Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information

1.1. Material Characterization

1.1.1. FTIR analysis

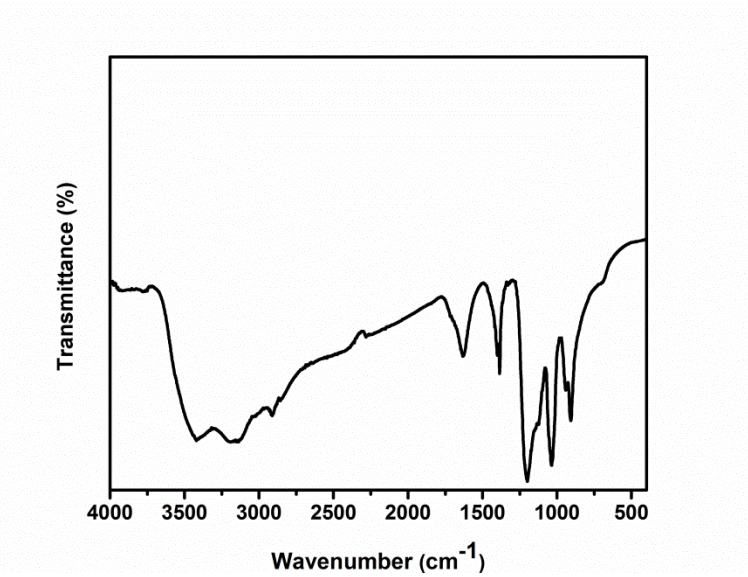

Figure S1: FTIR spectrum of CDs.

1.1.2. Size distribution of CDs

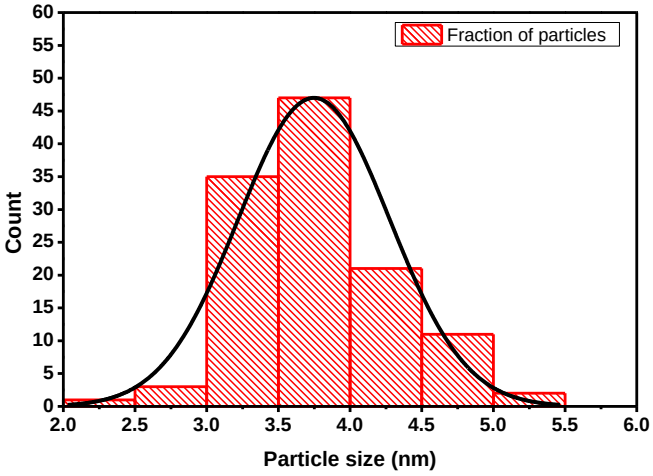

Figure S2: Size distribution of CDs.

1.1.3. Elemental composition of CDs and MoS_2 NS

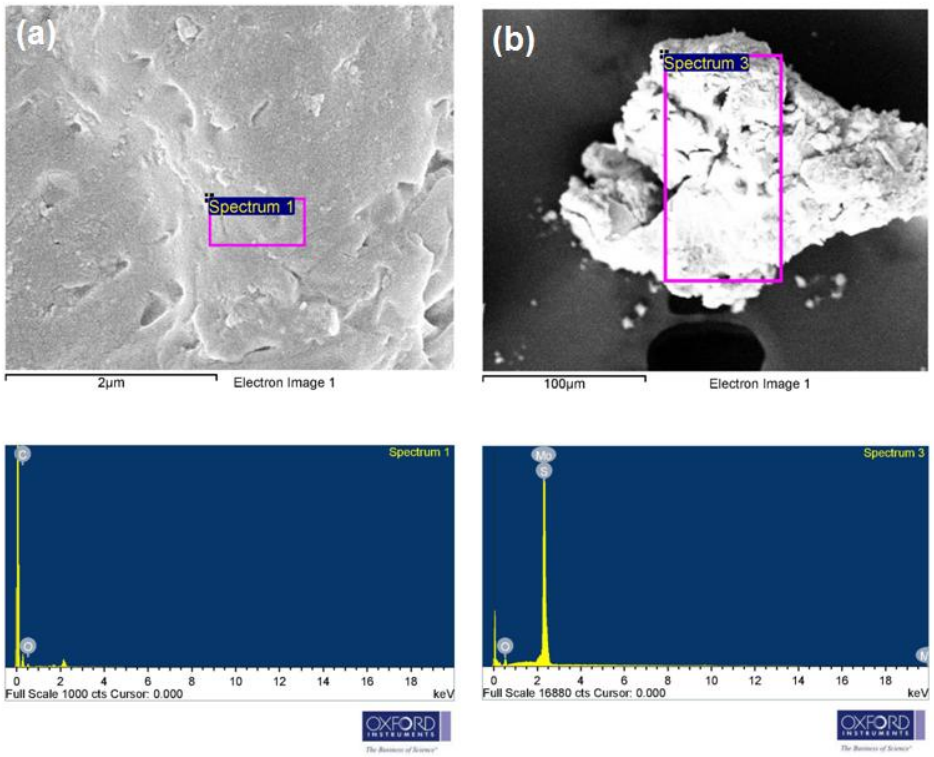

Figure S3: EDX spectra of (a) CDs and (b) MoS_2 NS.

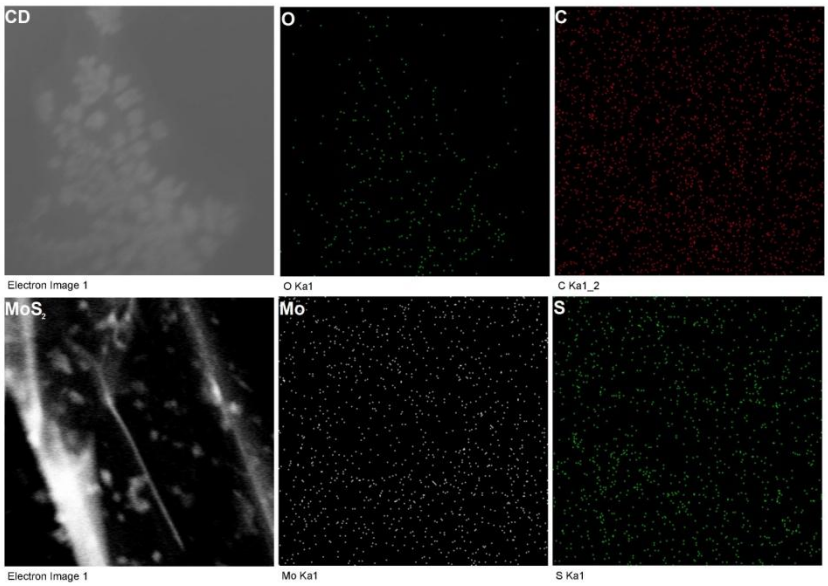

Figure S4: Elemental mapping of CDs and MoS_2 NS.

1.2. Optical properties of CDs

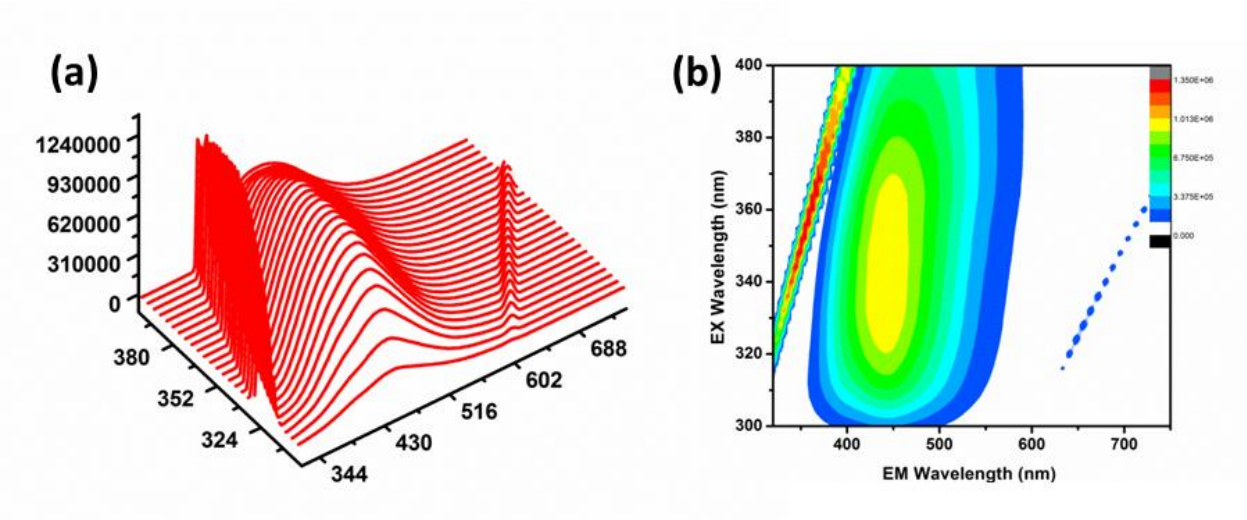

Figure S5: Excitation-emission spectra and intensity mapping of CDs (300-400 nm).

1.3. Effect of pH and time

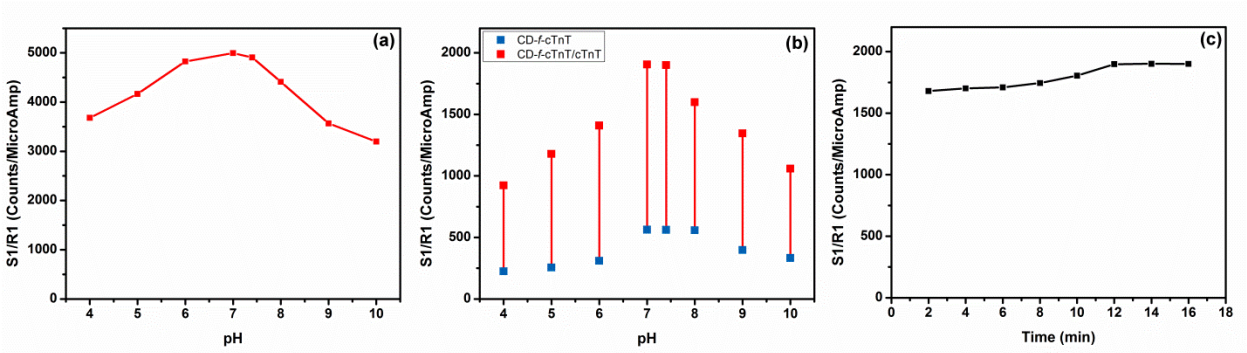

Figure S6: (a) Effect of pH on fluorescence intensity of anti-cTnT-f-CDs; **(b)** Effect of pH on fluorescence intensity of anti-cTnT-f-CDs/MoS_2 in presence of 50 ng mL^{-1} cTnT and **(c)** Effect of time on restored fluorescence intensity of anti-cTnT-f-CDs /MoS_2 in presence of 50 ng mL^{-1} cTnT

1.4. Comparison of analytical performance of various cTnT assays

Table S1: Comparison of analytical performance of different literature reported cTnT sensing platforms and commercial assays

	Probe/Device	Method/Type	LoD ng mL^{-1}	99th ng mL^{-1}	Limit ng mL^{-1}
Contemporary research	Single-walled carbon nanotube[1]	Upconversion fluorescence	100	--	100-2500
	Screen printed electrode[2]	Electro-chemical	0.15	--	0-700
	((E)-4-[(4-decyloxyphenyl)diazenyl]-1-methylpyridinium iodide)/Au[3]	Electro-chemical	0.10	--	0.2 -1.0
	Carbon nanotube[4]	Electro-chemical	0.033	--	0.1-10
	CdTe[5]	Fluorescence	0.221	--	0–160
	Gold nanoparticle[6]	Fluorescence	0.5	--	0.5–40
	Current	Upconversion fluorescence	0.12		0.5-50
Commercial	Abbott ARCHITECT[7]		<0.01	0.028	--
	Radiometer AQT90 cTnT[8]	Time-resolved fluorescence (POC level)	0.01	0.017	--
	Cobas h 232 POC system[9]	Visual detection (POC level)	--	NAD	0.05 – 2
	Roche CARDIAC Trop T Sensitive test (visual)[10]	Visual detection (POC level)	--	NAD	Positive result >0.1
	Elecsys® Troponin T high sensitive[11]	Clinical & immunochemistry test	0.005	0.014	--

NAD= the 99th percentile concentration of the value distribution of a reference population is indeterminate

References:

1. J. Zhang, S. Kruss, A.J. Hilmer, S. Shimizu, Z. Schmois, F. De La Cruz, P.W. Barone, N.F. Reuel, D.A. Heller, M.S. Strano, Adv. Healthcare Mater. 2014, 3(3), 412-423.

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3. D. Brondani, J. V. Piovesan, E. Westphal, H. Gallardo, R. A. F. Dutra, A. Spinelli, I. C. Vieira, Analyst,2014, 139(20), 5200-5208.

4. S. L. R. Gomes-Filho, A. C. M. S. Dias, M. M. S. Silva, B. V. M. Silva, R. F. Dutra, Microchem. J. 2013, 109, 10-15.

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8. https://www.radiometer.in/en-in/products/immunoassay-testing/aqt90-flex-immunoassay-analyzer/troponin-test-on-the-aqt90-flex-immunoassay-analyzer

9. http://www.cobas.com/home/product/point-of-care-testing/cobas-h-232.html

10. http://www.cobas.com/home/product/clinical-and-immunochemistry-testing/roche-cardiac-trop-t-sensitive-test.html

11. http://www.cobas.com/home/product/clinical-and-immunochemistry-testing/elecsys-troponin-t-hs-tnt-hs.html

1.5. Validation of cTnT assay in buffer

1.5.1. Calibration curve and standard deviation

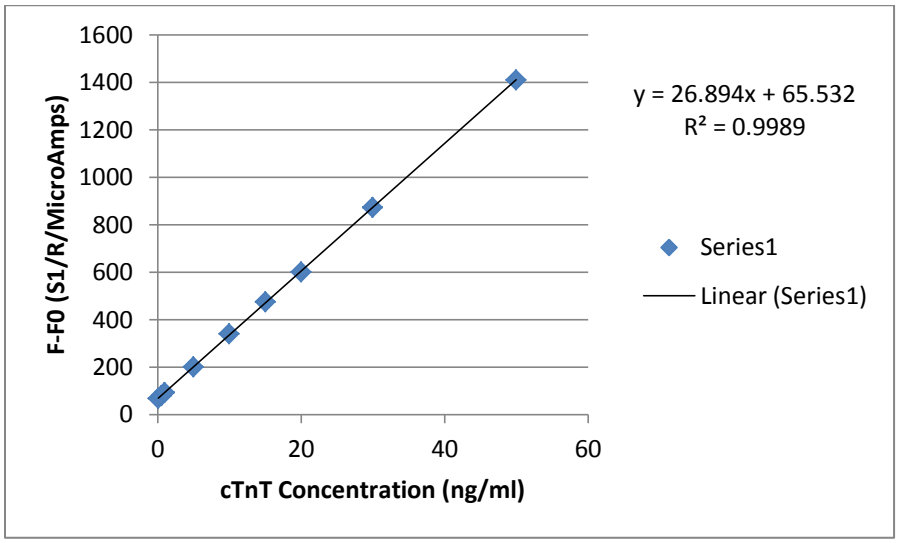

Figure (i): (F-F_0) vs [cTnT] linearity curve.

Table (i): Calculated concentration and recovery percentage using calibration curve

Standard concentration ng/mL	Intensity S1/R1 (MicroAmps)	Calculated concentration ng/mL	Recovery (%)
0.1	67.3	0.111343	111.343
0.5	77.4	0.487703	97.54062
1	90.8	0.987032	98.70323
5	199.4	5.033835	100.6767
15	473.9	15.26263	101.7509
10	338.8	10.22835	102.2835
20	600.1	19.96527	99.82635
30	871.5	30.07855	100.2618
50	1409.8	50.13743	100.2749
	Average		101.4068
	SD		3.763778

1.5.2. Regression analysis

Table (ii): Regression statistics

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.999981
R Square	0.999962
Adjusted R Square	0.999956
Standard Error	2.965115
Observations	9

Table (iii): ANOVA

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1610705	1610705	183203.2	1E-16
Residual	7	61.54333	8.791904		
Total	8	1610767			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	65.53237	1.012437	48.56277	4.11E-10	62.34146	68.72328	62.34146	68.72328
X Variable 1	26.89368	0.062832	428.0224	1E-16	26.74511	27.04226	26.74511	27.04226

1.5.3. Results

Parameter	**Value**
Slope	26.894
Intercept	65.532
Accuracy	101.4±3.76
Linearity range	0.1-50.00 ng/mL
Correlation co-efficient	0.99
SD (From SE of Intercept)	1.012436546
LoD	0.12 ng/mL
LoQ	0.38 ng/mL

1.6. Validation of cTnT assay in serum

1.6.1. Calibration curve and standard deviation

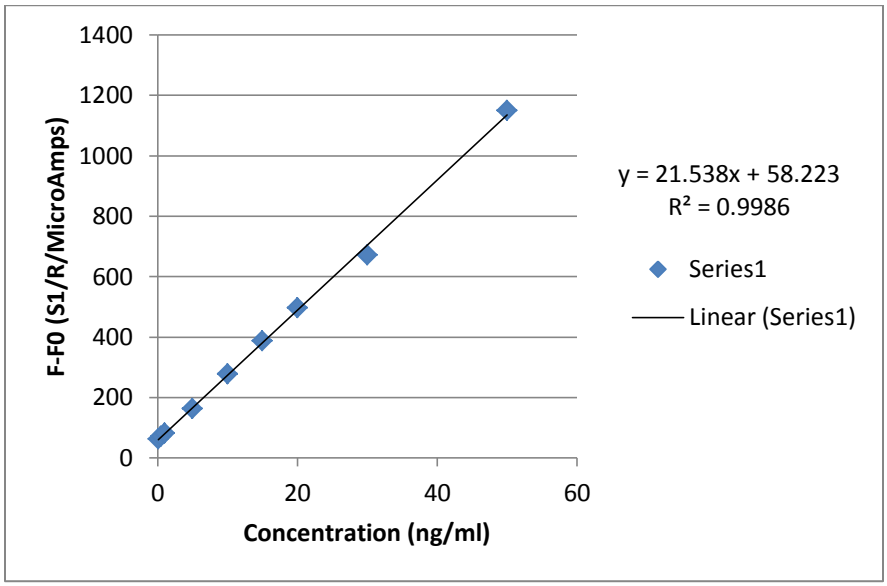

Figure (i). (F-F_0) vs [cTnT] linearity curve.

Table (i): Calculated concentration and recovery percentage using calibration curve

Standard concentration ng/mL	Intensity S1/R1 (MicroAmps)	Calculated concentration ng/mL	Recovery (%)
0.1	61.6	0.131683691	131.6836906
0.5	70.3	0.548889848	109.7779696
1	80.9	1.057209994	105.7209994
5	162.2	4.955929602	99.11859205
10	278.2	10.51867837	105.1867837
15	387.5	15.76013044	105.0675362
20	497.1	21.01596893	105.0798446
30	671.4	29.37447849	97.91492831
50	1149.2	52.28724884	104.5744977
	Average		107.1249825
	SD		9.307967318

1.6.2. Regression analysis

Table (ii): Regression statistics

SUMMARY OUTPUT	
Multiple R	0.999309
R Square	0.998619
Adjusted R Square	0.998422
Standard Error	14.28564
Observations	9

Table (iii): ANOVA

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1033055	1033055	5062.019	2.85E-11
Residual	7	1428.557	204.0796		
Total	8	1034483			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	58.22319	6.501458	8.955405	4.41E-05	42.84968	73.59669	42.84968	73.59669
X Variable 1	21.53793	0.302721	71.14787	2.85E-11	20.82211	22.25375	20.82211	22.25375

1.6.3. Results

Parameter	**Value**
Slope	21.583
Intercept	58.223
Accuracy	107.1±9.30
Linearity range	0.1-50.00 ng/mL
Correlation co-efficient	0.99
SD (From SE of Intercept)	6.501457895
LoD	0.99 ng/mL
LoQ	3.01 ng/mL

1.7. Calculation of different statistical parameters

Parameter	Formula
Calculated Concentration	CC=(Intensity-Intercept)/slope
Recovery %	R=Calculated concentration/Standard concentration)*100
Mean	M=Summation of recovery/n; n=no of concentrations
Standard Deviation (SD)	Using Excel functions
Slope	From linear fitting
Intercept	From linear fitting
Accuracy	Mean ± SD
Linearity range	From linear fitting
Correlation co-efficient	From Regression analysis
Standard Deviation (SD) of intercept	From SE of Intercept by Regression analysis
LoD	3.3*(SD of Intercept/Slope)
LoQ	10*(SD of Intercept/Slope)