

Supporting Information

Quantum Dot-Based Hybrid Coacervate Nanodroplets for Ultrasensitive Detection of Hg²⁺

*Shivendra Singh, Jamuna K. Vaishnav and Tushar Kanti Mukherjee **

Discipline of Chemistry, Indian Institute of Technology Indore, Simrol, Khandwa Road, Indore-453552, M.P., India.

* Corresponding author e-mail: tusharm@iiti.ac.in

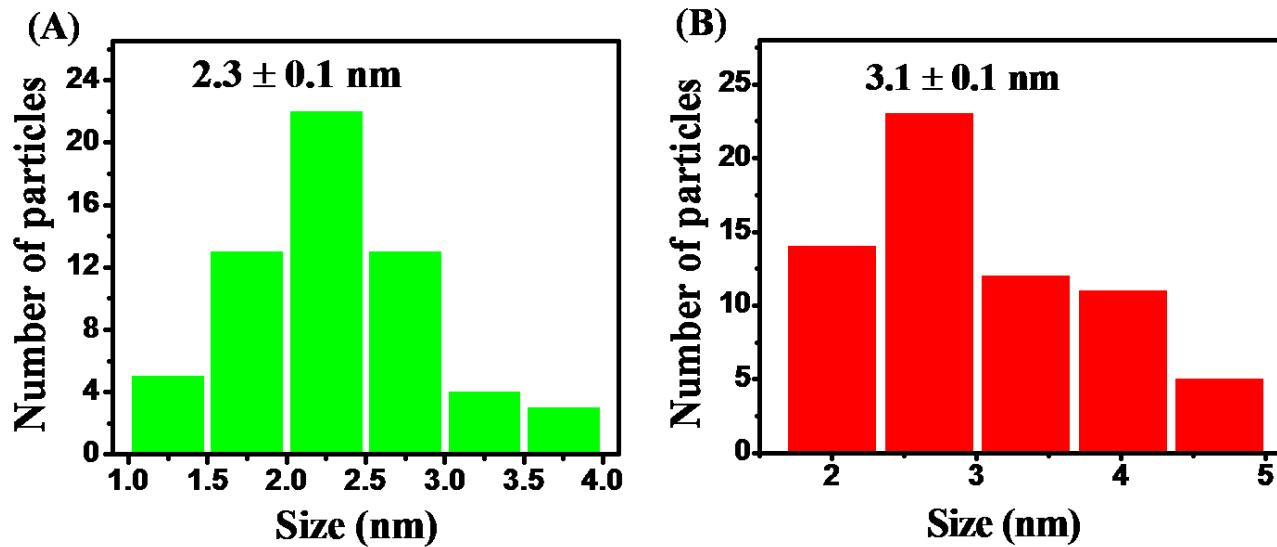


Figure S1. Size distribution histograms estimated from AFM images of (A) QD⁵²³, and (B) QD⁶⁶⁶.

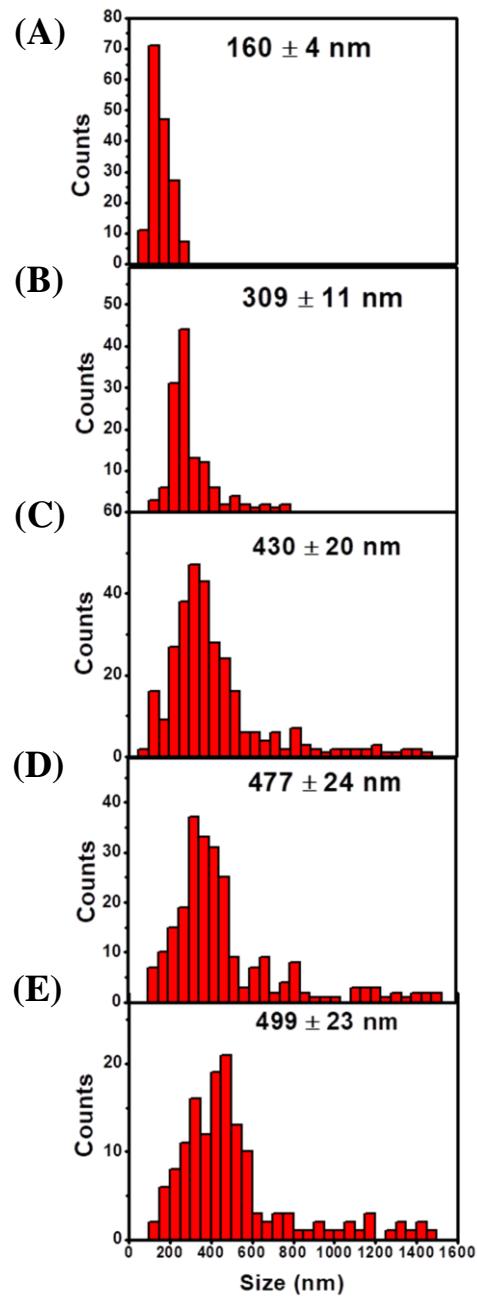


Figure S2. Size distribution histograms estimated from SEM images of G-ND at (A) 1 h, (B) 2 h, (C) 4 h, (D) 6 h, and (E) 12 h of equilibration time.

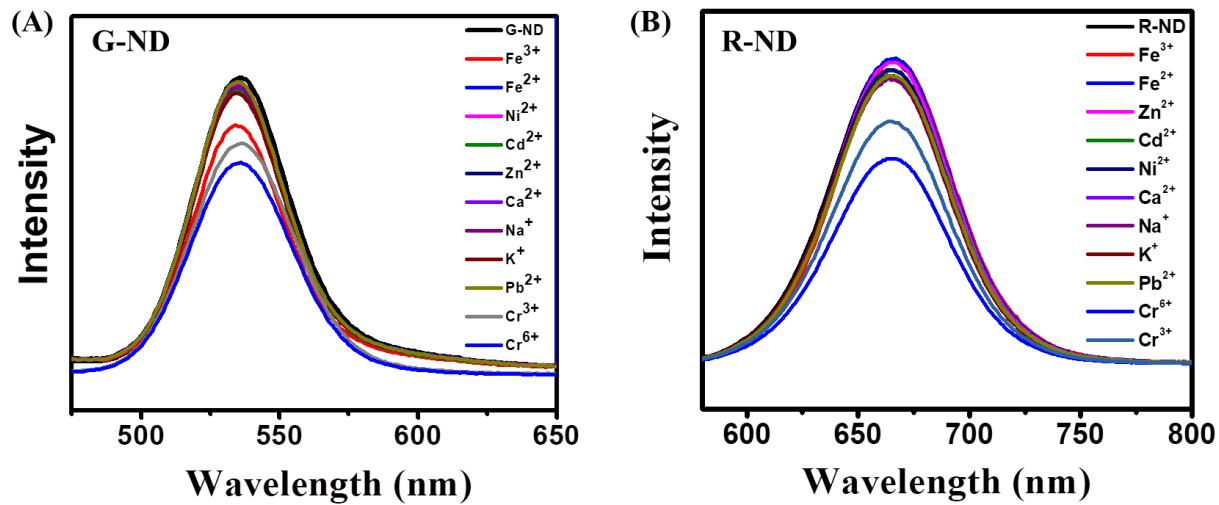


Figure S3. PL spectra of (A) G-ND and (B) R-ND in the presence of various interfering metal ions.

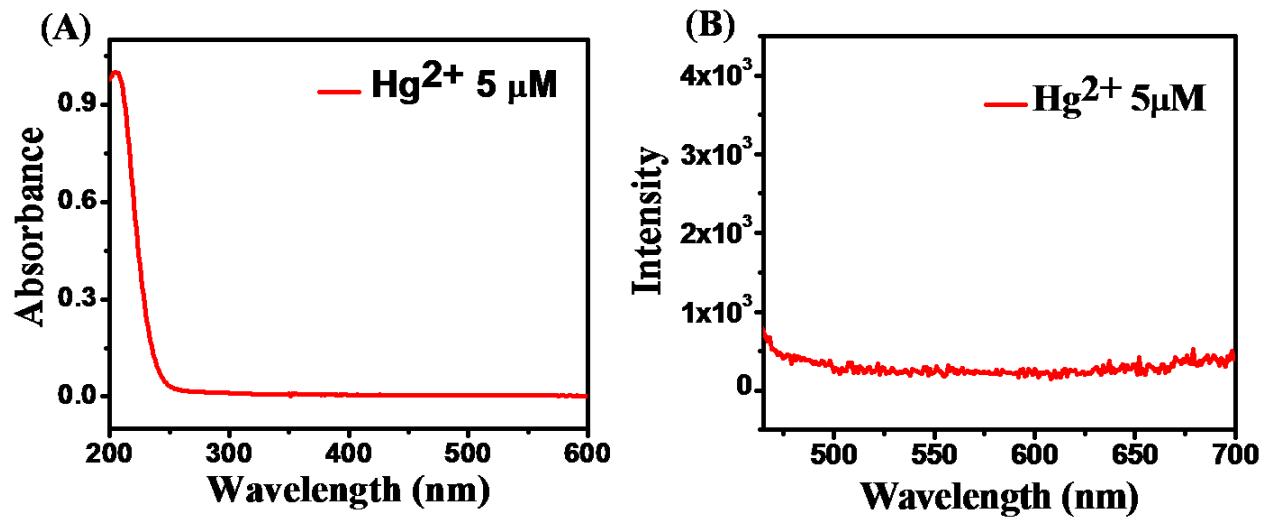


Figure S4. (A) Absorbance spectrum and (B) Emission spectrum of $5 \mu\text{M} \text{ Hg}^{2+}$.

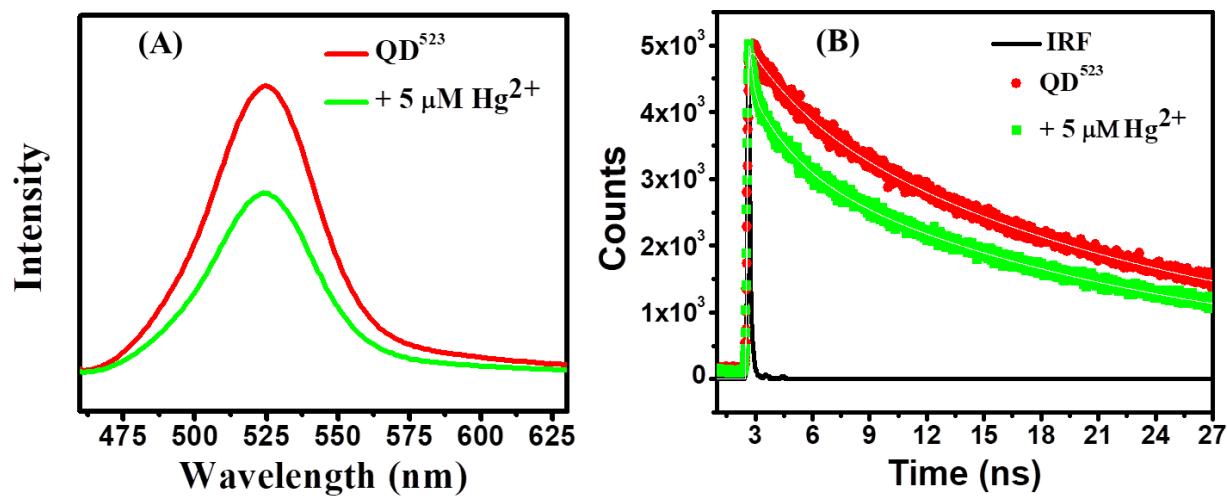


Figure S5. (A) PL spectra and (B) PL decay traces of QD^{523} in the absence and presence of $5 \mu\text{M} \text{Hg}^{2+}$.

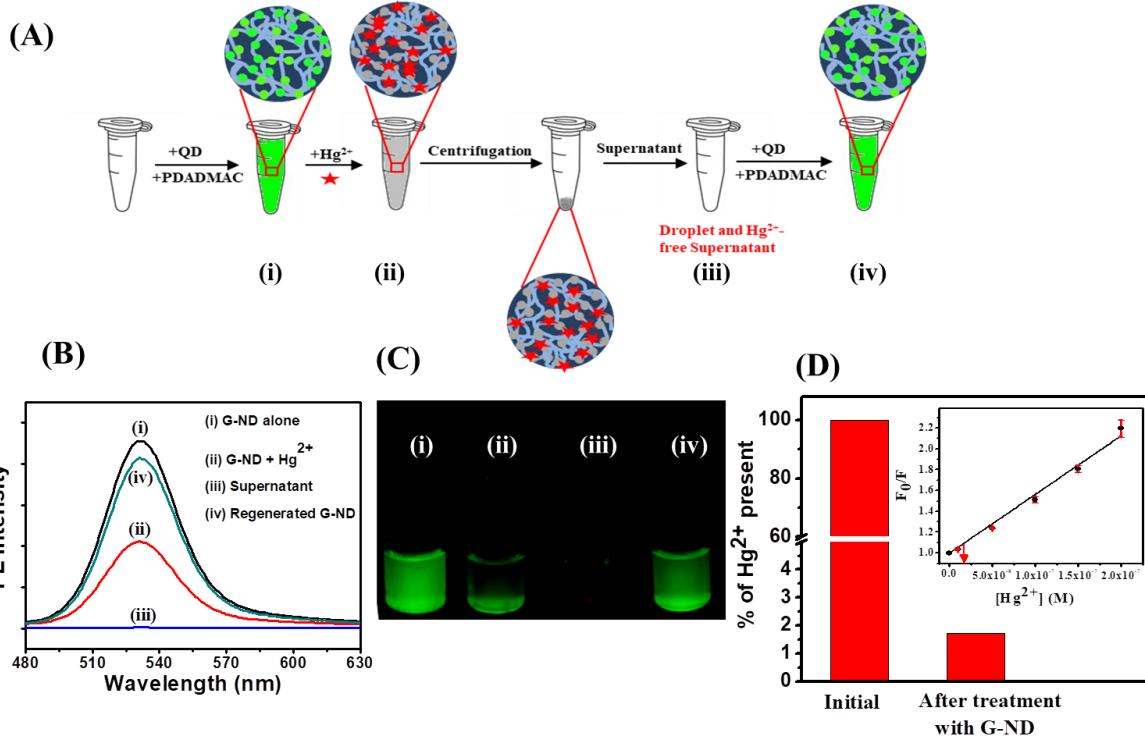


Figure S6. (A) Schematic illustration of Hg²⁺ sequestration from contaminated water using G-ND via centrifugation process. (B) PL spectra of (i) initial G-ND, (ii) G-ND + 1 μM Hg²⁺, (iii) supernatant, (iv) regenerated G-ND in supernatant. (C) Corresponding UV light photograph of solutions at different stages of Hg²⁺ sequestration process. (D) Quantitative estimation of sequestration efficiency of Hg²⁺ from standard calibration curve. The inset shows the PL calibration plot for G-ND and Hg²⁺ system.

Table S1. Changes in the Mean Size of nanodroplets and LOD of Hg²⁺ sensing as a Function of Equilibration Time.

Equilibration Time	Mean Size	LOD
1 h	160±4 nm	1.87 nM
2 h	309±11 nm	1.72 nM
4 h	430±20 nm	1.32 nM
6 h	477±24 nm	1.27 nM
12 h	499±23 nm	1.25 nM

Table S2. The PL Lifetime Decay Parameters of QD⁵²³ and G-ND in the Absence and Presence of 5 μM Hg²⁺

Sample	τ_1 (ns)	a_1	τ_2 (ns)	a_2	τ_3 (ns)	a_3	$\langle\tau\rangle$ (ns)	χ^2
QD	4.38	0.16	0.30	0.23	23.13	0.61	14.9	1.03
QD + Hg ²⁺	3.34	0.15	0.17	0.54	22.8	0.38	9.20	1.08
G-ND	1.30	0.05	0.03	0.90	7.07	0.05	0.50	1.10