

## Supporting Information

**Carbon Nanoparticles for Ferric ion detection and novel HFCNs-Fe<sup>3+</sup> Composite for NH<sub>3</sub> and F<sup>-</sup> estimation based on "TURN ON" Mechanism**

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# **1. Characterization**

## **1.1 UV Vis Absorption Spectroscopy and Photoluminescence Spectroscopy**

Shimadzu UV-Vis 2450 spectrophotometer was used for recording UV-Vis absorption spectra in the range of 200-650 nm. Photoluminescence spectra were taken by Horiba scientific Fluoromax-4C spectrophotometer. A quartz cuvette of 10 mm path length and volume 3.5 ml was used for collecting the spectra

## **1.2 Quantum Yield Measurement**

Absolute quantum yield is measured directly by using Edinburgh instruments FLS 980 . We have prepared a highly diluted solution of CNs and measured the absolute quantum yield.

## **1.3 Fourier Transform Infrared Spectroscopy (FTIR)**

Infra red spectra (IR) of CNs were recorded by using Thermo scientific Nicolet 6700. The use of the spectral subtraction provided reliable and reproducible results.

## **1.4 Raman Spectroscopy**

Invia Renishaw Raman spectrophotometer was used for recording the raman spectra of CNs.

## **1.5 CHNS Analysis**

Elementar vario Micro instrument was used for the CHNS analysis of CNs.

## **1.6 Field Emission Scanning Electron Microscopy (FESEM)**

Carl Zeiss Ultra Plus was used to record FESEM image

## **1.7 Transmission Electron Microscopy (TEM)**

TEM study was carried out by TEM TECHNAI G2 20 S-TWIN. A drop of highly diluted CNs solution was placed on Carbon coated Copper grid. Again a drop was added before drying it. Afterwards drying was carried at ambient temperature

## **1.8 Confocal laser scanning microscopy (CLSM)**

Confocal laser scanning microscopy (CLSM) (Ziess LSM 780) was used for cell imaging.

## **1.9 X-Ray Photoelectron Spectroscopy**

XPS study for HFCNs and SFCNs were carried out by using PHI 5000 Versa Probe II, FEI Inc.

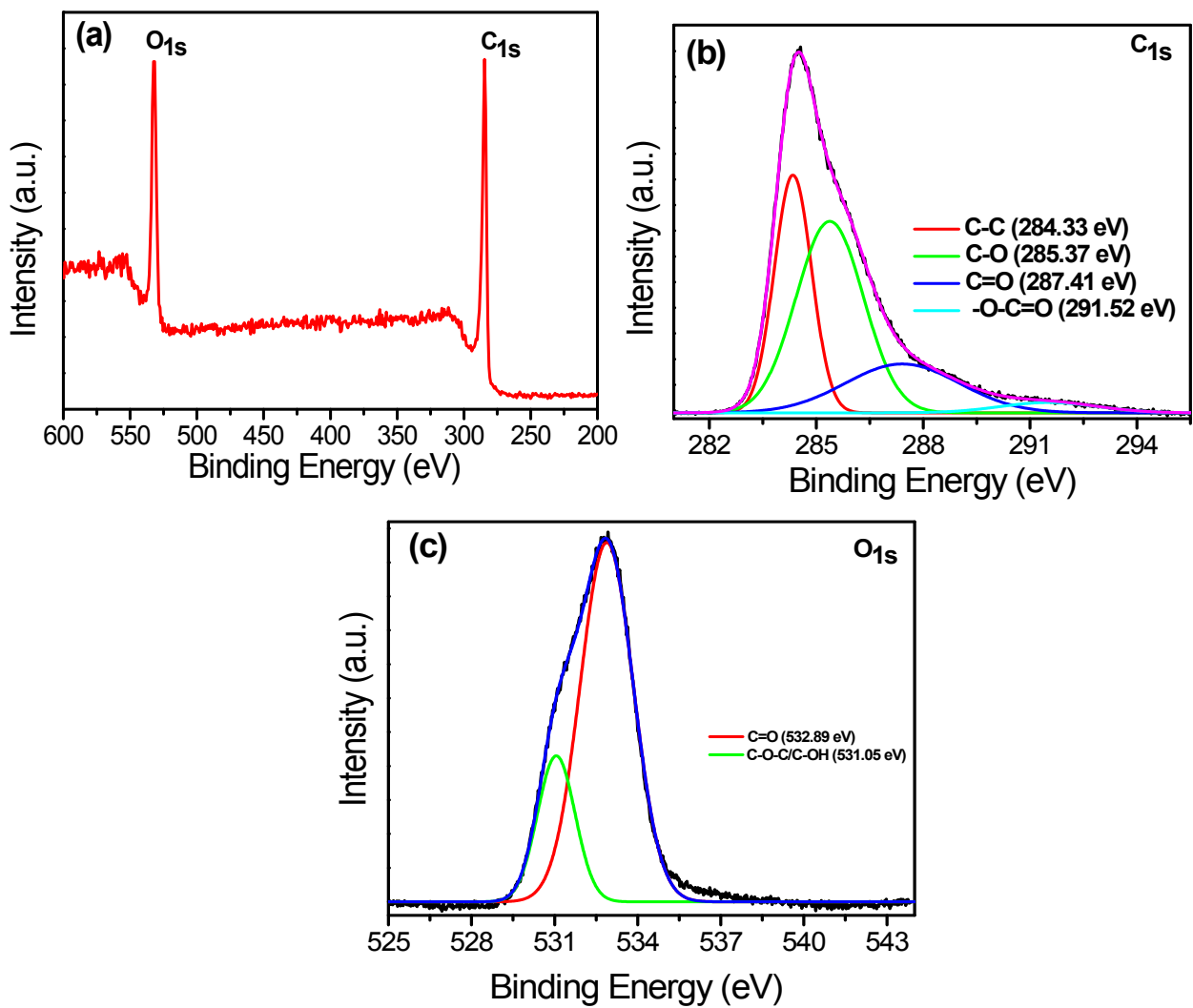


Fig. SI 1. (a) XPS broad spectrum (b) XPS C<sub>1s</sub> spectra (c) XPS N<sub>1s</sub> spectra (d) XPS O<sub>1s</sub> spectra of HFCNs.

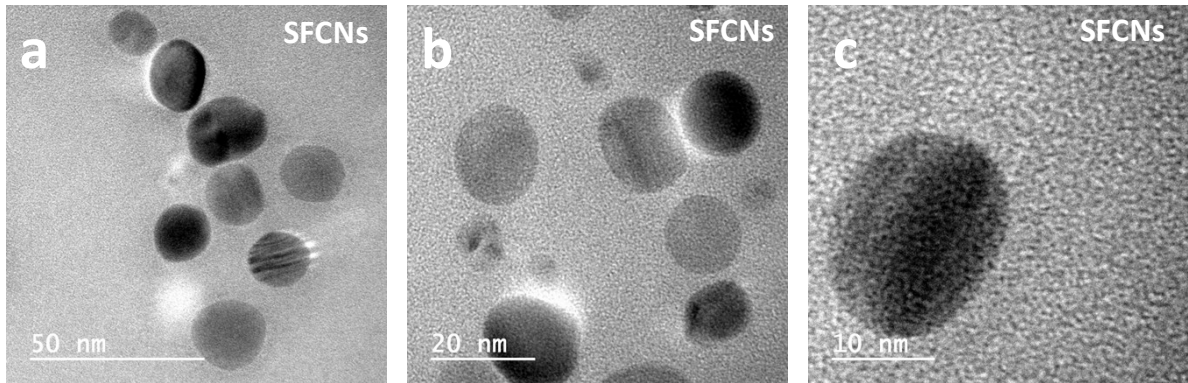


Fig. SI 2 HRTEM of SFCNs at different scale bar (a) 50 nm (b) 20 nm (c) 10 nm.

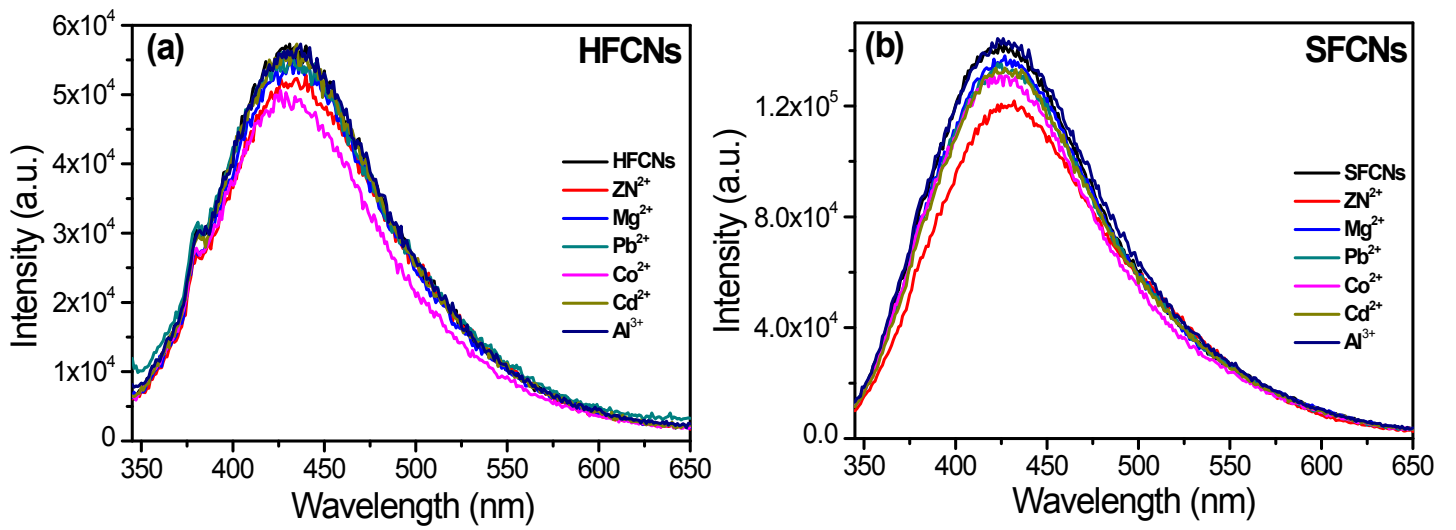


Fig. SI 3 (a and b) Fluorescence response of CNs in the presence of different cations.

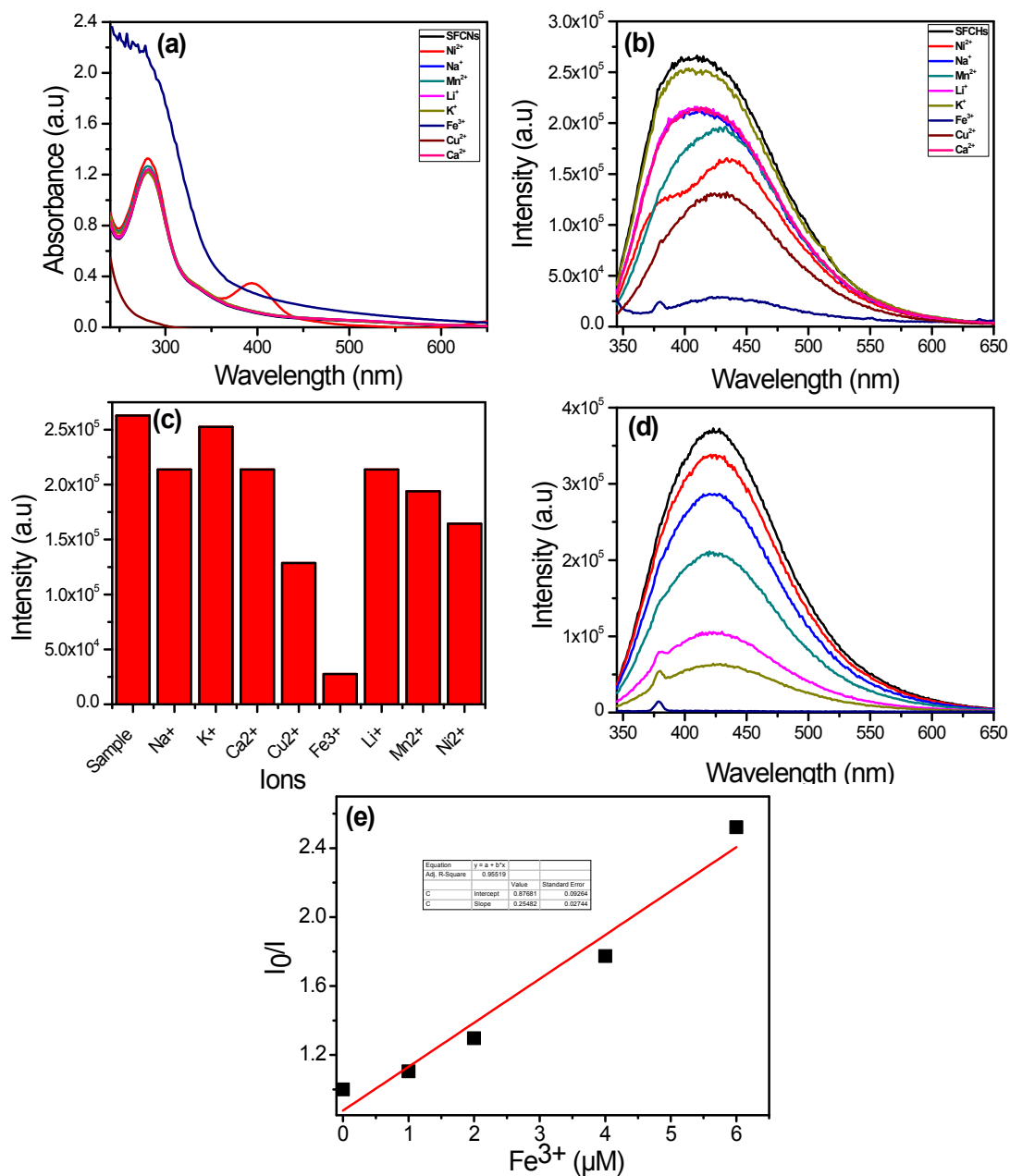


Fig. SI 4. (a) The Optical response of SFCNs in the presence of different cations (b) Fluorescence response of SFCNs in the presence of different cations (c) Performance of SFCNs: comparison of fluorescence intensities in presence of different metal ions. (d) Typical PL quenching of SFCNs in different concentrations of Hb 0, 1, 2, 4, 6, 8 and 10  $\mu\text{M}$  (a–g): (e) Linear relationship between  $I_0/I$  and Hb concentration in the range of 0–6  $\mu\text{M}$ .

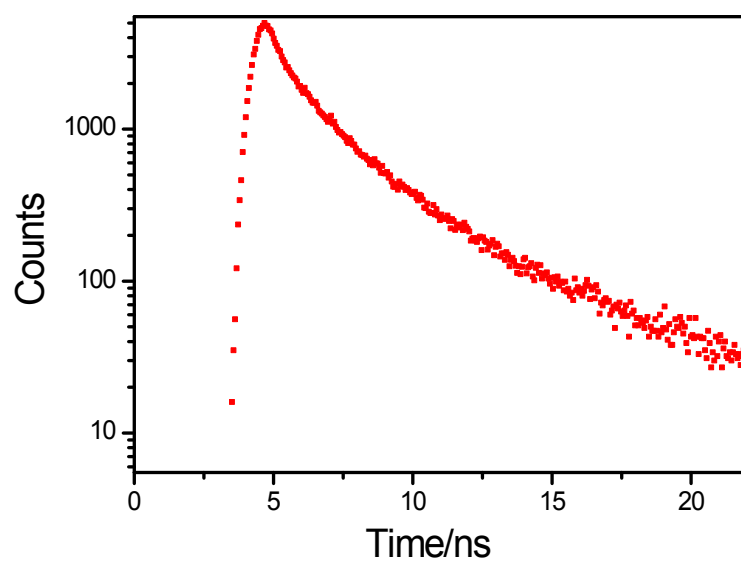


Fig. SI 5 Photoluminescence lifetime decay curves of the HFCNs -Fe<sup>3+</sup> composite.

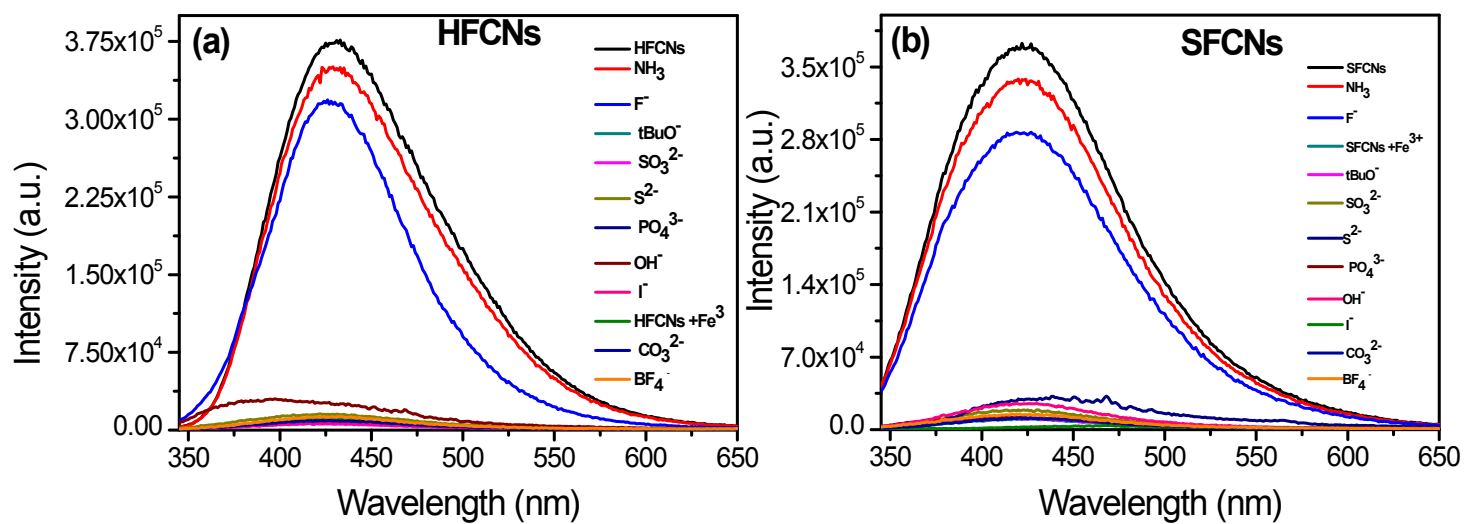


Fig. SI 6 (a and b) Fluorescence response of CNs in the presence of different anion.



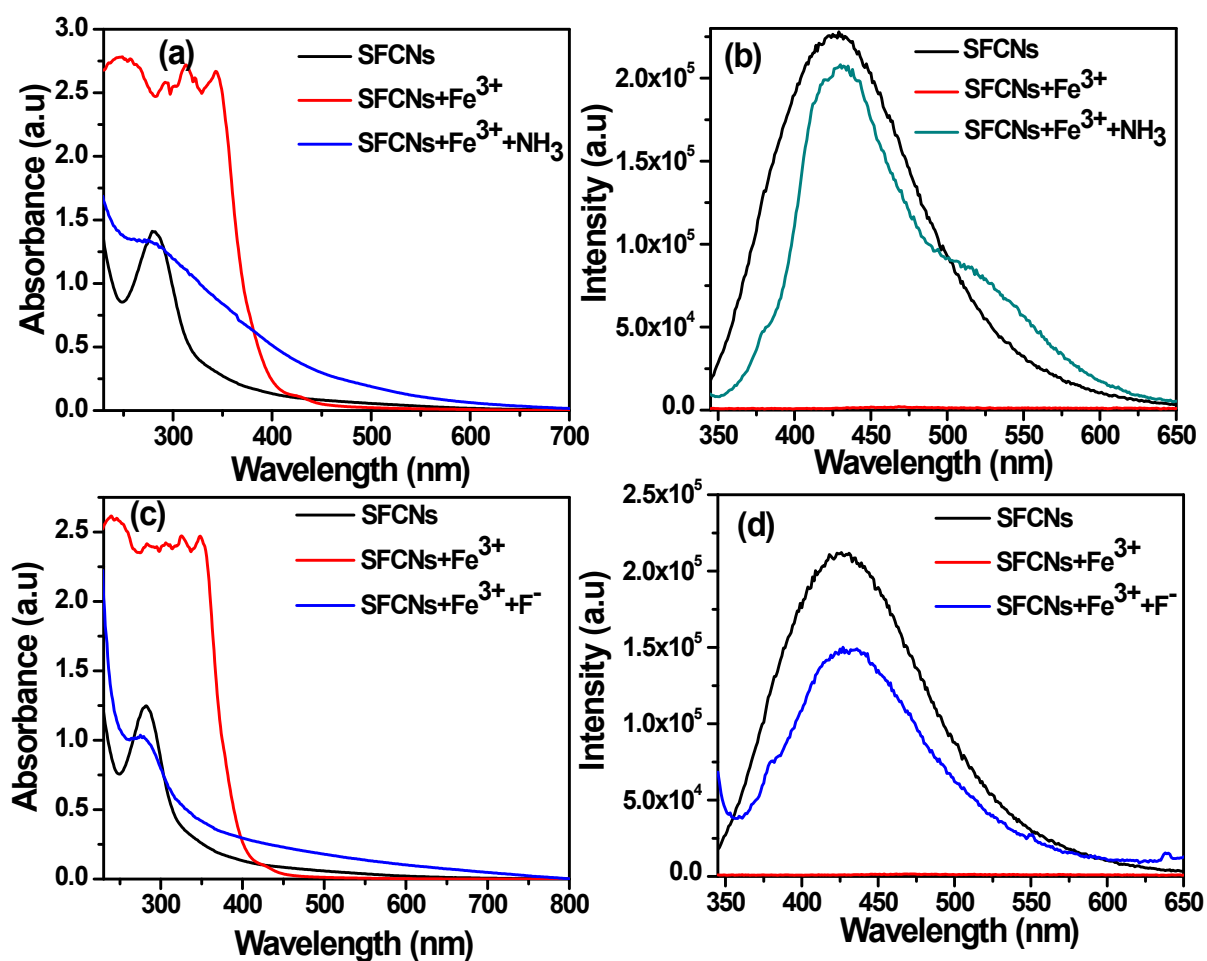


Fig. SI 7 (a) The Optical response of SFCNs in the presence of different inputs condition Fe<sup>3+</sup> and NH<sub>3</sub> horizontal line (dashed) that marks the threshold value. (b) Fluorescence response of SFCNs the presence of different inputs condition Fe<sup>3+</sup> and NH<sub>3</sub>, (c) The Optical response of SFCNs in the presence of different inputs condition Fe<sup>3+</sup> and F<sup>-</sup> (d) Fluorescence response of SFCNs the presence of different inputs condition Fe<sup>3+</sup> and F<sup>-</sup>.