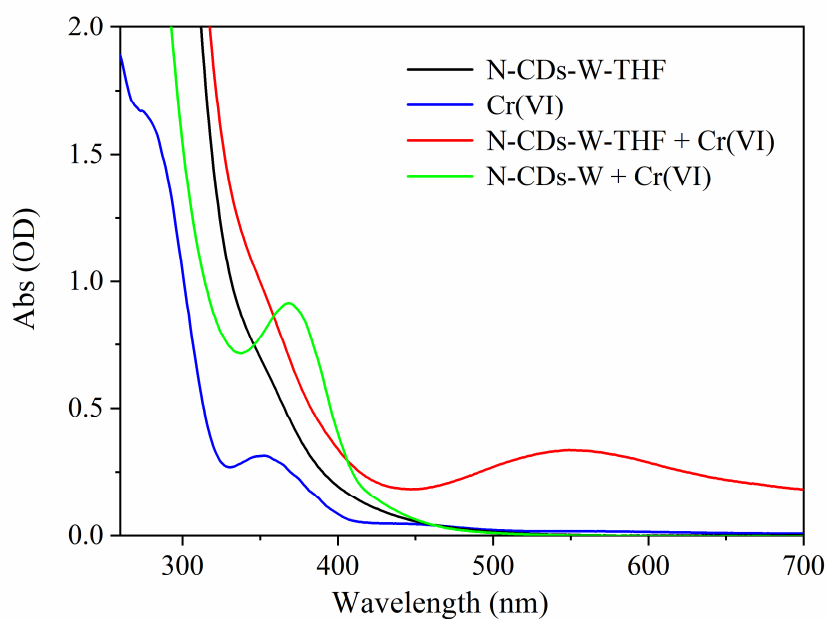
Fullerene	W-THF	N-CDs-W	N-CDs-W-THF	Assignments
		3430 m br	3390 m br	-O-H stretching
		3240 m br	3205m br	-N-H asymmetric stretching
	3360 br			-O-H stretching
		3192 m sh		-N-H symmetric stretching
		3047 m br	3053 m br	-CH aromatic stretching
			2953 m br	-CH <sub>x</sub> stretching
	2974 w			-CH <sub>2</sub> asymmetric stretching
	2877 w			-CH <sub>2</sub> symmetric stretching
		2866 sh	2882 w br	-CH <sub>x</sub> stretching
		1753 vw		-C=O carboxylic stretching
			1707 s sp	-C=O carboxylic stretching
		1672 vw br		-C=O primary amide stretching
	1635m			-O-H bending
		1630 m sp		-C=C, -C=O stretching, -NH <sub>2</sub> scissoring
		1593 vw br		-C=C, -C=O stretching, -NH <sub>2</sub> scissoring
			1548w br	-C=C, -C=O stretching, -NH <sub>2</sub> scissoring
	1465 w			-CH <sub>2</sub> deformation bending
1427 m sp				-C=C- tangential displacement
		1409 s br	1406 s br	-C-N amide III stretching, -C-O hydroxyl stretching
			1329 s br	-C-OH carboxylic acid stretching
	1367 w			-CH <sub>2</sub> deformation bending
		1307 s br		-C-OH carboxylic acid stretching
			1245 m br	-CH <sub>x</sub> wagging
			1209 m sh	-CH <sub>x</sub> wagging
			1178 m sh	-C-OH carboxyl stretching
	1190 w			O-H...O-C stretching
1180 m sp				-C=C- tangential displacement
		1094 w sh		-C-O-C asymmetric ether stretching
	1055 br		1055 s br	-C-O-C- asymmetric stretching
		1042 m sp	1032 m sh	-C-O-C asymmetric ether stretching
			1022 m sh	-C-O-C asymmetric ether stretching
	914 w			-CH <sub>2</sub> -CH <sub>2</sub> - stretching
			935 w sp	-NH wagging, -C-O-C symmetric ether stretching
			905 w sp	-C-O-C symmetric ether stretching,
			874 vw br	-NH wagging, -C-O-C symmetric ether stretching
		827 m sp	826 s sp	-C-O-C epoxy bending
	807 w			
		714 m sp		-NH <sub>2</sub> wagging
572 s sp				-C-H radial displacement
522 s sp				-C-H radial displacement



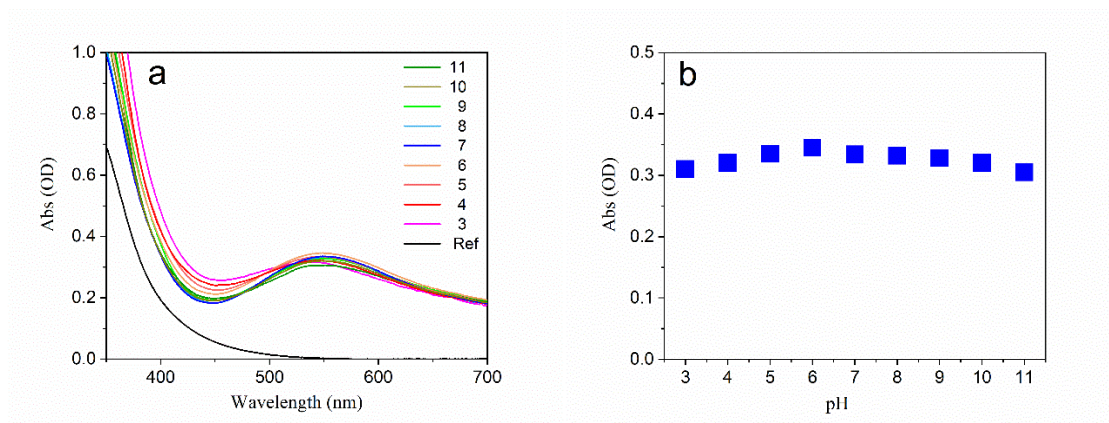
**Figure S2.** Dependence on the excitation wavelength of fluorescent emission intensity and peak wavelength in N-CDs-W-THF.



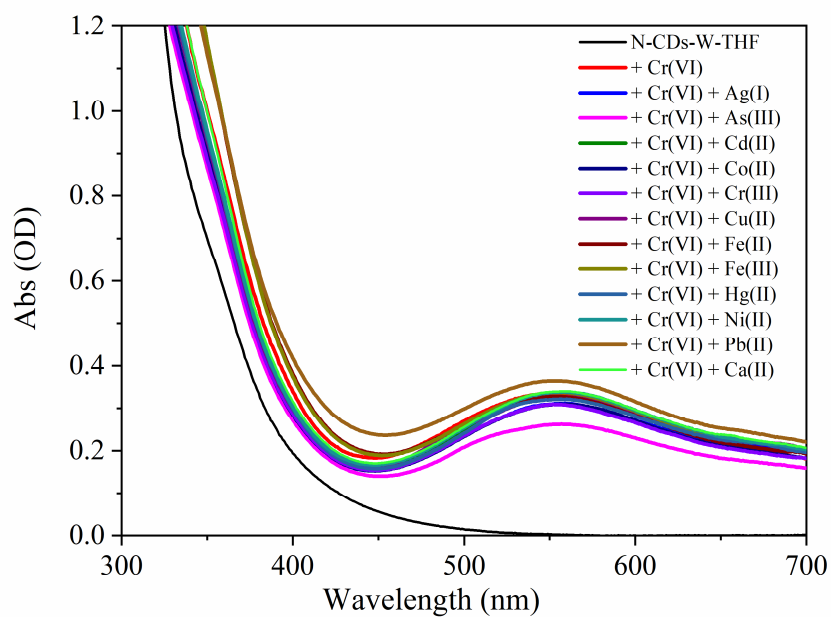
**Figure S3.** White-light image of the pristine N-CDs-W-THF sensing solution (Ref) and after the addition of different HM ions at a concentration of 100  $\mu$ M and calcium ions at 1 mM.



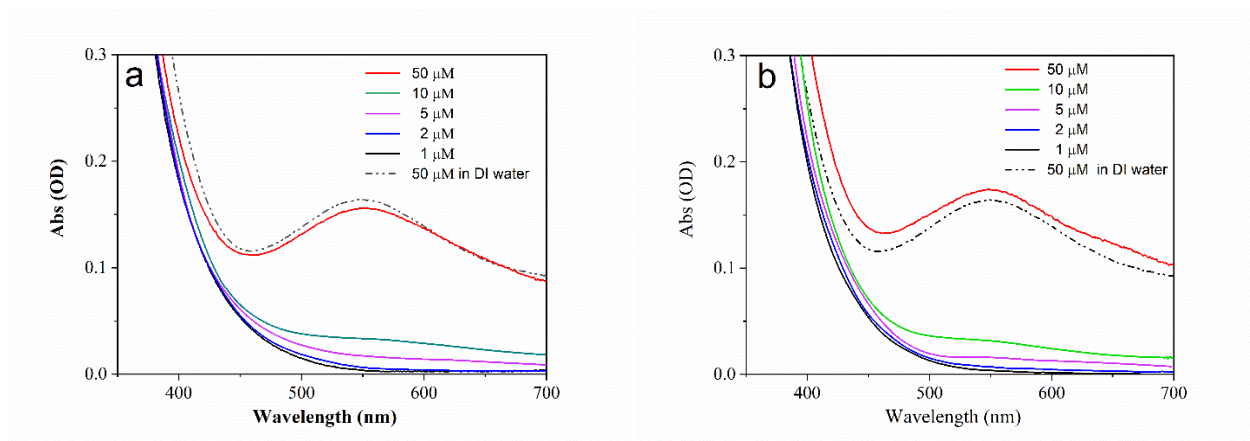
**Figure S4.** UV-vis absorption spectra of N-CDs-W-THF reference solution (black curve), Cr(VI) in DI water at 100  $\mu$ M (blue), N-CDs-W-THF solution (red) and N-CDs-W solution (green) in the presence of Cr(VI) ions at a concentration of 100  $\mu$ M.



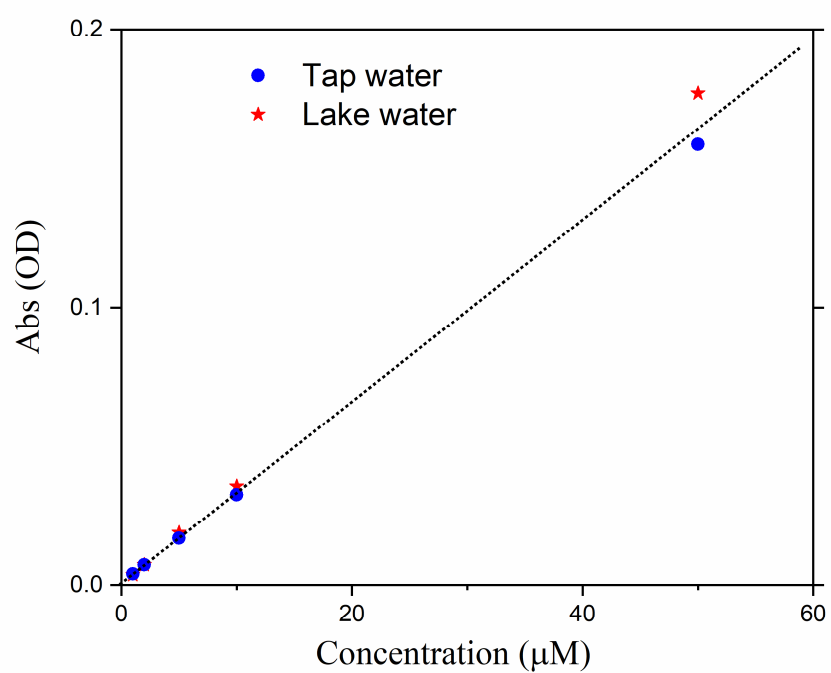
**Figure S5.** (a) UV-vis absorption spectra of N-CDs-W-THF and (b) absorbance at 550 nm of the sensing solution upon the addition of DI water with 100  $\mu$ M of Cr(VI) ions at different values of pH in the optimized volume ratio 2:1.



**Figure S6.** UV-vis absorption spectra of N-CDs-W-THF reference solution upon the addition of Cr(VI) and other interfering HM ions at a concentration of 100  $\mu\text{M}$  and calcium ions at 1 mM.



**Figure S7.** UV-vis absorption spectra of N-CDs-W-THF reference solution upon the addition of (a) tap water and (b) lake water spiked with different concentrations of Cr(VI).



**Figure S8.** Absorbance at 550 nm as a function of Cr(VI) concentration in tap water samples (circles) and lake water samples (stars). The dotted line is the calibration curve obtained with DI water.