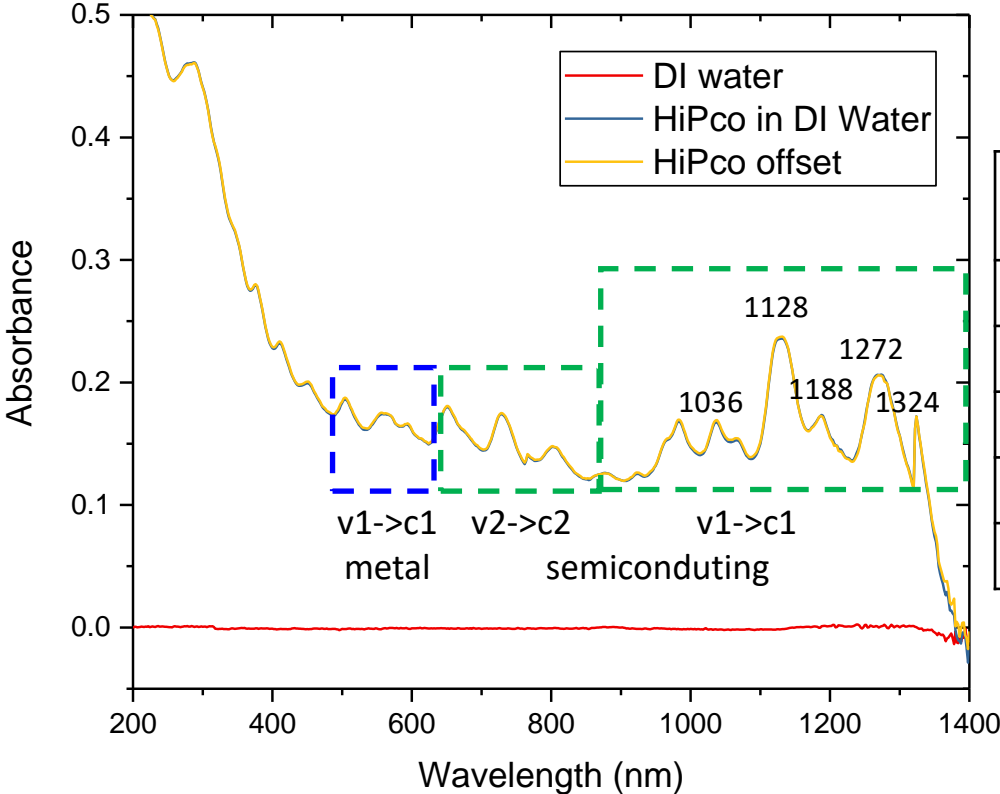
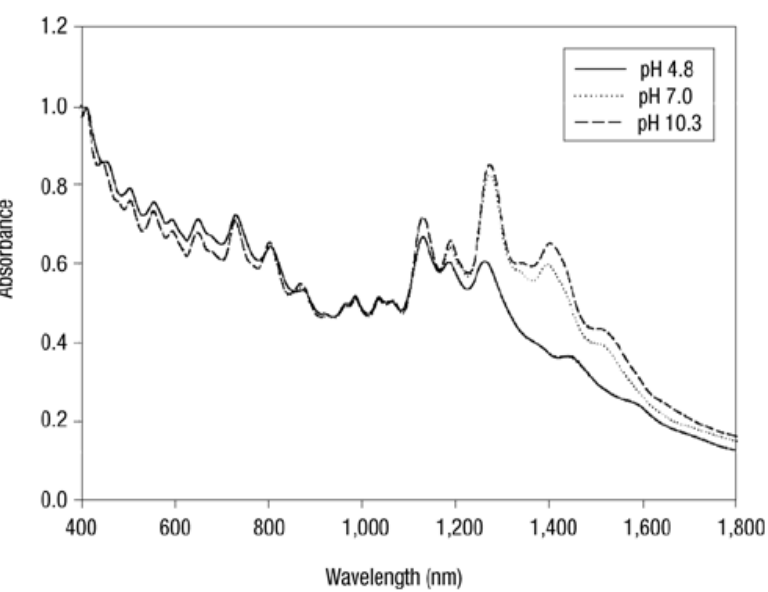


Absorption spectra of HiPco CNT



Peak Wavelength(nm)	Diameter (nm)
1036	0.829
1128	0.904
1188	0.953
1272	1.02
1324	1.06

DNA-assisted dispersion and separation of carbon nanotubes, Ming Zheng

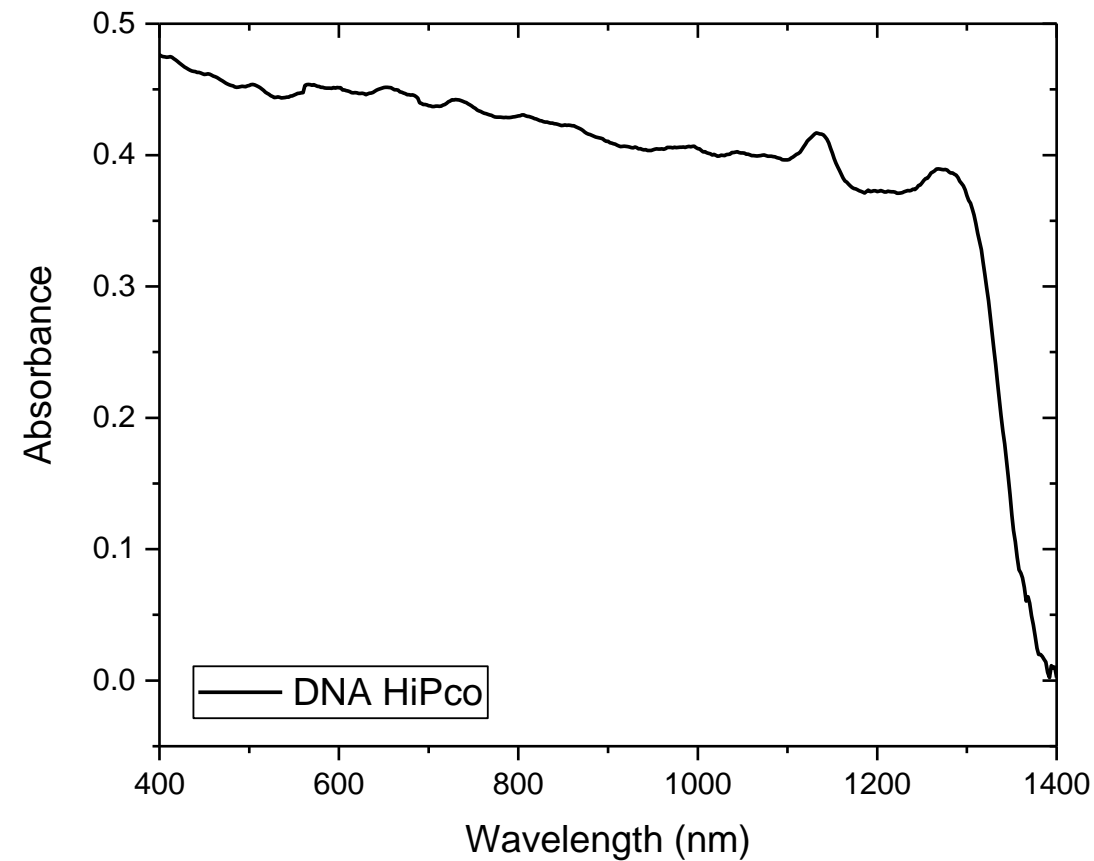
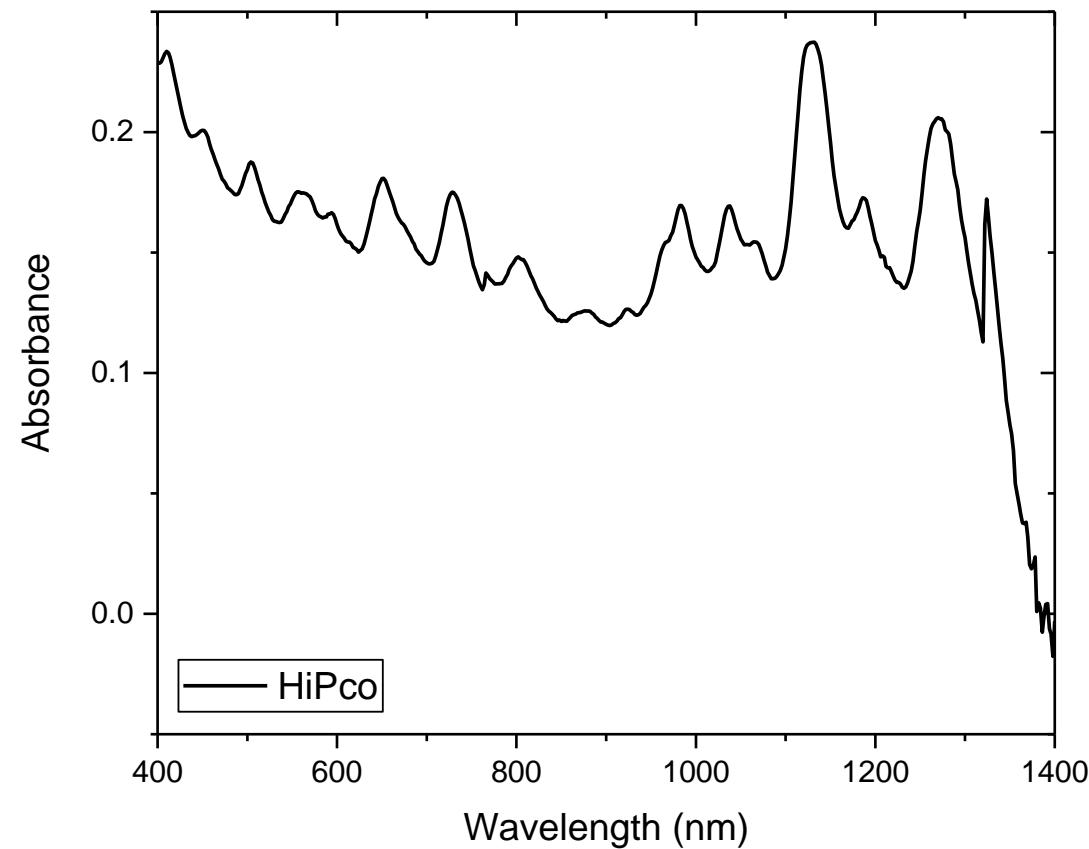
Wavelength (nm)	Diameter (nm)
1000	0.80
1200	0.96
1400	1.13
1600	1.29

Purification and Characterization of Single-Wall Carbon Nanotubes (SWNTs) Obtained from the Gas-Phase Decomposition of CO (HiPco Process), R. H. Hauge

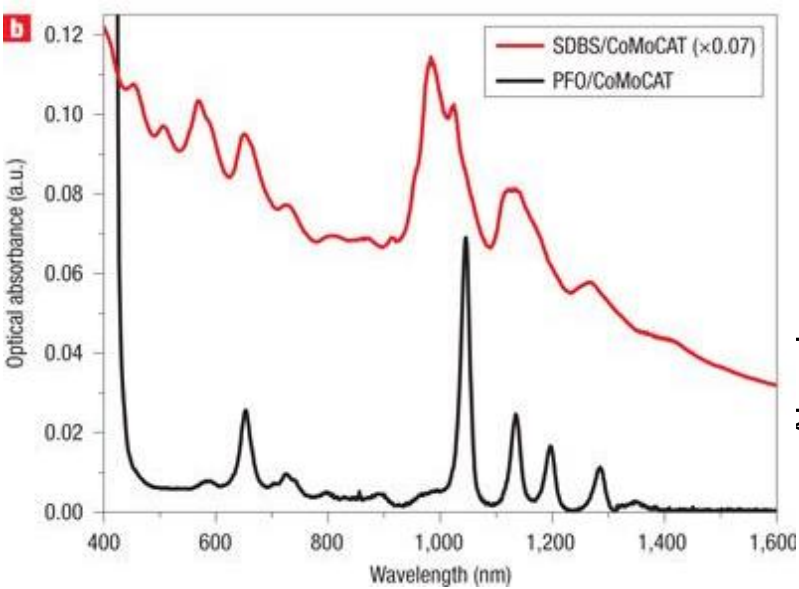
The spectra reveals the presence of 5 different peak wavelength with a diameter distribution spanning from 0.829 to 1.06 nm.

My Data

Absorption spectra of HiPco CNT after DNA wrapping

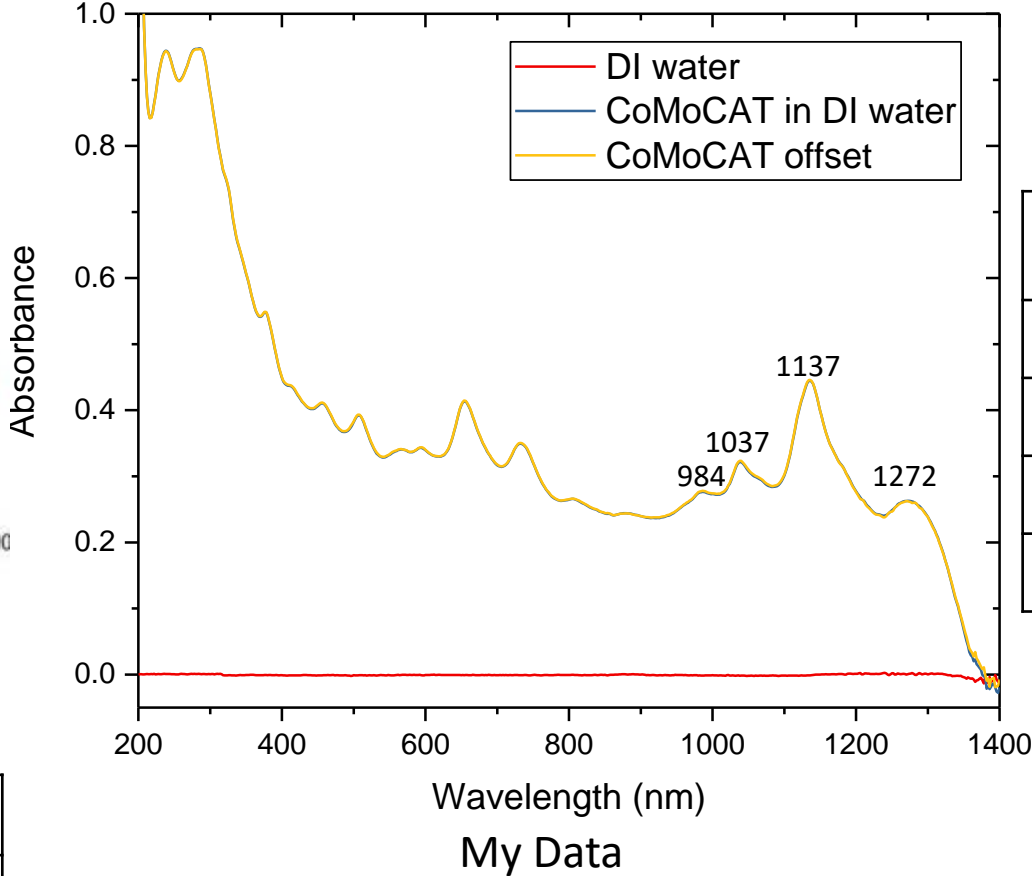


Absorption spectra of CoMoCAT CNT



Highly selective dispersion of single-walled carbon nanotubes using aromatic polymers, Robin J. Nicholas

Wavelength (nm)	Diameter (nm)
1000	0.80
1200	0.96
1400	1.13
1600	1.29

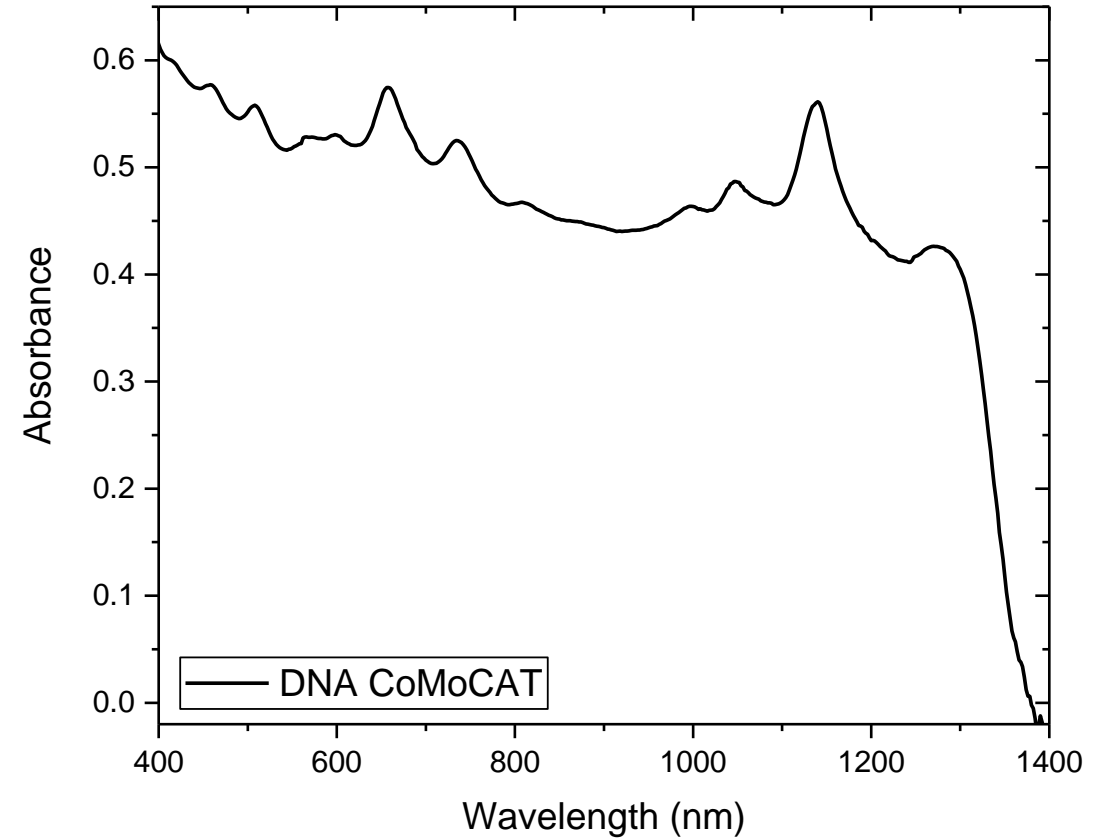
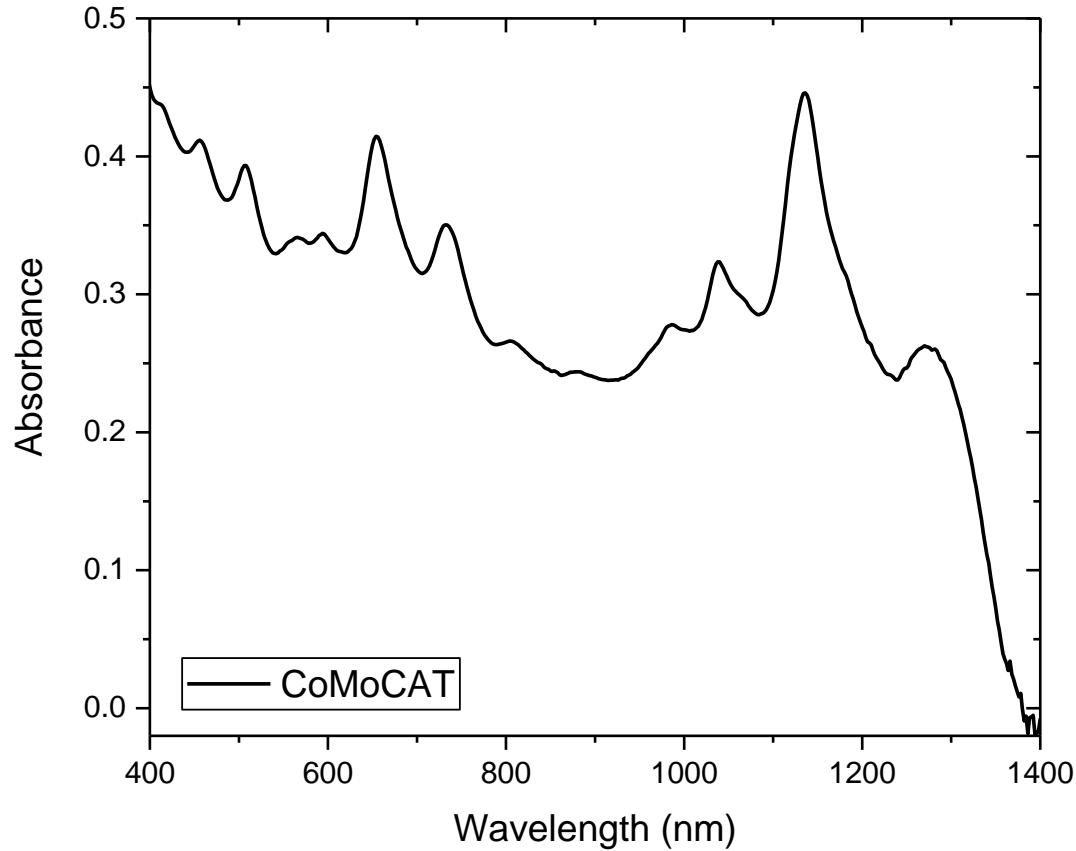


Purification and Characterization of Single-Wall Carbon Nanotubes (SWNTs) Obtained from the Gas-Phase Decomposition of CO (HiPco Process), R. H. Hauge

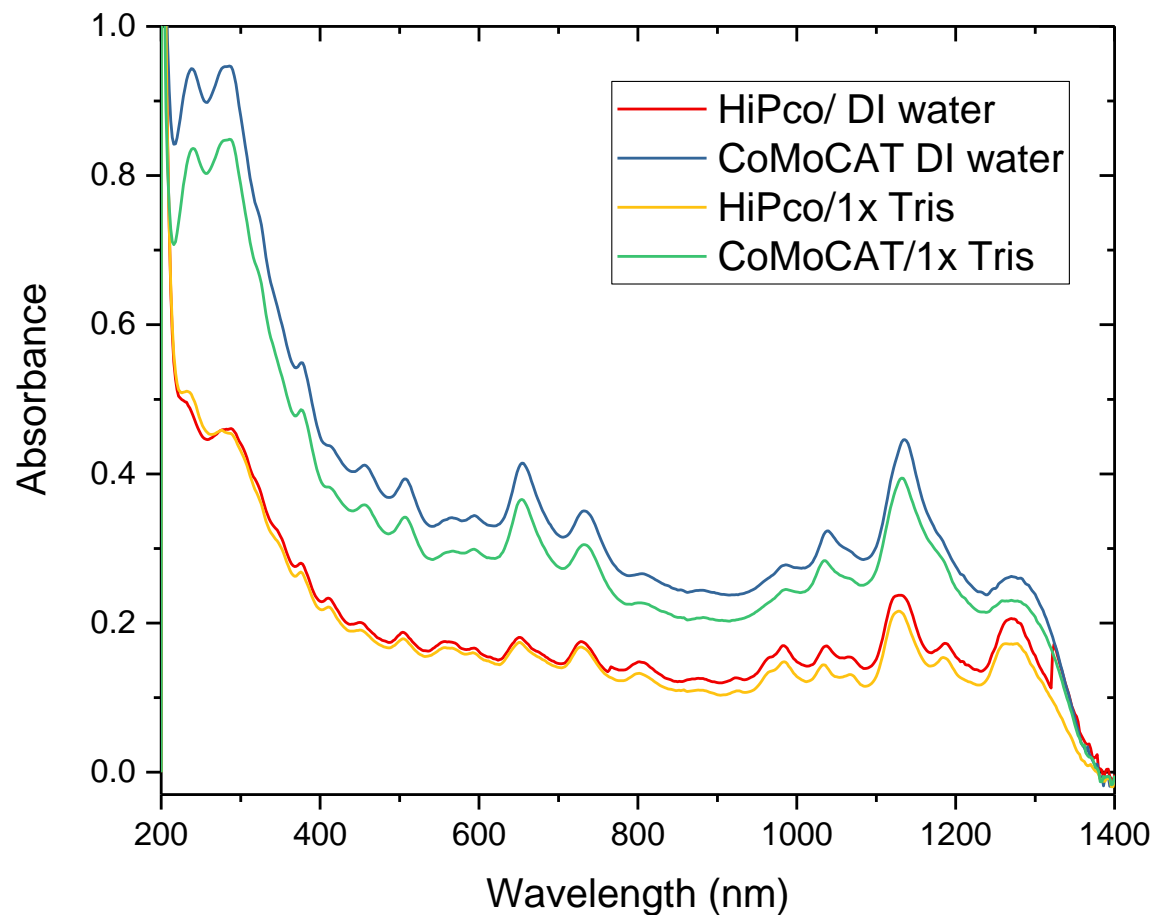
Peak Wavelength (nm)	Diameter (nm)
984	0.787
1037	0.830
1137	0.912
1272	1.02

The spectra reveals the presence of 4 different peak wavelength with a diameter distribution spanning from 0.787 to 1.02 nm.

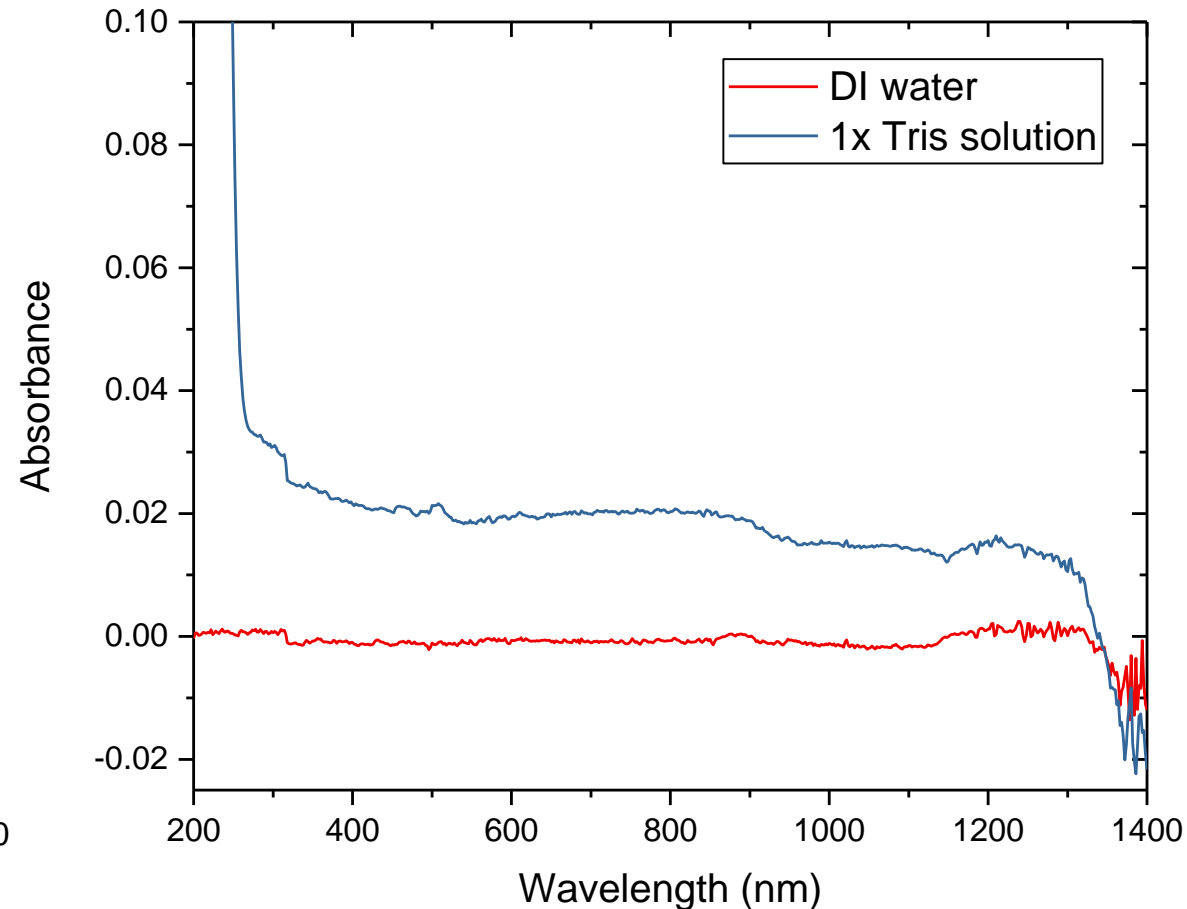
Absorption spectra of CoMoCAT CNT after DNA wrapping



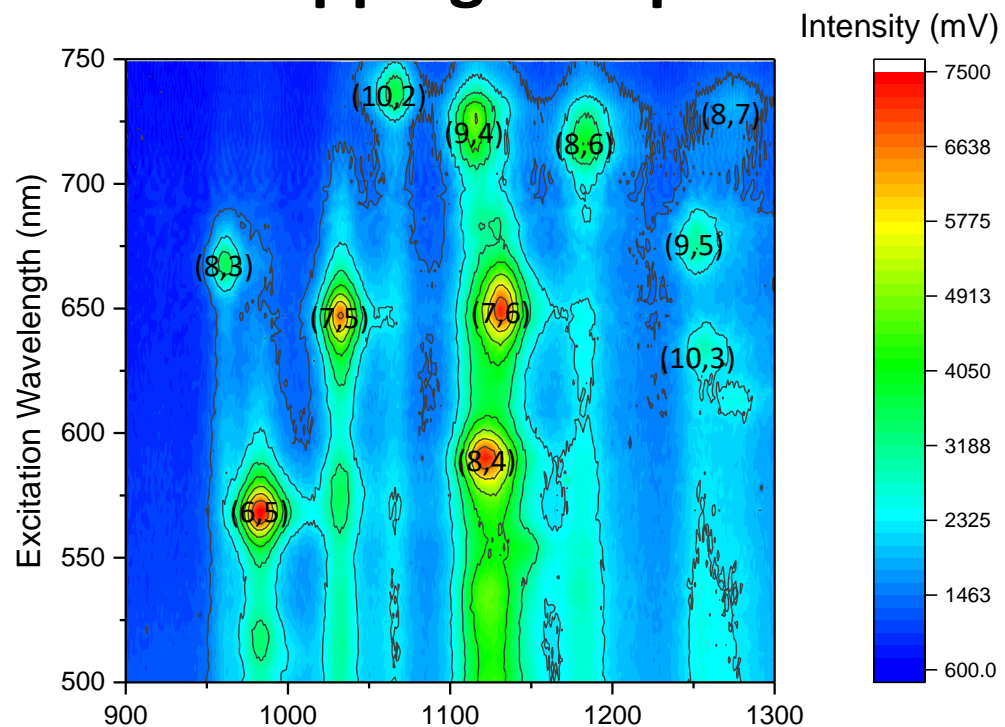
Absorption spectra of HiPco & CoMoCAT CNT



My Data (test solution - DI water or
1x Tris solution)

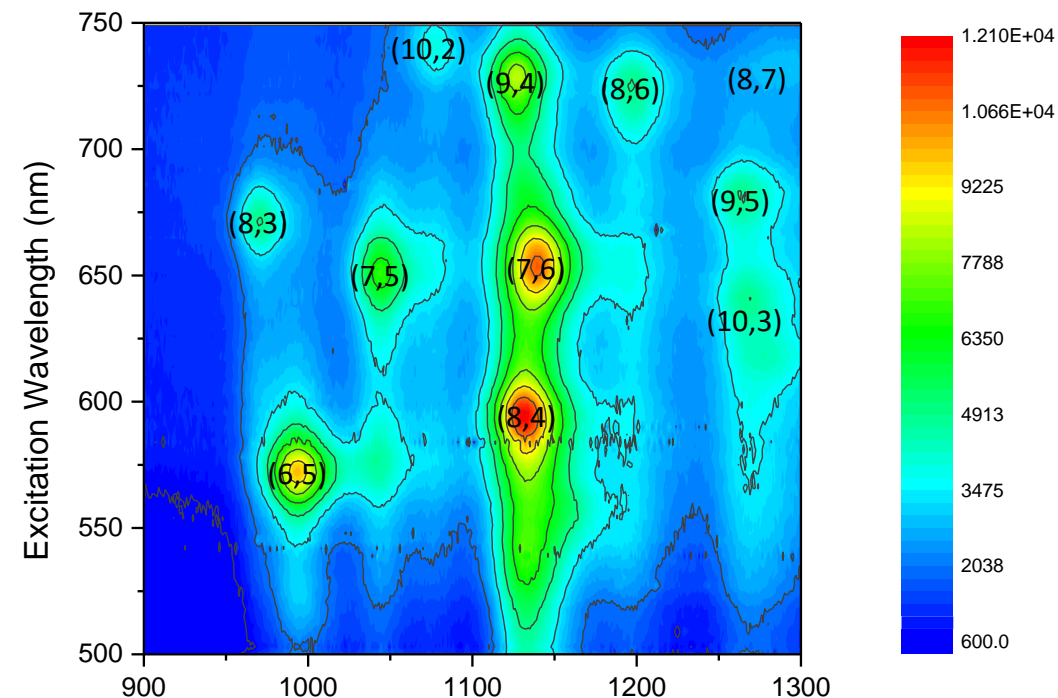


PLE mapping of HipCo CNT



SC-SWCNT

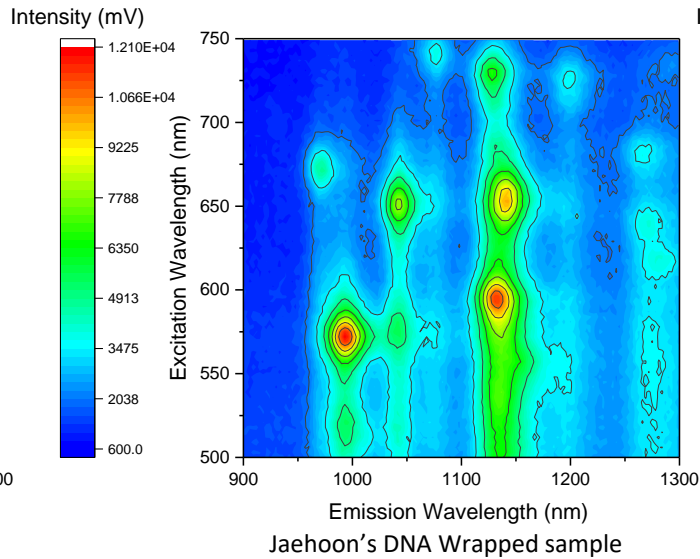
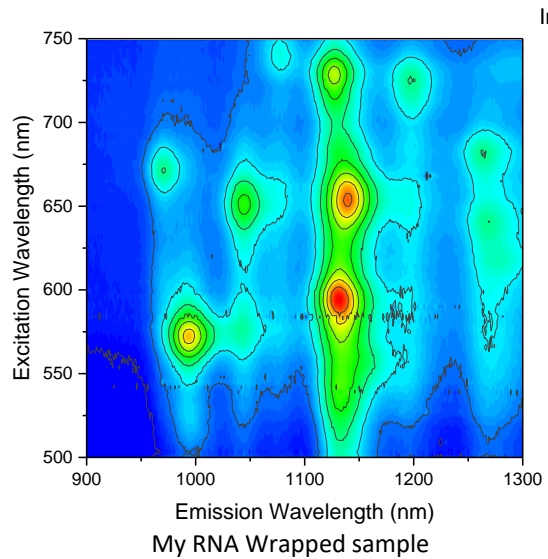
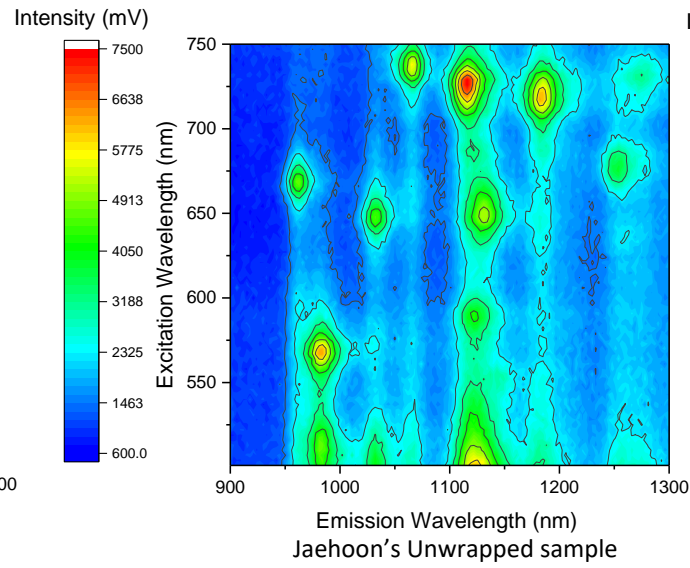
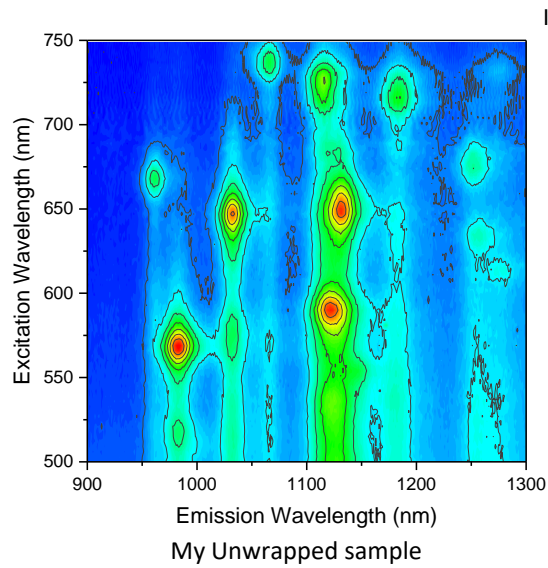
Excitation Wavelength (nm)	Emission Wavelength (nm)	Assignment
568	982	(6,5)
668	961	(8,3)
647	1032	(7,5)
648	1131	(7,6)
590	1122	(8,4)
736	1065	(10,2)
724	1114	(9,4)
718	1183	(8,6)
733	1274	(8,7)
676	1253	(9,5)
633	1258	(10,3)



RNA-SWCNT

Excitation Wavelength (nm)	Emission Wavelength (nm)	Assignment
571	993	(6,5)
671	971	(8,3)
651	1044	(7,5)
654	1139	(7,6)
594	1131	(8,4)
740	1077	(10,2)
725	1127	(9,4)
724	1197	(8,6)
731	1284	(8,7)
678	1265	(9,5)
633	1268	(10,3)

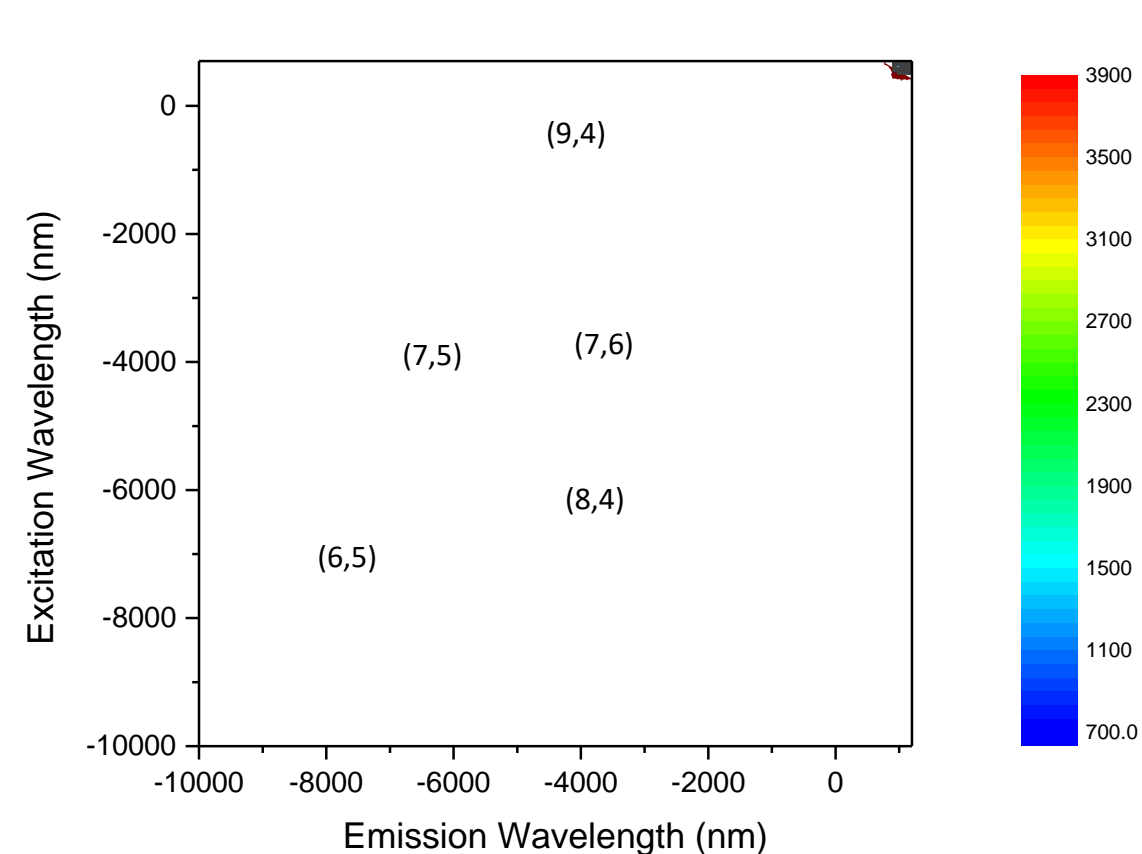
PLE mapping of HipCo CNT



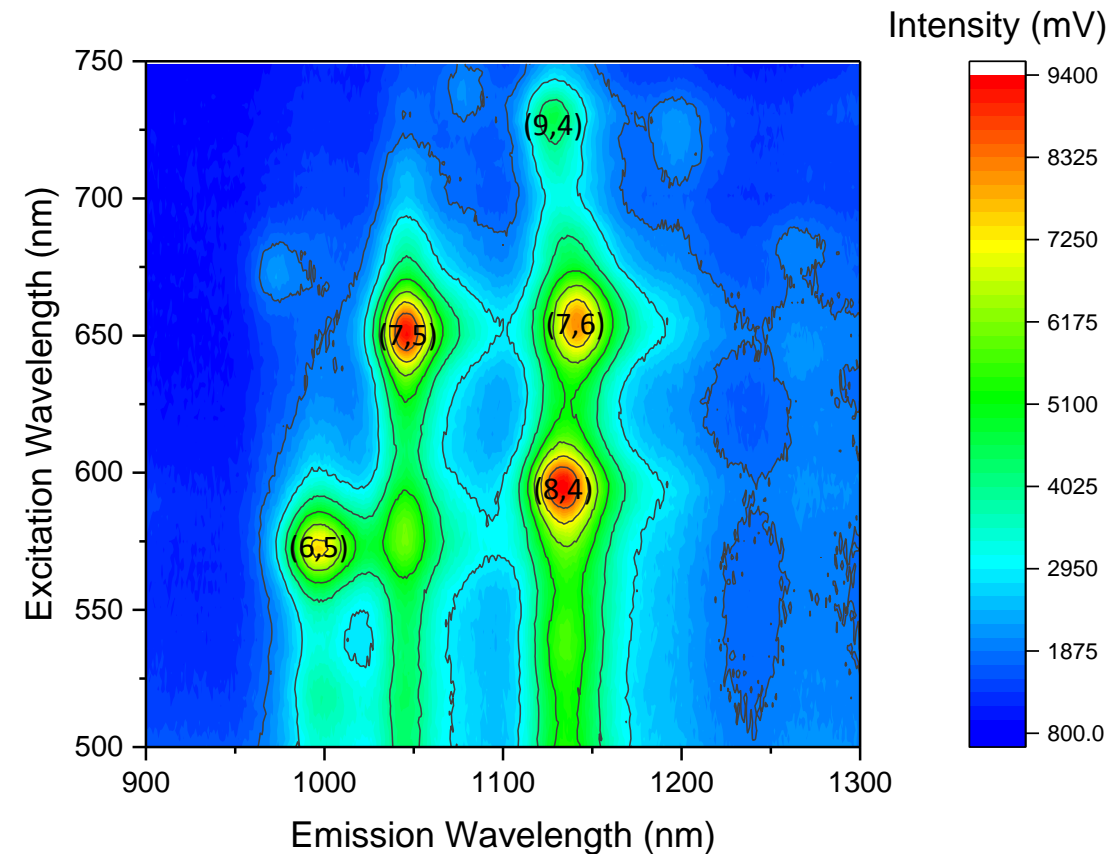
Unwrapped HiPco Sample						
Assignment	My data		Jaehoon's data		Table 1 (2002)	
	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)
(6,5)	568	982	567	982	567	975
(8,3)	668	961	668	962	663	952
(7,5)	647	1032	648	1034	644	1023
(7,6)	648	1131	649	1130	647	1122
(8,4)	590	1122	589	1122	587	1113
(10,2)	736	1065	737	1065	734	1053
(9,4)	724	1114	726	1116	720	1101
(8,6)	718	1183	718	1184	716	1172
(8,7)	733	1274	728	1272	728	1267
(9,5)	676	1253	677	1254	671	1244
(10,3)	633	1258	-	-	633	1250

RNA/DNA Wrapped HiPco Sample						
Assignment	My data		Jaehoon's data		Table 1 (2002)	
	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)
(6,5)	571	993	572	994	567	975
(8,3)	671	971	672	971	663	952
(7,5)	651	1044	651	1042	644	1023
(7,6)	654	1139	653	1141	647	1122
(8,4)	594	1131	594	1132	587	1113
(10,2)	740	1077	741	1076	734	1053
(9,4)	725	1127	729	1128	720	1101
(8,6)	724	1197	725	1198	716	1172
(8,7)	731	1284	-	-	728	1267
(9,5)	678	1265	681	1265	671	1244
(10,3)	633	1268	637	1271	633	1250

PLE mapping of CoMoCAT CNT



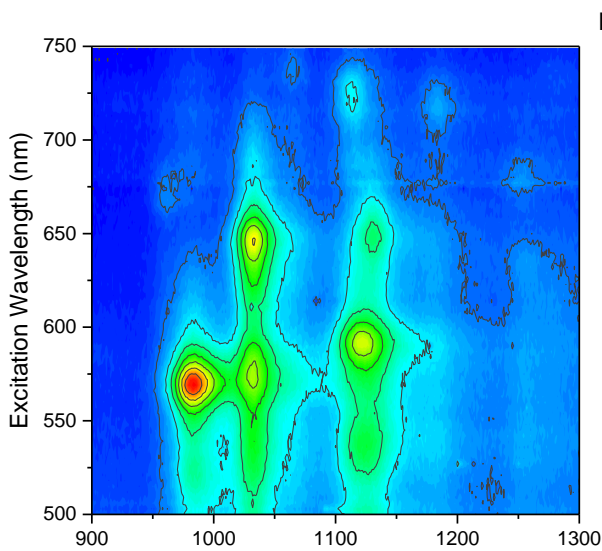
Excitation Wavelength (nm)	Emission Wavelength (nm)	Assignment
570	983	(6,5)
646	1031	(7,5)
591	1123	(8,4)
648	1130	(7,6)
724	1113	(9,4)



Excitation Wavelength (nm)	Emission Wavelength (nm)	Assignment
573	998	(6,5)
652	1046	(7,5)
594	1134	(8,4)
654	1142	(7,6)
728	1128	(9,4)

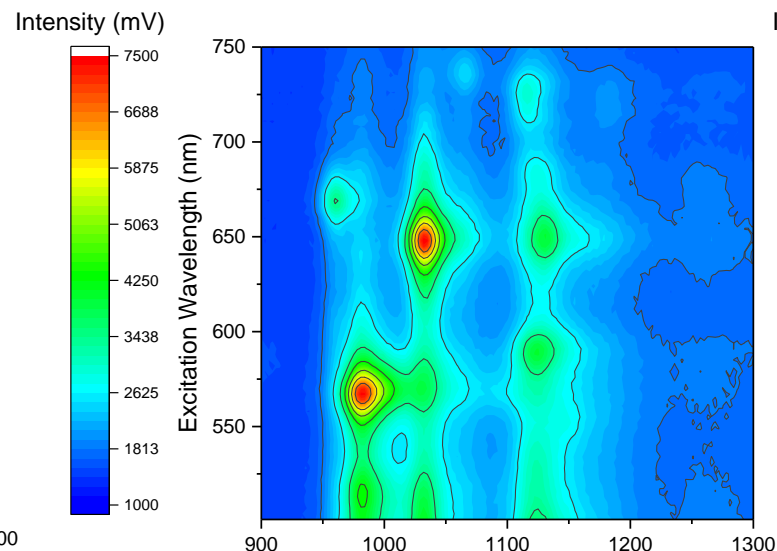
My data (My data – Table1)

PLE mapping of CoMoCAT CNT



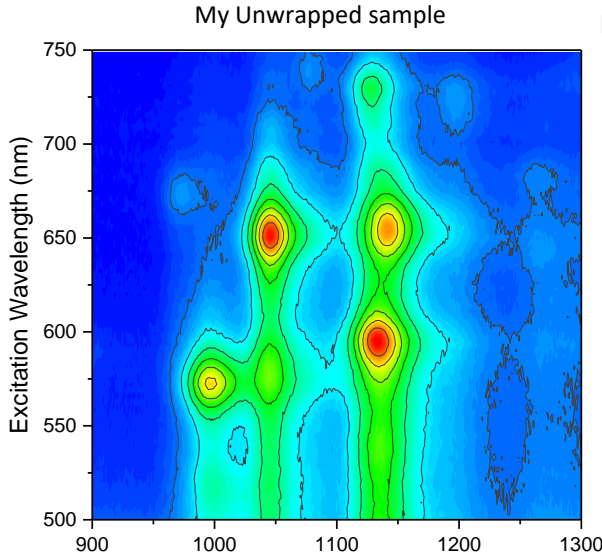
Emission Wavelength (nm)

My Unwrapped sample



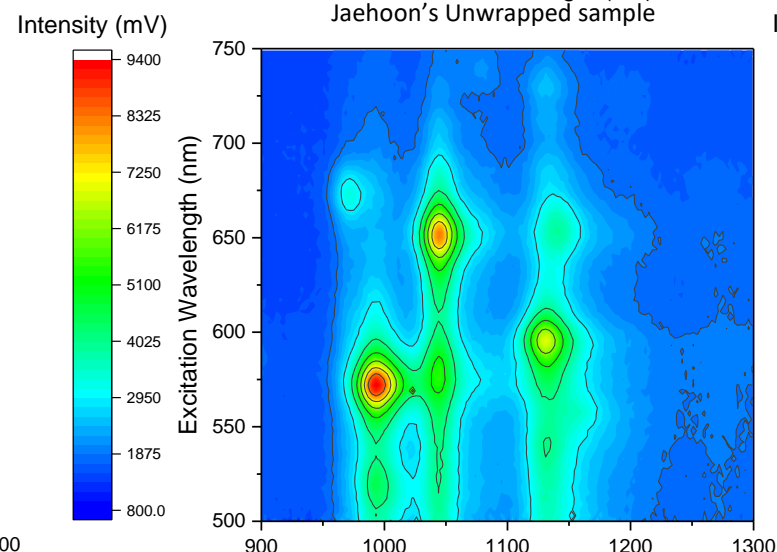
Emission Wavelength (nm)

Jaehoon's Unwrapped sample



Emission Wavelength (nm)

My RNA Wrapped sample



Emission Wavelength (nm)

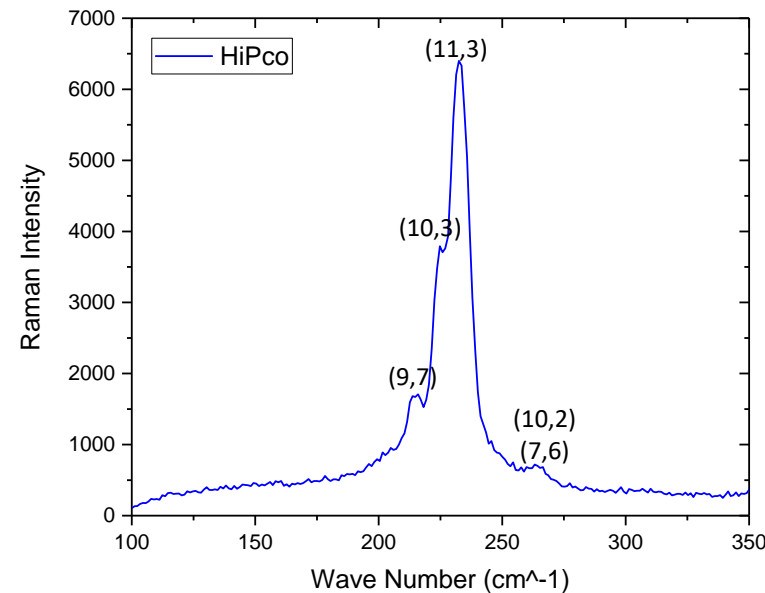
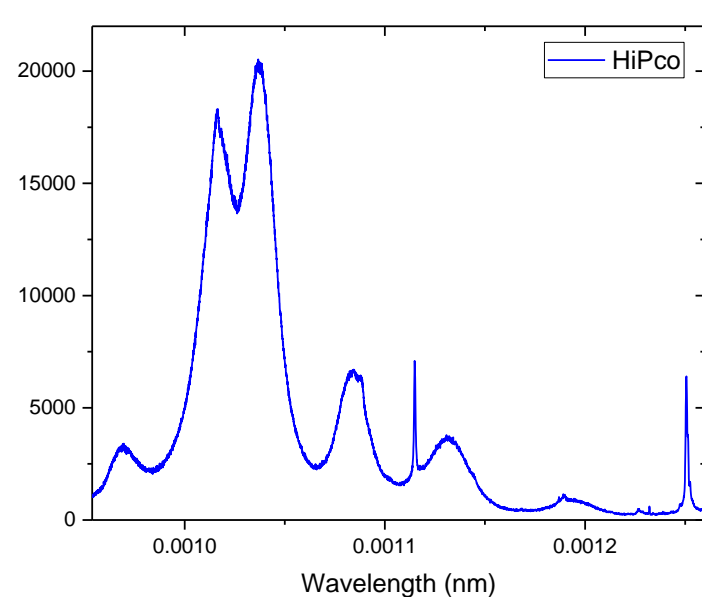
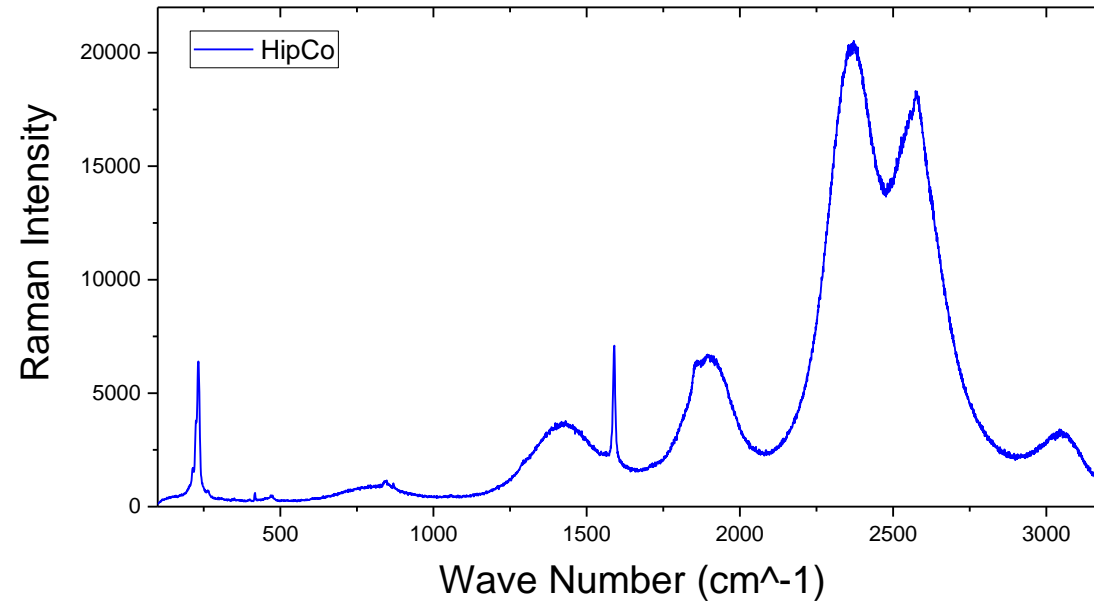
Jaehoon's DNA Wrapped sample

Unwrapped CoMoCAT Sample						
Assignment	My data		Jaehoon's data		Table 1 (2002)	
	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)
(6,5)	570	983	567	982	567	975
(7,5)	646	1031	647	1034	644	1023
(8,4)	591	1123	588	1125	587	1113
(7,6)	648	1130	650	1130	647	1122
(9,4)	724	1113	723	1117	720	1101

RNA/DNA Wrapped CoMoCAT Sample						
Assignment	My data		Jaehoon's data		Table 1 (2002)	
	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)	Ex (nm)	Em (nm)
(6,5)	573	998	572	993	567	975
(7,5)	652	1046	651	1043	644	1023
(8,4)	594	1134	595	1132	587	1113
(7,6)	654	1142	653	1139	647	1122
(9,4)	728	1128	728	1130	720	1101

Raman Spectra of HipCo CNT 785nm

My Data



- Wave number to wavelength

$$\Delta w(\text{cm}^{-1}) = \left(\frac{1}{\lambda_0(\text{nm})} - \frac{1}{\lambda_1(\text{nm})} \right) \times \frac{(10^7 \text{ nm})}{(\text{cm})}$$

- dt calculated using this formula:

$$\bar{v}_{\text{RBM}} = \frac{223.5}{d_t(\text{nm})} + 12.5$$

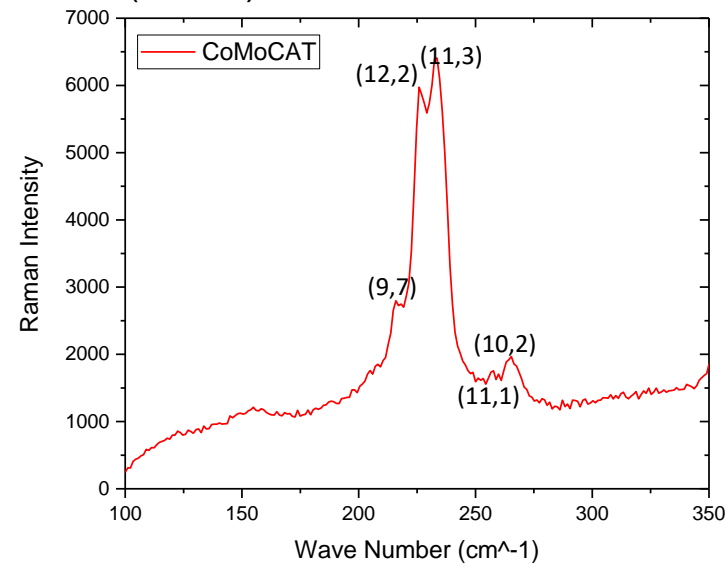
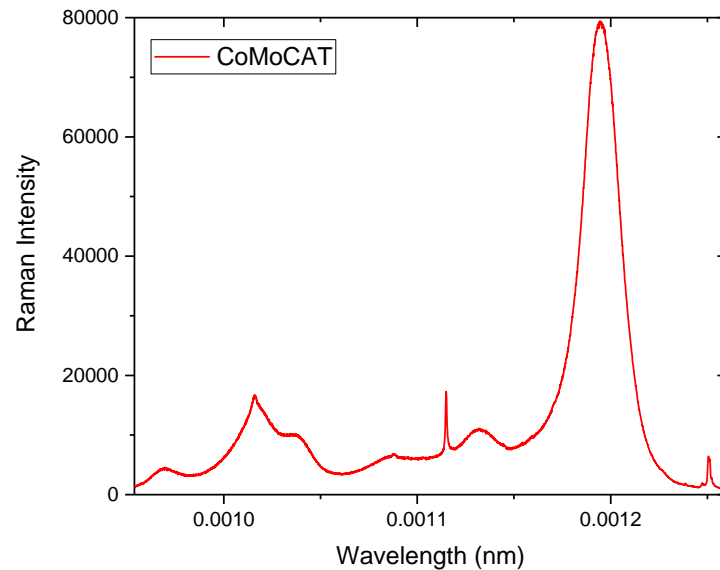
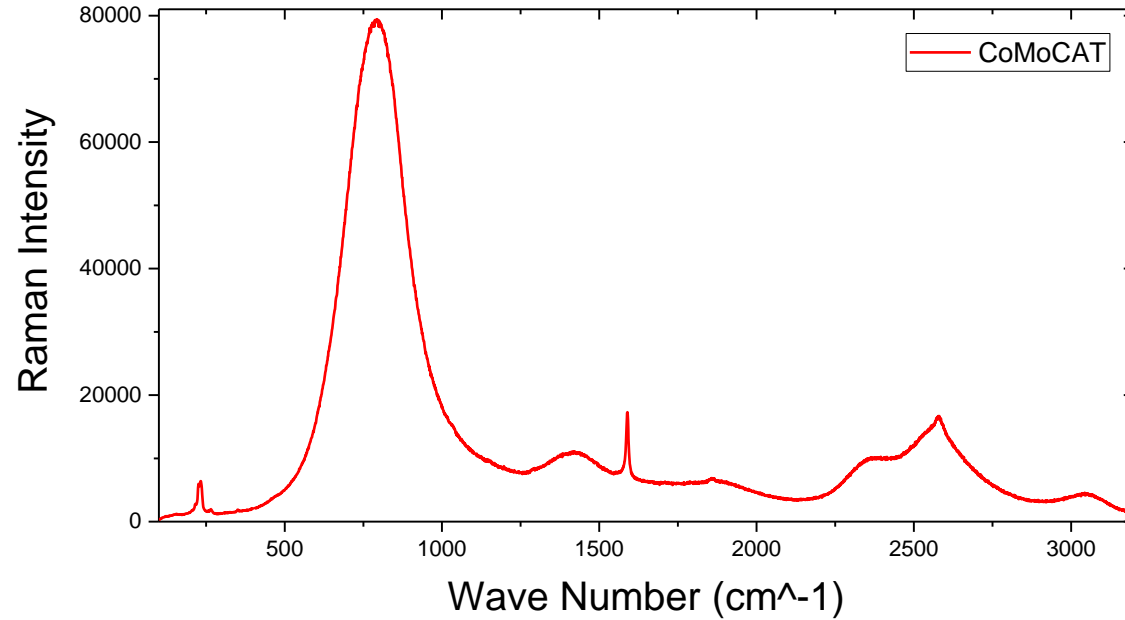
- Raman intensity peak correspond CNT assignment from Table 1

assignment	Predicted v_RBM (cm ⁻¹)	v_RBM (cm ⁻¹)	dt (nm)
(9,7)	214.9	214.7	1.104249
(10,3)	225.1	225.2	1.05127
(11,3)	232.8	232.4	1.014526
(10,2)	265.1	264.1	0.884798
(7,6)	262.1	264.1	0.895433

The Raman spectra reveals the presence of 5 different semiconducting (n,m) with a diameter (dt) distribution spanning from 0.885 to 1.10 nm.

Raman Spectra of CoMoCAT CNT 785nm

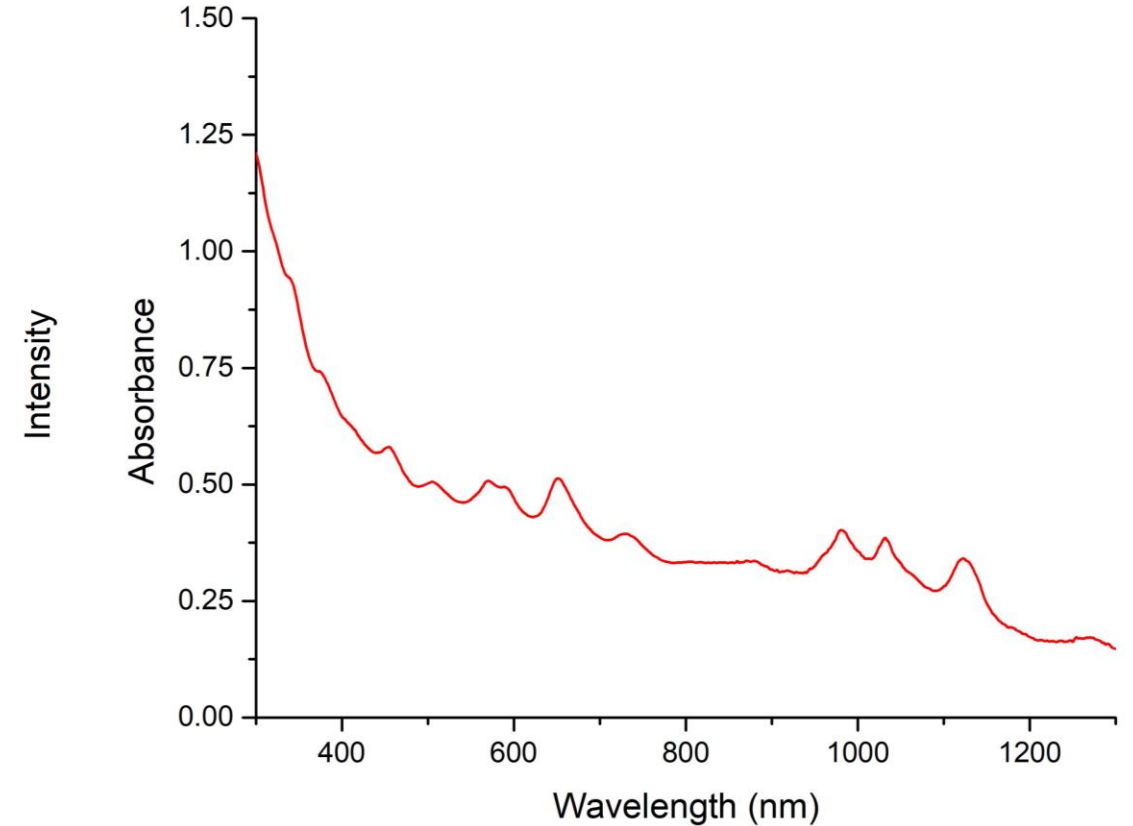
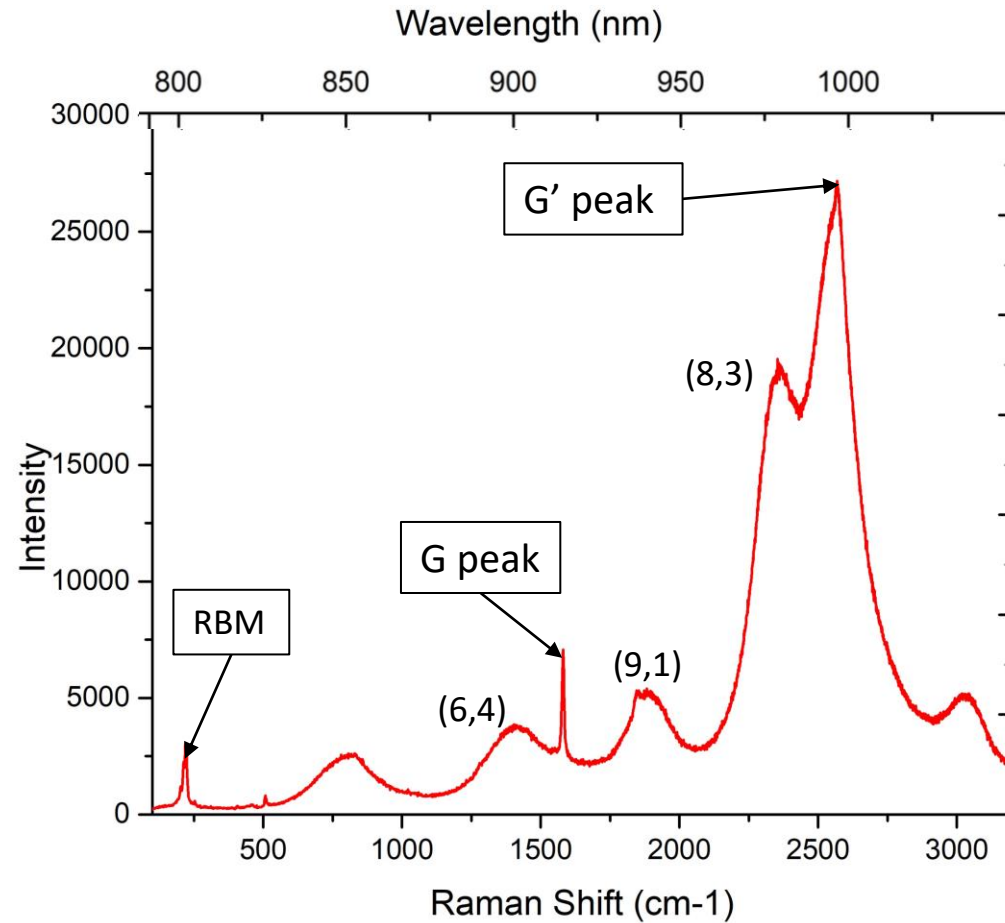
My Data



assignment	Predicted v_RBM (cm ⁻¹)	v_RBM (cm ⁻¹)	dt (nm)
(9,7)	214.9	216.5	1.104249
(12,2)	227	226.8	1.041958
(11,3)	232.8	232.6	1.014526
(11,1)	256.4	257	0.916359
(10,2)	265.1	265.1	0.884798

The Raman spectra reveals the presence of 5 different semiconducting (n,m) with a diameter (dt) distribution spanning from 0.885 to 1.10 nm.

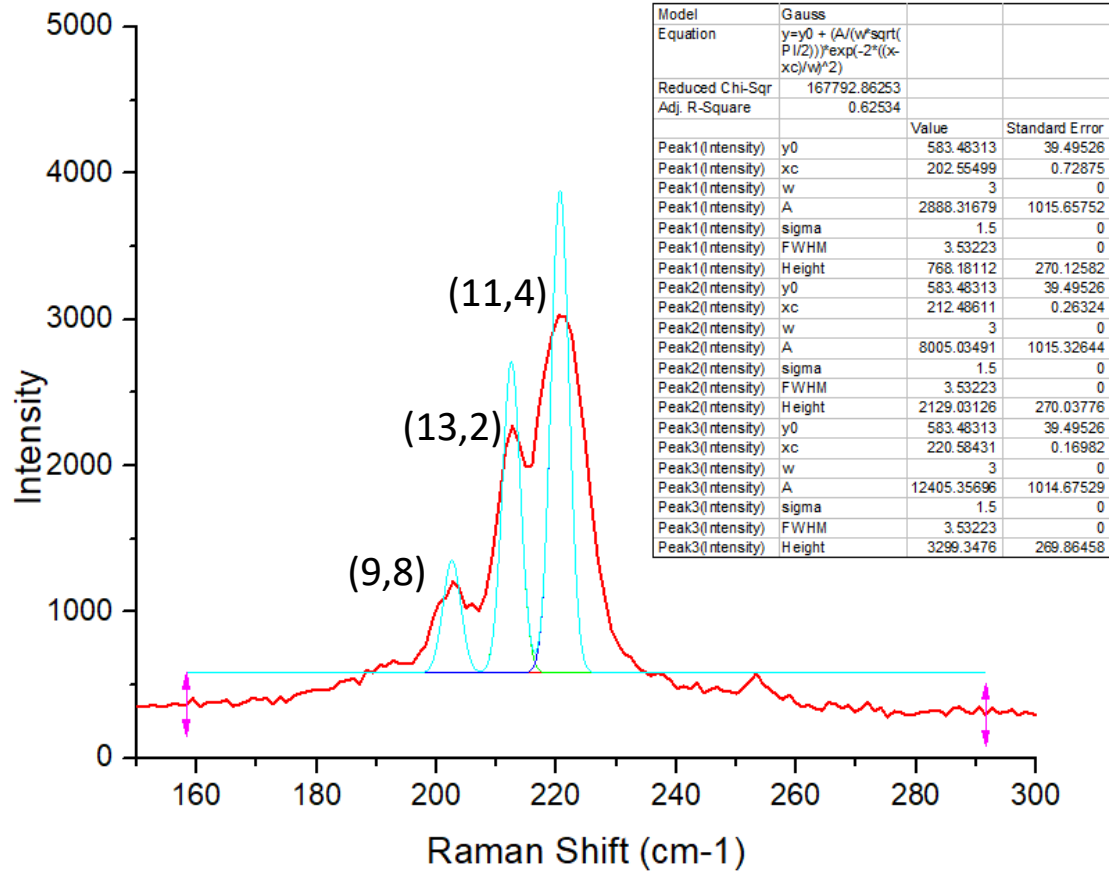
Harshith's SC CNT - CoMoCAT



SC CNT Synthesis Procedure:

1. Disperse 15 mg SWNT and 0.6 g Sodium Cholate (SC) in 30 mL H₂O.
2. Probe-tip sonicate for 1 hour at 70% amplitude (Total power on tip sonicator = 130 W).
3. Transfer the surfactant into centrifuges according to same weight.
4. Ultracentrifuge for 2 hours at 30,000 RPM.

SC CNT Characterisation in RBM Zone



- Wavelength(nm) to Wave number (cm⁻¹)

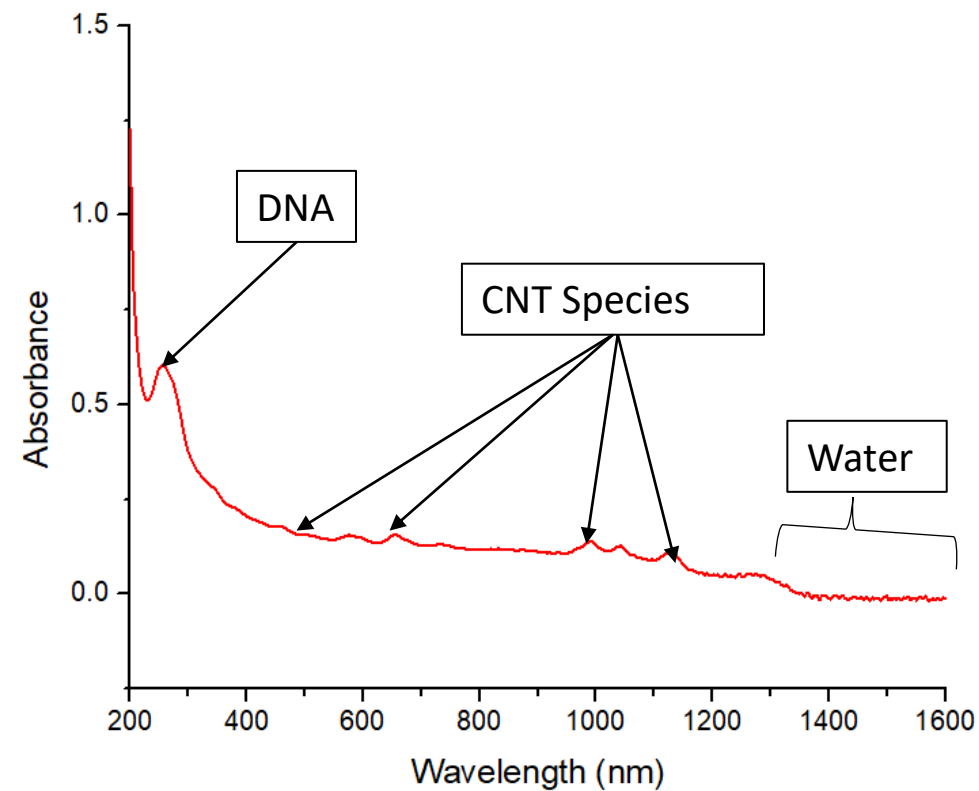
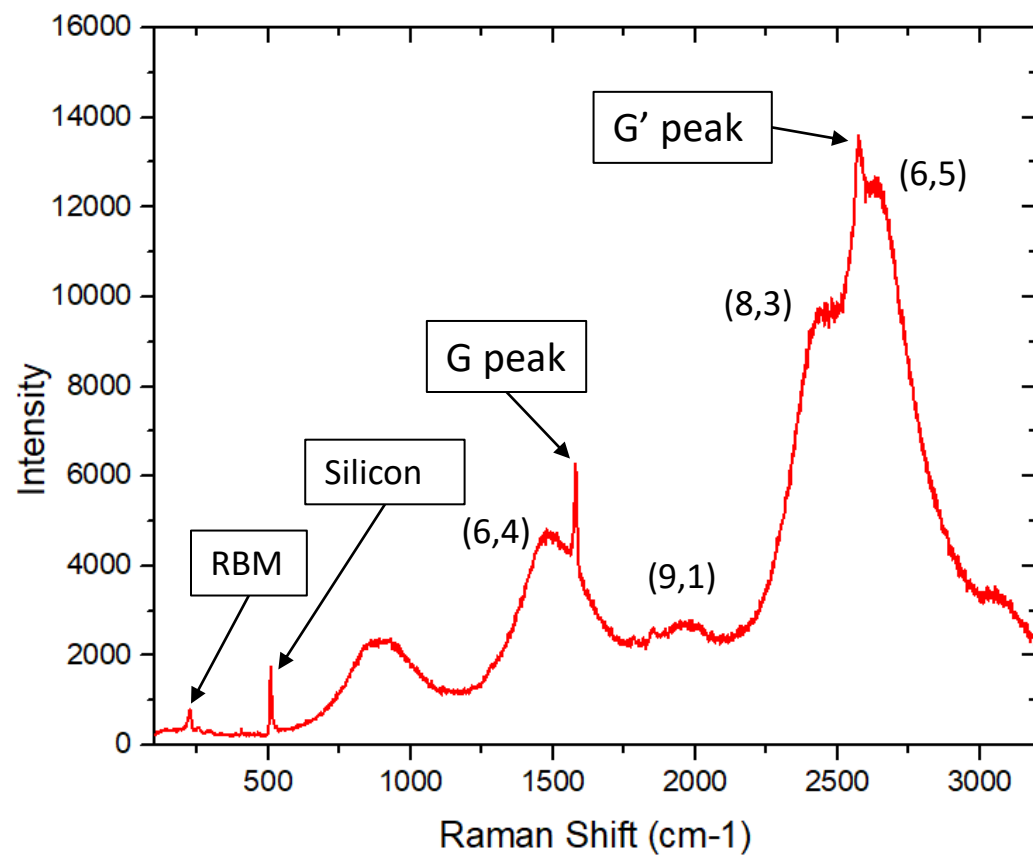
$$\Delta w(\text{cm}^{-1}) = \left(\frac{1}{\lambda_0(\text{nm})} - \frac{1}{\lambda_1(\text{nm})} \right) \times \frac{(10^7 \text{ nm})}{(\text{cm})}$$

- dt calculated using this formula:

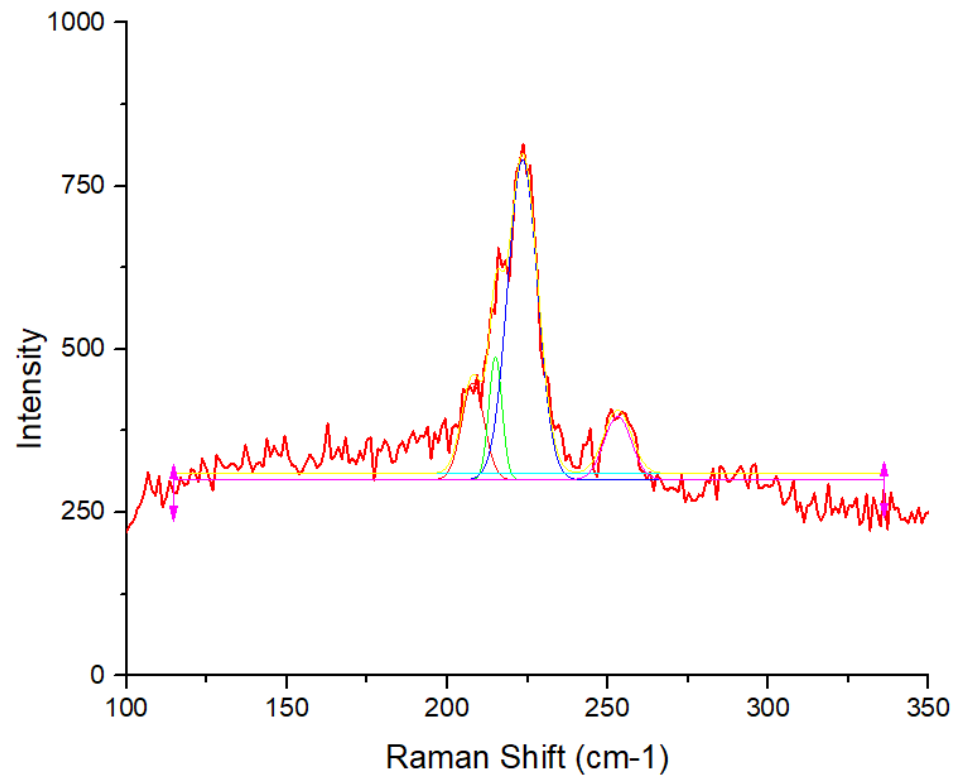
$$\bar{\nu}_{\text{RBM}} = \frac{223.5}{d_t(\text{nm})} + 12.5$$

RBM Peaks (cm ⁻¹)	Relatable Kataura Plot values	dt (nm)	Species assignment (n,m)
202.555	203.6	1.17	(9,8)
212.486	212.1	1.12	(13,2)
220.584	221.7	1.068	(11,4)

DNA wrapped CNT (Dialysis from SC-CNT)



DNA wrapped CNT (Dialysis) – RBM Zone



- Wavelength(nm) to Wave number (cm⁻¹)

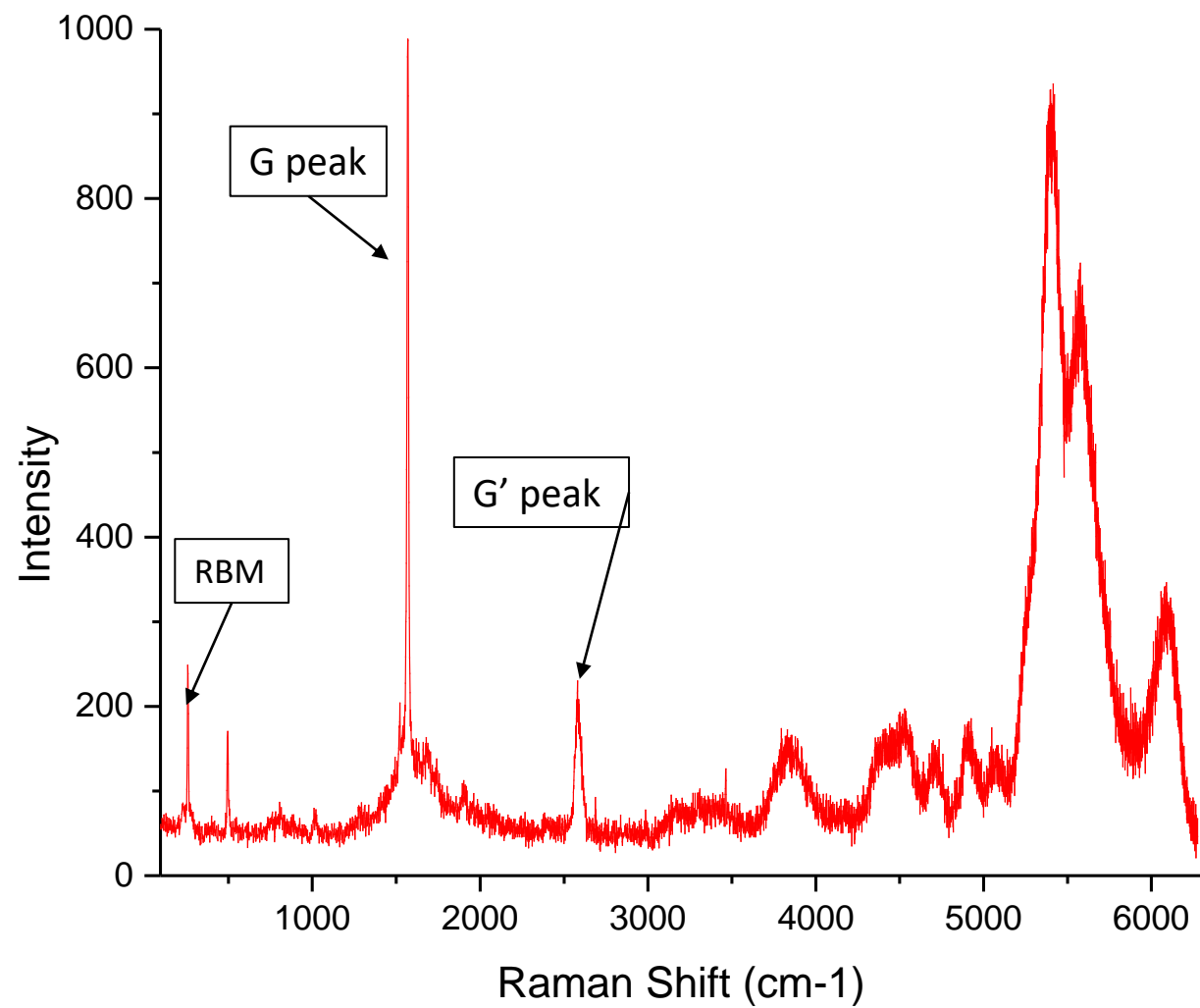
$$\Delta w(\text{cm}^{-1}) = \left(\frac{1}{\lambda_0(\text{nm})} - \frac{1}{\lambda_1(\text{nm})} \right) \times \frac{(10^7 \text{ nm})}{(\text{cm})}$$

- dt calculated using this formula:

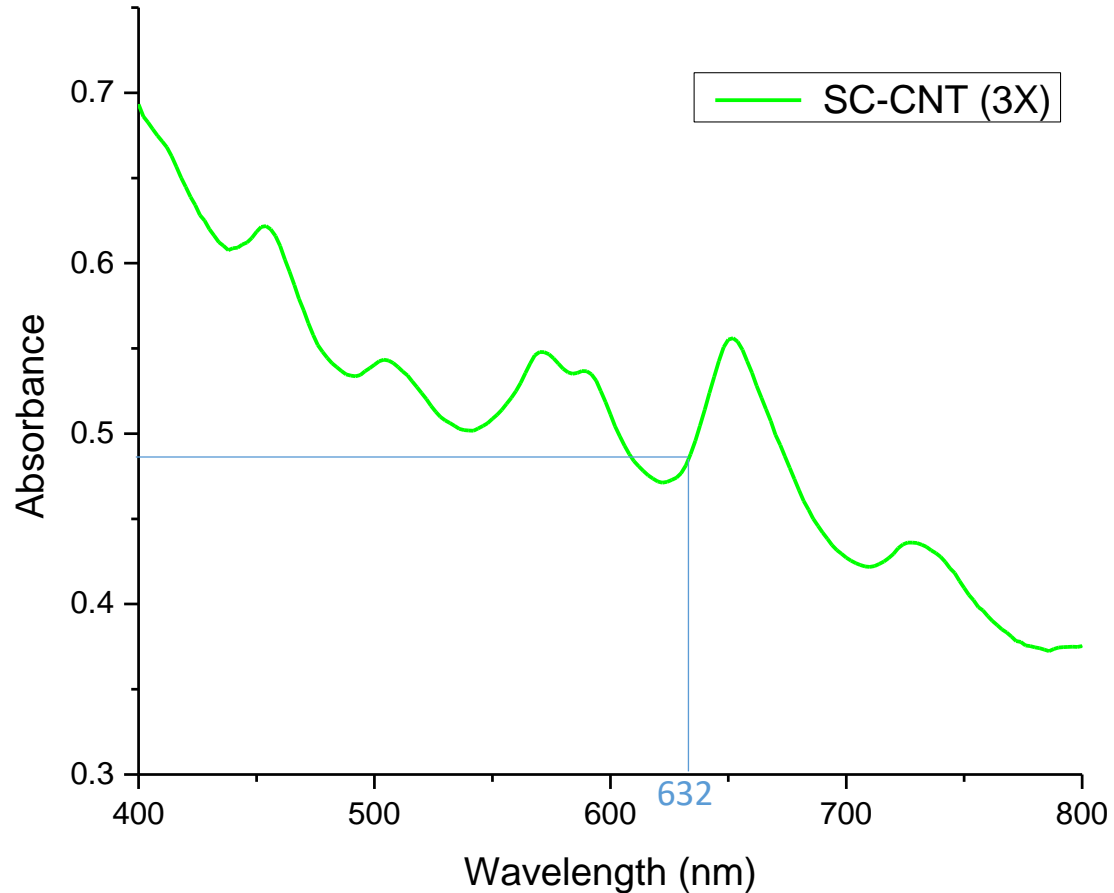
$$\bar{\nu}_{\text{RBM}} = \frac{223.5}{d_t \text{ (nm)}} + 12.5$$

RBM Peaks (cm ⁻¹)	Relatable Kataura Plot values	dt (nm)	Species assignment (n,m)
208	207.7	1.145	(12,4)
215	215.1	1.103	(9,7)
223	221.7	1.068	(11,4)
244	241.6	0.976	(9,5)
253	251.3	0.936	(10,3)

SC CNT with 633 nm Laser



Absorbance of SC-CNT (3X)



Extinction coefficient for SC-CNT = $3.6 \times 10^4 \text{ cm}^2/\text{gm}$

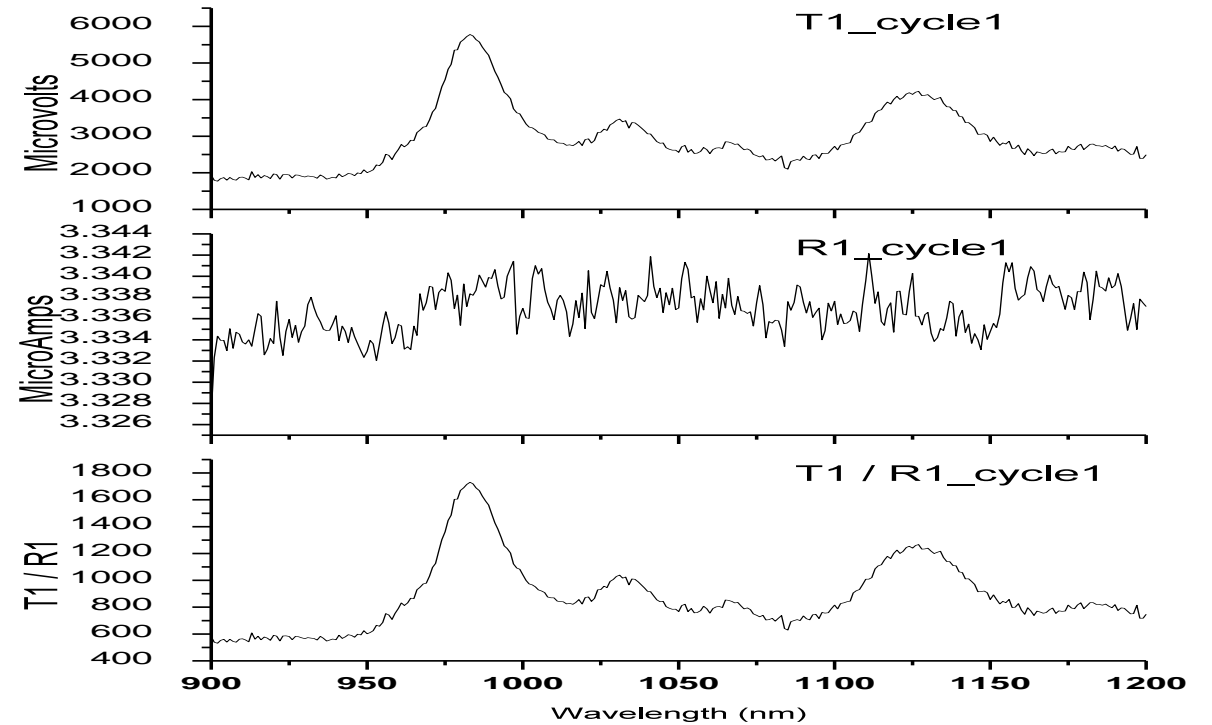
At 632 nm Absorbance of sample is 0.48144

$$A = \epsilon \cdot C \cdot L$$
$$0.48144 = 3.6 \times 10^4 \frac{\text{cm}^2}{\text{gm}} \times C \times 1 \text{ cm}$$
$$0.48144 = 3.6 \times 10^{-2} \frac{\text{L}}{\text{mg}} \times C$$
$$C = 13.37$$
$$3C = 40.12$$

Concentration of SC-CNT in sample is 40.12 mg/L

Parameter trials for PL mapping

Excitation Slit Width (nm)	Emission Slit Width (nm)	Integration Time (sec)	Intensity
4	4	0.4	6000
3	3	0.5	3500
5	2	0.4	4000
5	2	0.5	4000
5	1	0.3	2500
5	1	0.4	2500
5	3	0.4	6000

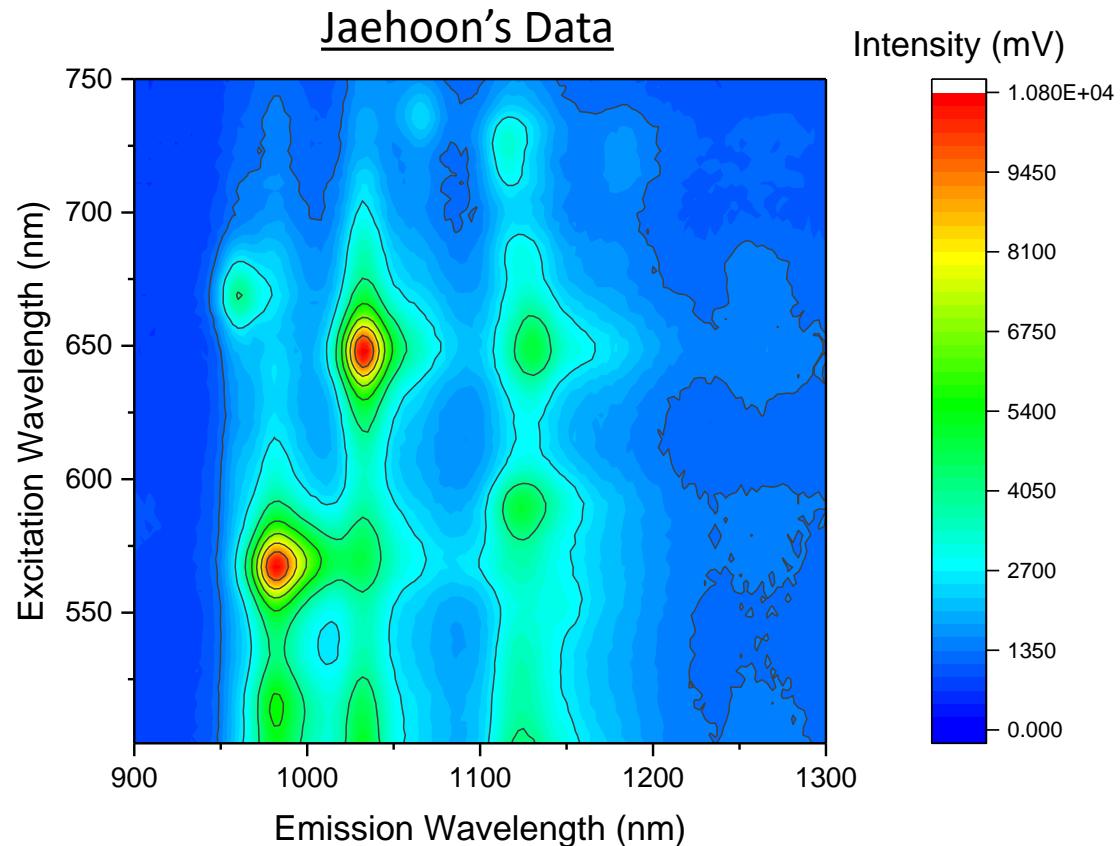
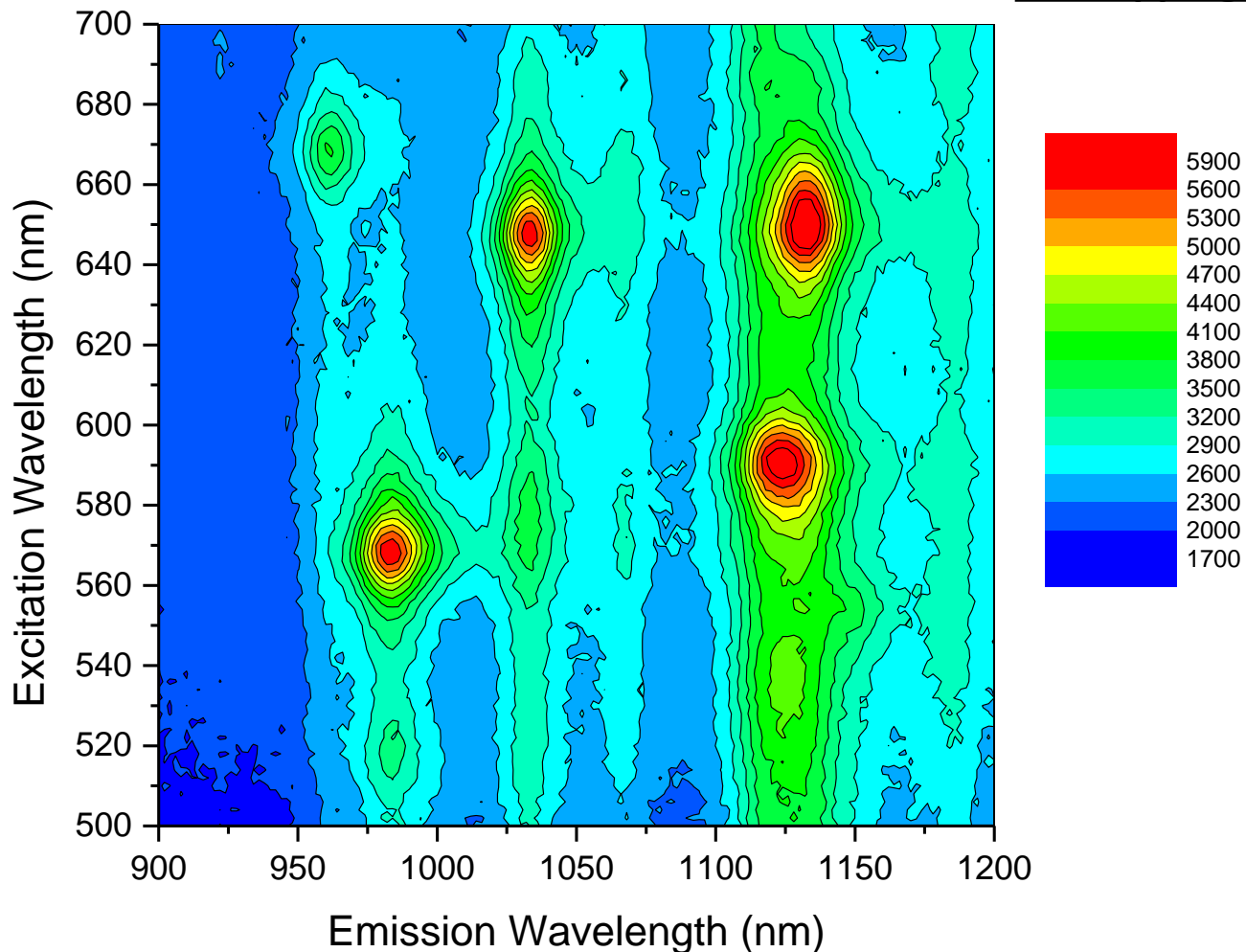


Best Choice

Final decided parameters:

- Excitation: 500-700 nm, Increment: 2 nm, Slit Width: 5 nm
- Emission: 900-1200 nm, Increment: 2 nm, Slit Width: 3 nm
- Integration time: 0.4 sec

PL Mapping of SC-CNT



CNT Species	Excitation (nm)	Emission (nm)
(6,5)	570	985
(7,5)	645	1035
(7,6)	650	1130
(8,4)	590	1125