

## Supplementary file of

### Simple Fluorescence Chemosensor for the Detection of Calcium Ion in Water Samples and Its Application in Bio-Imaging of Cancer Cells

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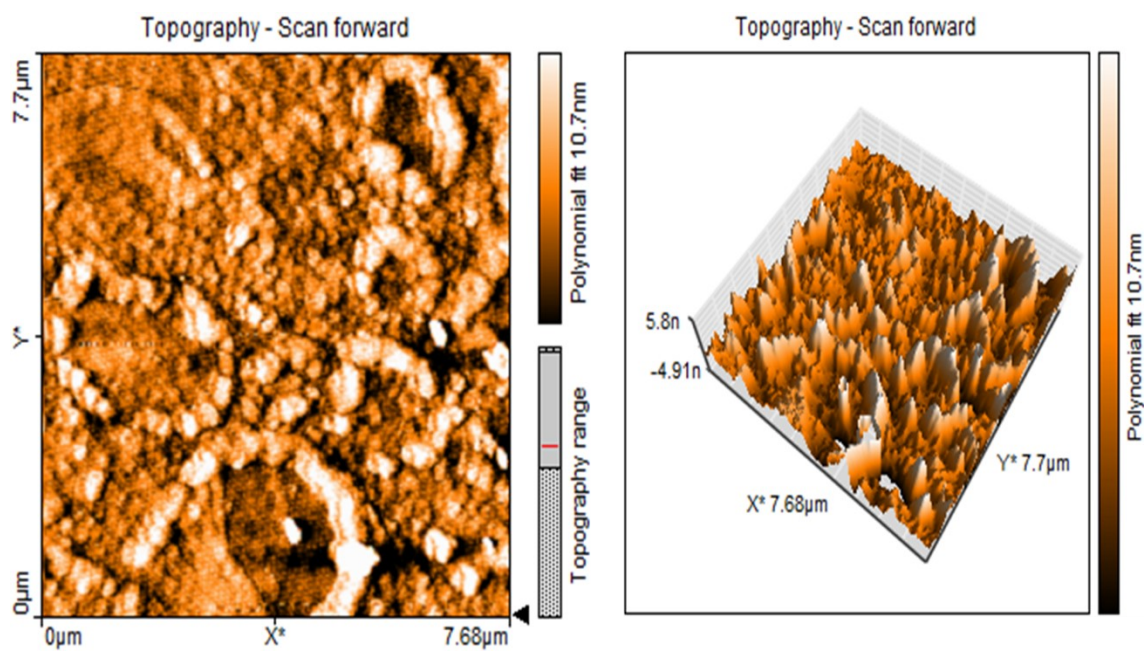
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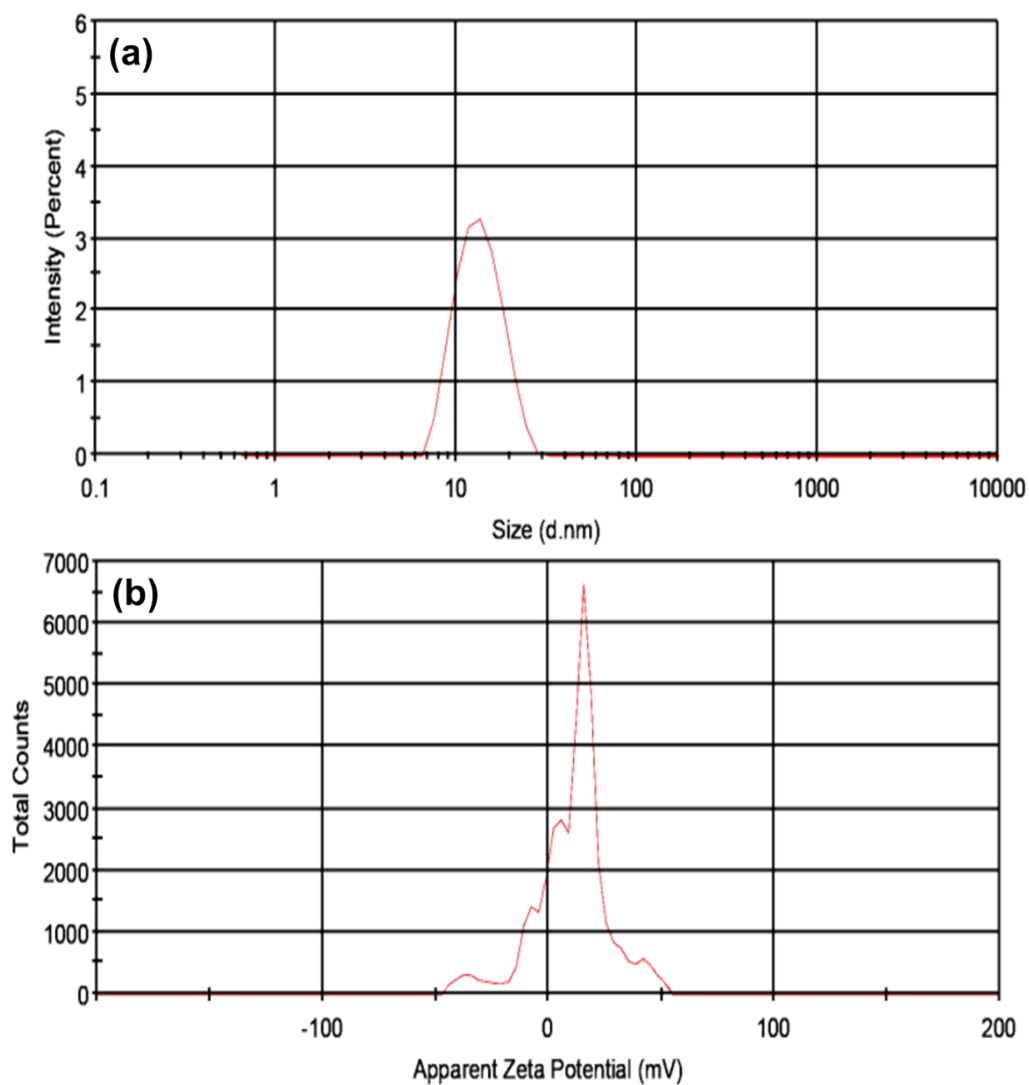
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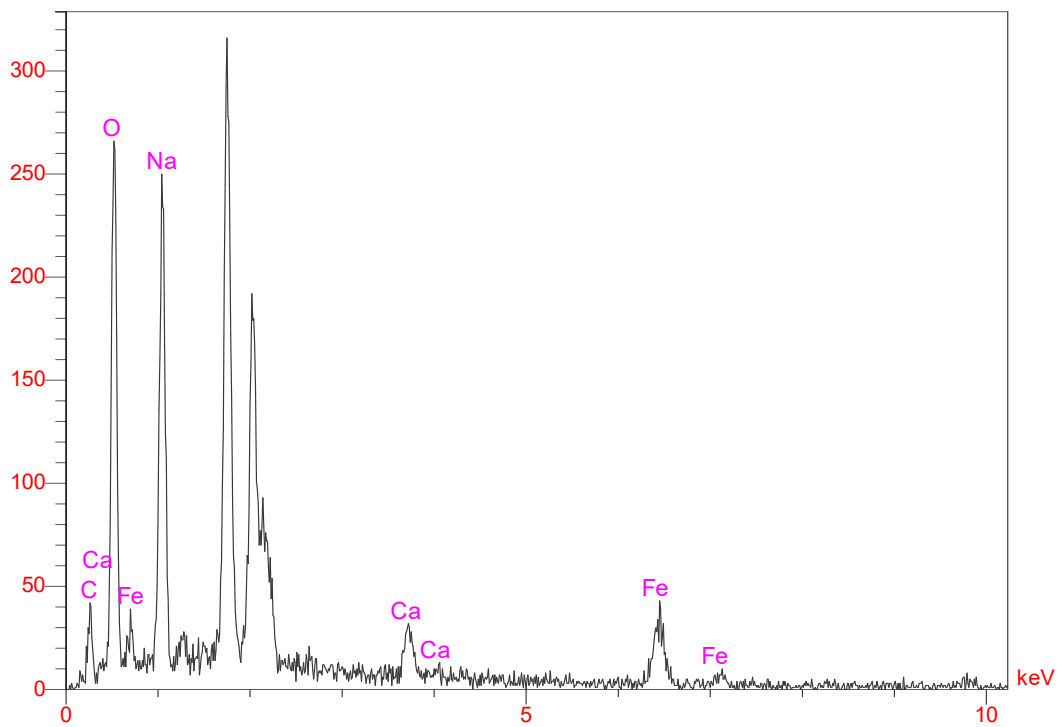
## Figures and Table



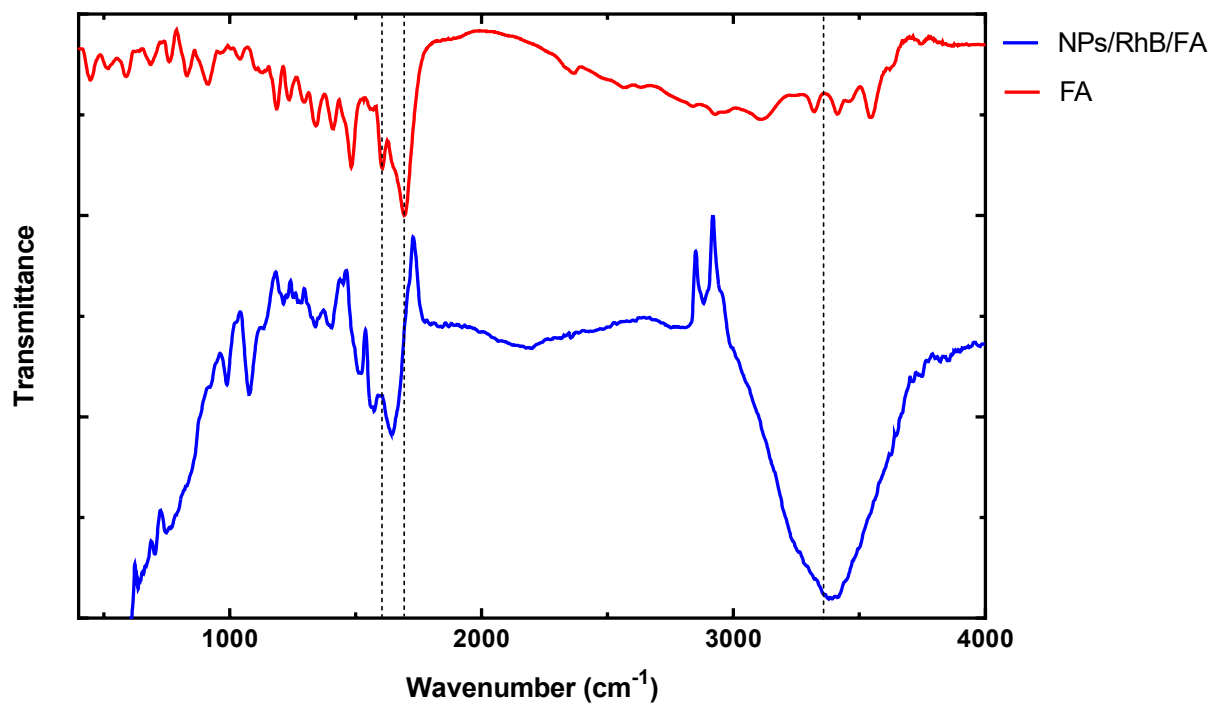
**Fig S1.** AFM images of the MNPs-PDNPs/RhB/FA nanoparticles.



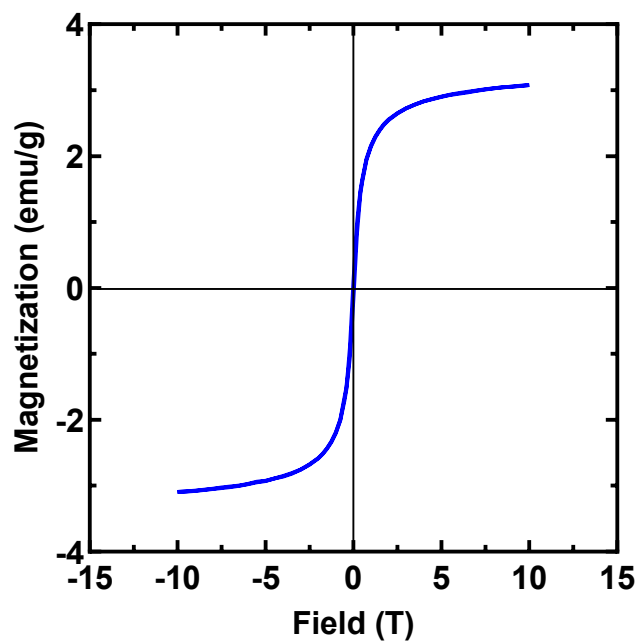
**Fig. S2.** Size (a) and zeta-potential (b) analysis of the MNPs-PDNPs/RhB/FA nanoparticles.



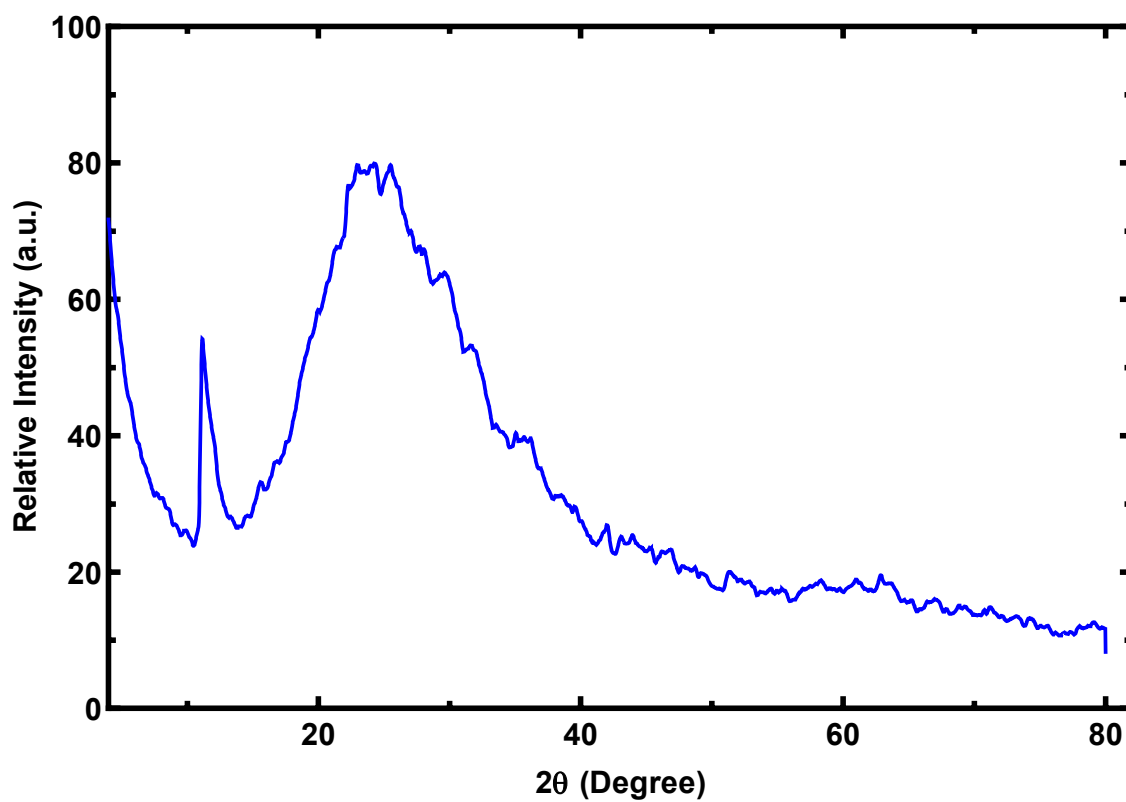
**Fig. S3.** EDX analysis of the MNPs-PDNPs/RhB/FA nanoparticles.



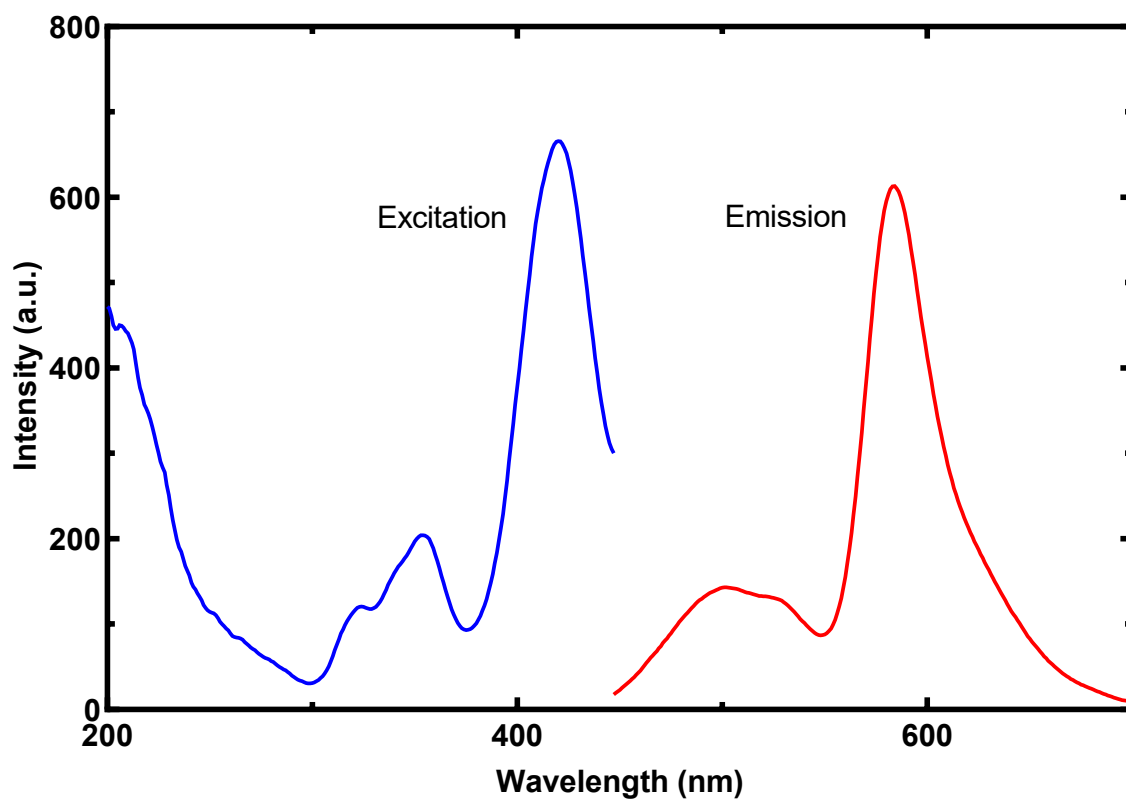
**Fig. S4.** FTIR spectra of MNPs-PDNPs/RhB/FA nanoparticles and FA.



**Fig. S5.** Vibrating sample magnetometer (VSM) analysis of the MNPs-PDNPs/RhB/FA nanoparticles obtained at room temperature.

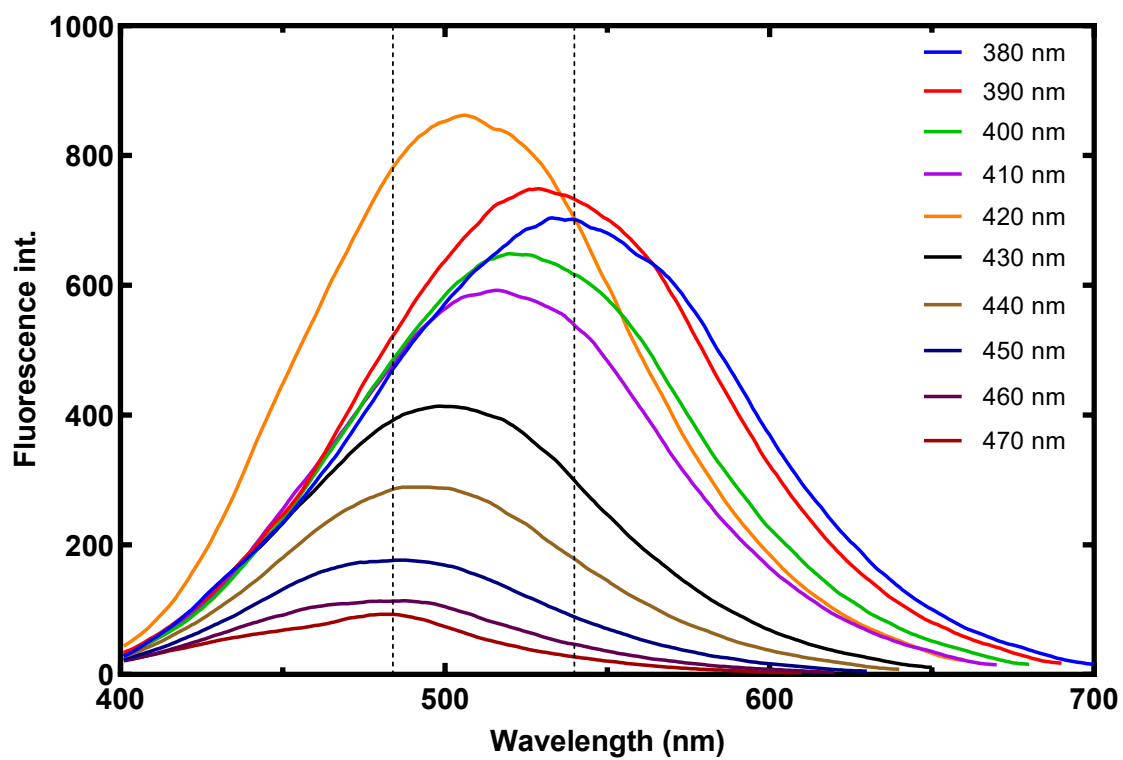


**Fig. S6.** XRD analysis of the MNPs-PDNPs/RhB/FA nanoparticles at the 2-theta range of 4-80°.

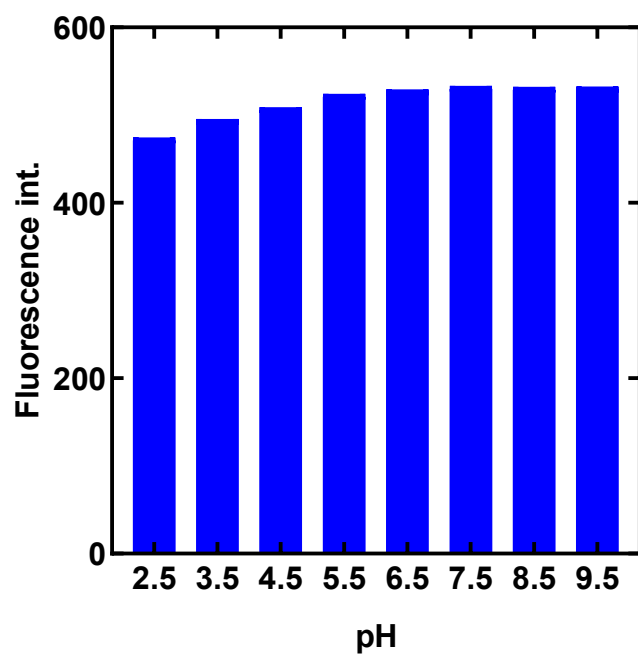


**Fig. S7.** Excitation and emission of the MNPs-PDNPs/RhB/FA nanoparticles.

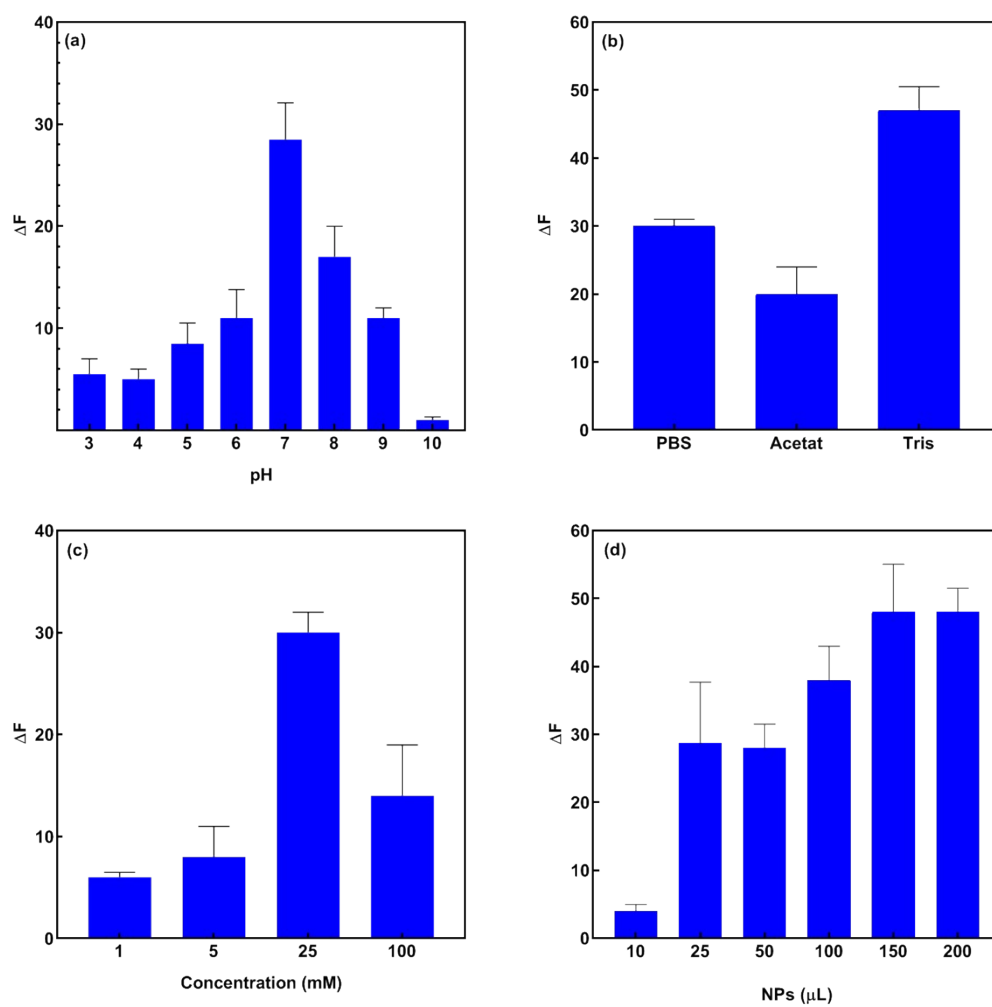




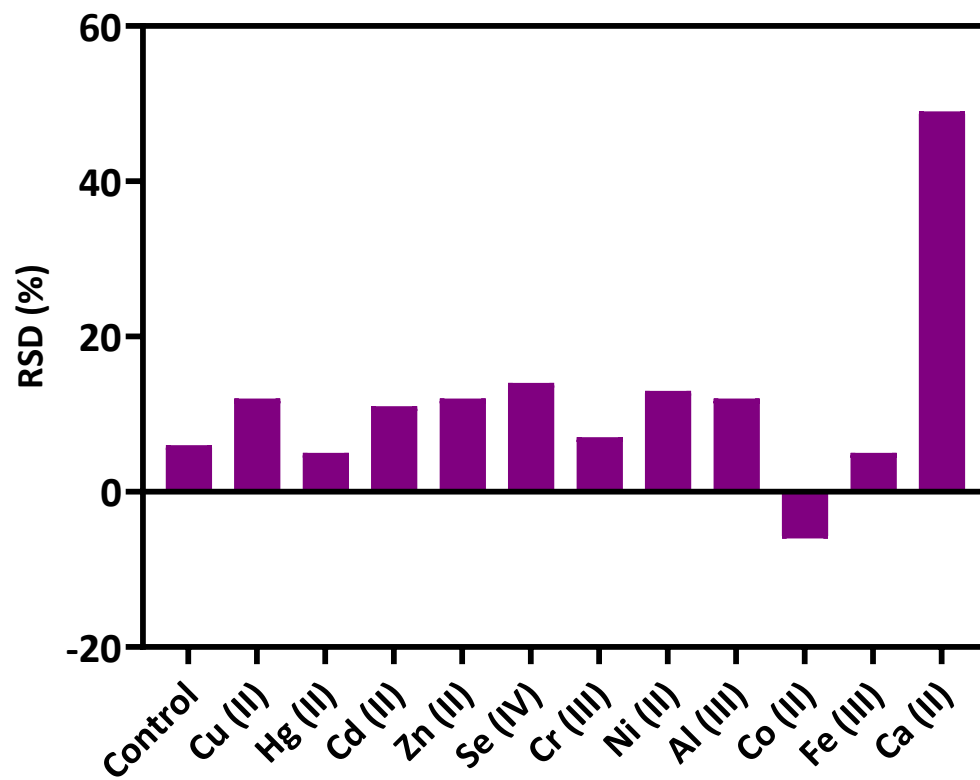
**Fig. S8.** Effect of various excitation wavelengths on the fluorescence spectra and the peak position of the MNPs-PDNPs/RhB/FA nanoparticles.



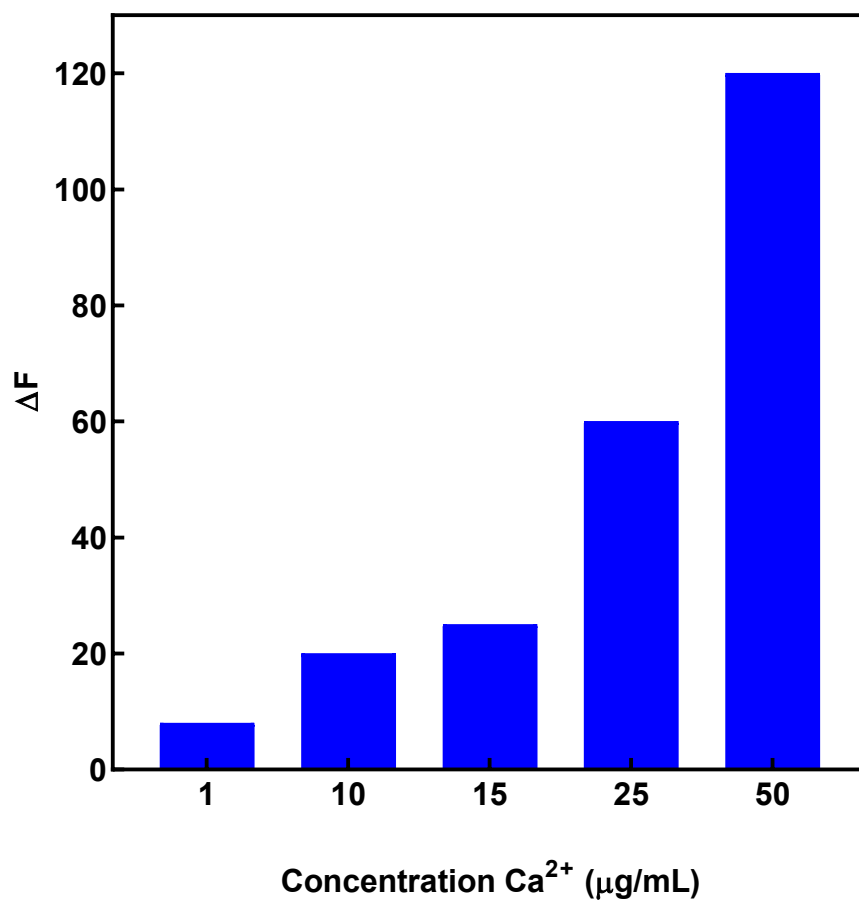
**Fig. S9.** pH effect on the fluorescence emission of the MNPs-PDNPs/RhB/FA nanoparticles.



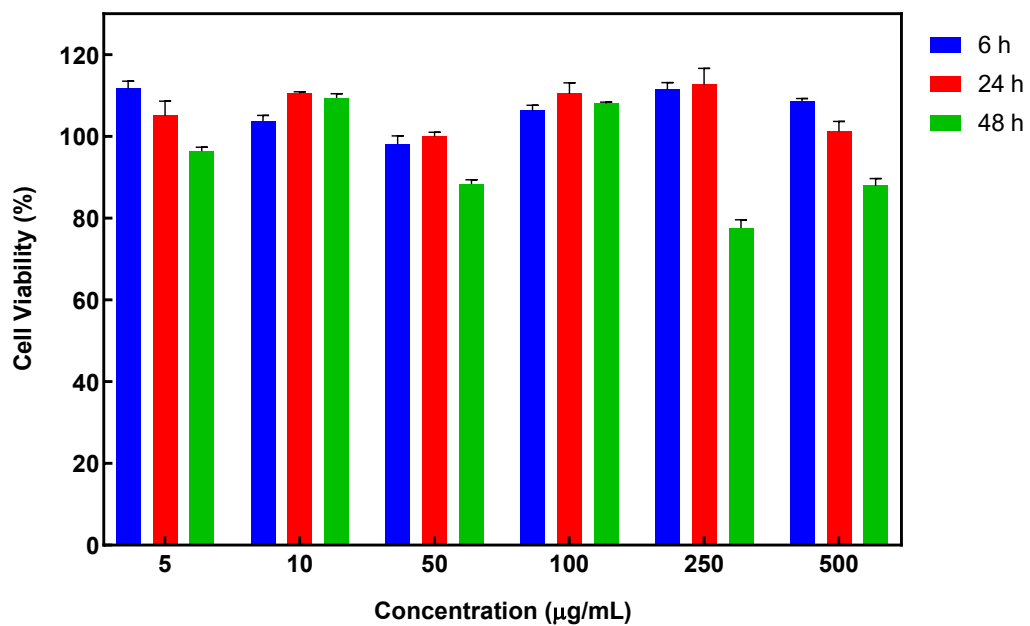
**Fig. S10.** Optimization of effects of (a) pH, (b) Buffer type, (c) buffer concentration, (d) and concentration of MNPs-PDNPs/RhB/FA.



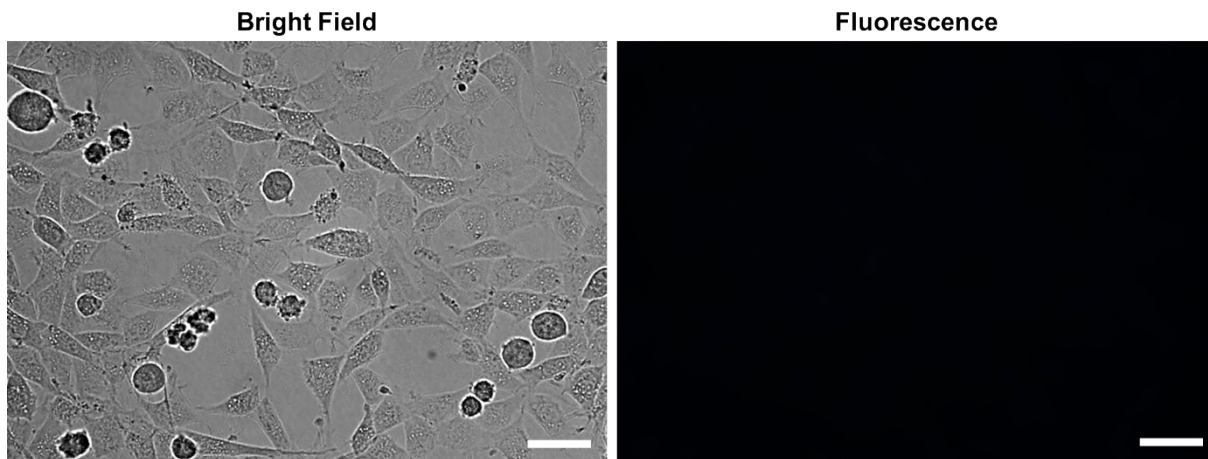
**Fig. S11.** Effect of interfering agents ( $\text{Al}^{3+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Se}^{4+}$ ,  $\text{Cr}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Cu}^{2+}$ , and  $\text{Co}^{2+}$ ) on the probe response in the presence of Ca ions.



**Fig. S12.** Quantitative detection of Ca in live cells.



**Fig. S13.** Cell viability of MNPs-PDNPs/RhB/FA nanoparticles on the MCF 7 cell lines.



**Fig. S14.** Uptake of the MNPs-PDNPs/RhB/FA nanoparticles (200  $\mu\text{g}/\text{mL}$ ) to the FR-negative HEK 293 normal cells (scale bar 20  $\mu\text{m}$ ).

**Table S1.** EDS profile of MNPs-PDNPs/RhB/FA nanoparticles.

Element	W%*	A%**
C	20.21	28.64
O	25.19	30.61
Na	31.75	33.78
Ca	22.85	6.97
Fe	20.21	28.64
Total	100.00	100.00

\* weight and \*\* atomic percentages



Table S2. Analytical performances of fluorescence strategies for calcium determination

<b>Approach</b>	<b>Sample</b>	<b>LOD*</b>	<b>Linear range</b>	<b>Reference</b>
EGTA-modified CDs	Water	380 nM	15–300 $\mu$ M	[29]
Ag/Au nanocluster/carbon dots nanohybrids	tap and mineral	5 nM	20 – 600 nM	[30]
EDTA-CDs	Serum	77 pM	1-10 nM	[31]
Silver nanocluster–nanoparticle complexes (AgNCs–AgNPs)	Serum	-	0.20-1.19 mM	[32]
Oxytetracycline	water	125 nM	0–3 $\mu$ M	[33]
QDs-aptamer	water	3.77 pM	-	[34]
CuNCs	cell	220 nM	2–350 $\mu$ M	[35]
MNP-PDNP/RhB/FA	Live cell	-	0.5 – 2.5 $\mu$ M	This work
	water samples	-	12.5 $\mu$ M to 500 $\mu$ M	

\*Limit of detection