Electronic supplementary information (ESI) for

Improved biorefinery pathways of marine diatoms using a water miscible ionic liquid and its colloidal solution: Efficient lipid extraction and in-situ synthesis of fluorescent carbon dots for bio-imaging applications

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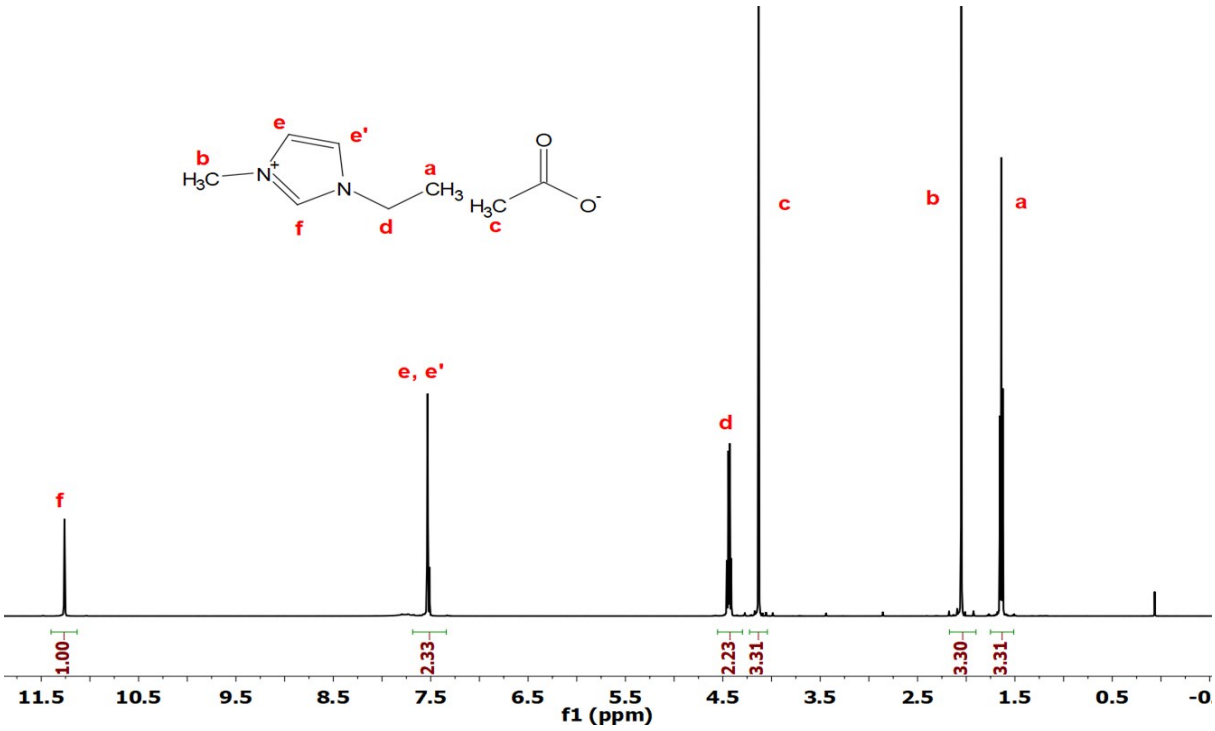

Fig. S1 ^{1}H NMR spectra of pure [EMIM][Ac].

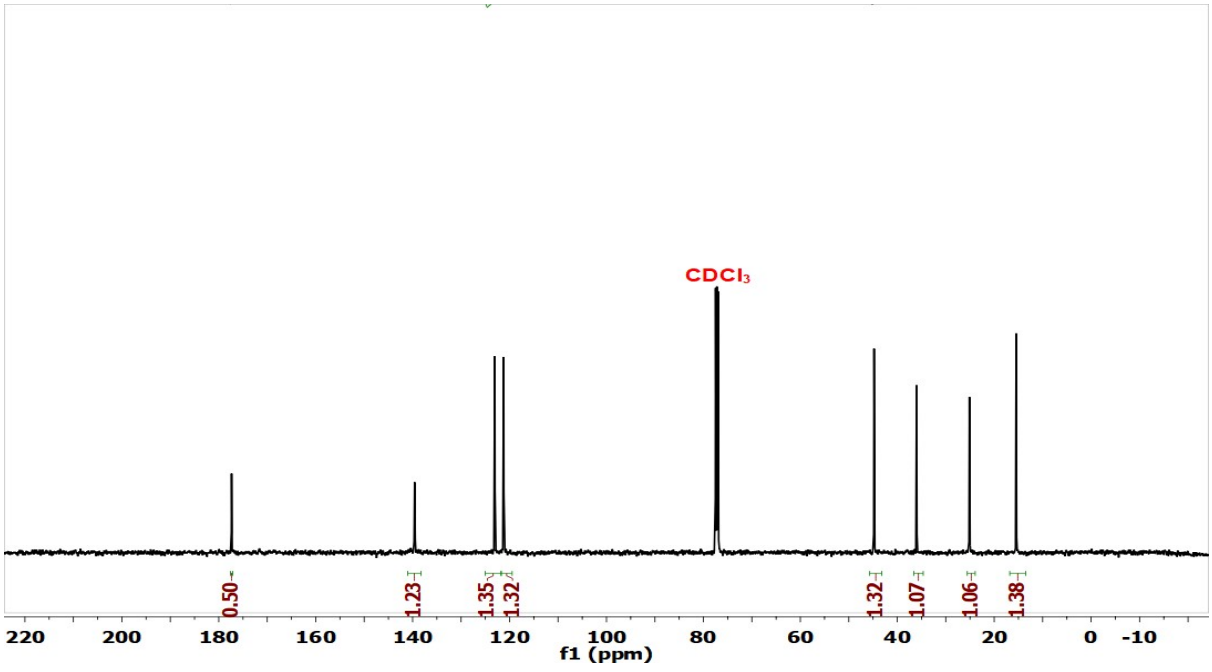

Fig. S2 ^{13}C NMR spectra of pure [EMIM][Ac].

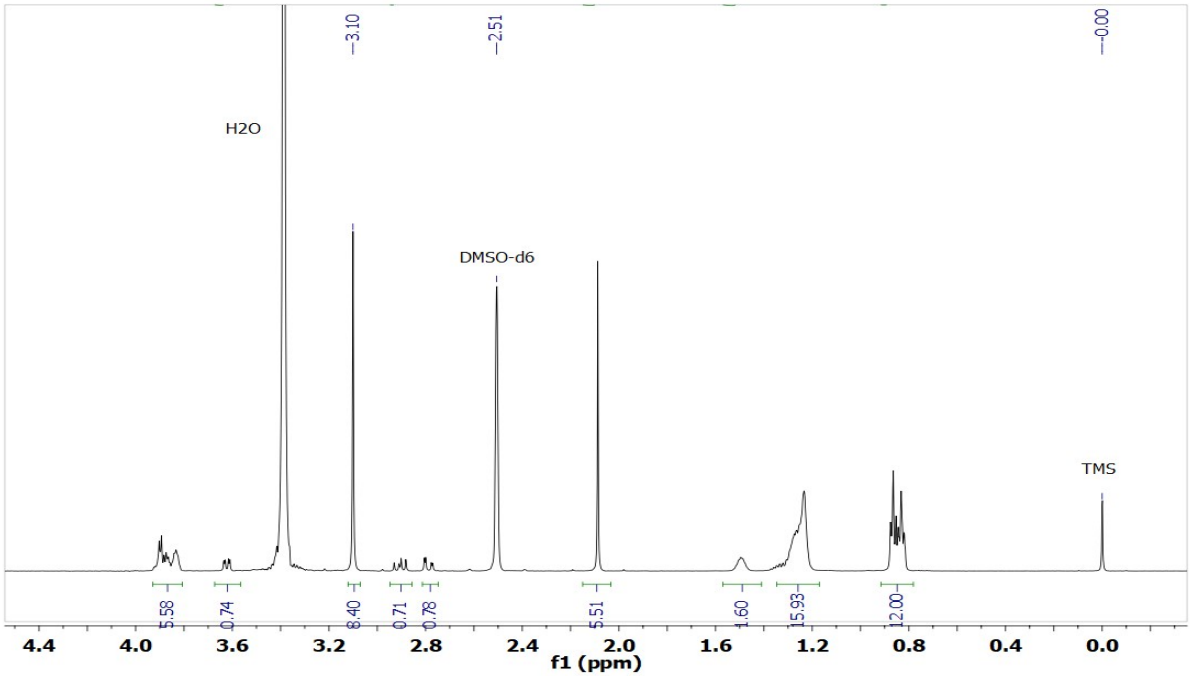

Fig. S3 ^{1}H NMR spectra of pure [Cho][AOT].

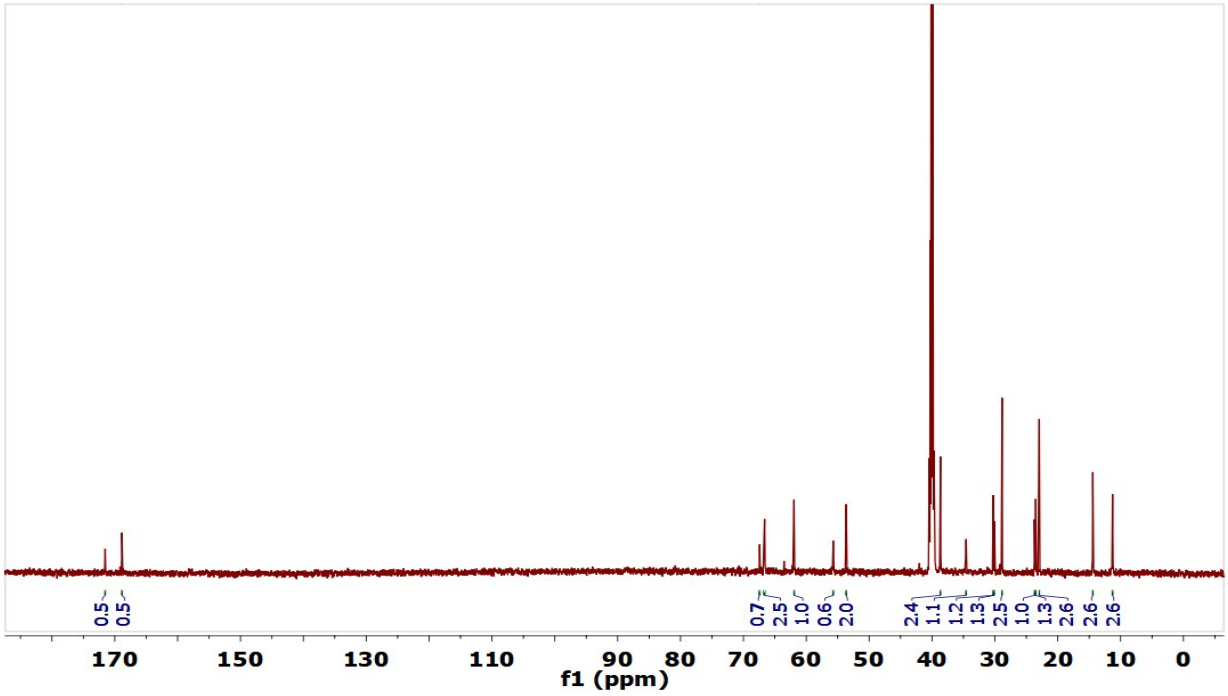

Fig. S4 ^{13}C NMR spectra of pure [Cho][AOT].

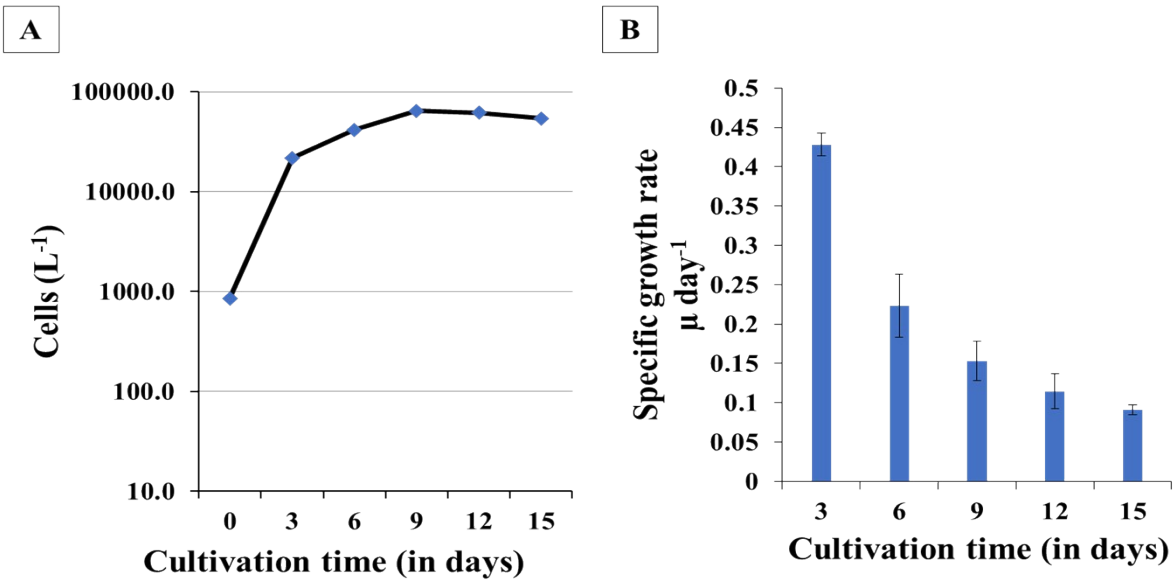

Fig. S5 Growth of the diatom *T. Lundiana* CSIRCSMCRI 001 at 25±1°C in f/2 media. (A). Logarithmic growth curve, (B). Specific growth rate (μ day^{-1}). Data shown in mean ± SE, n=3.

Table S1. Lipid separated from ionic liquid pre-treated biomass of *Thalassiosira lundiana* CSIRCSMCRI 001.

S.No.		Fatty acid composition	% of FAs in total lipid
1	C8:0	Octanoic acid, TMS	0.17
2	C8:1	3-Octenoic acid, TMS	2.40
3	C10:0	Decanoic acid, TMS	1.46
4	C12:0	Dodecanoic acid, 4,6-dimethyl-	1.87
5	C12:1	5-Dodecenoic acid, TMS derivative	1.20
6	C14:0	Myristic acid, TMS derivative	21.40
7	C14:1	9-Tetradecenoic acid, TMS derivative	0.22
8	C16:0	Palmitic Acid, TMS derivative	11.63
9	C16:1, n-7	Palmitelaidic acid, TMS derivative	8.84
10	C18:0	Stearic acid, TMS derivative	6.28
11	C18:1, n-9	Oleic Acid, TMS derivative	1.65
12	C18:2, n-6	Linoleic acid, 3TMS derivative	3.98
13	C19:0	Nonadecanoic acid TMS derivative	0.22
14	C19:3	Z,Z,Z-4,6,9-Nonadecatriene	0.20
15	C20:4, n-6	Arachidonic acid, TMS derivative	10.48
16	C20:0	Arachidic acid, TMS derivative	4.25
17	C22:6, n-3	Docosahexaenoic acid, TMS derivative	19.74
18	C26:0	Hexacosanoic acid, TMS derivative	0.57
19	C27:2	Desmosterol, TMS derivative	2.30
20	C28:0	Octacosanoic acid, TMS derivative	0.85
21	C30:0	Triacontanoic acid, TMS derivative	0.29
		Total	100 %
		Total fatty acids (mg/g dry weight)	90.56
		% of total lipids	9.06

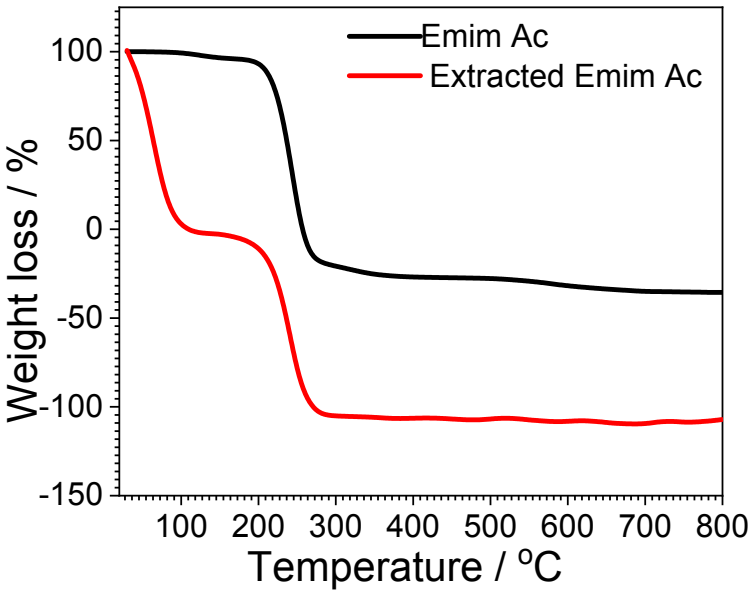

Fig. S6 Thermal gravimetric analysis (TGA) of pure ionic liquid [EMIM][Ac] and RIBC solutions after lipid extraction from *T. lundiana* CSIRCSMCRI 001.

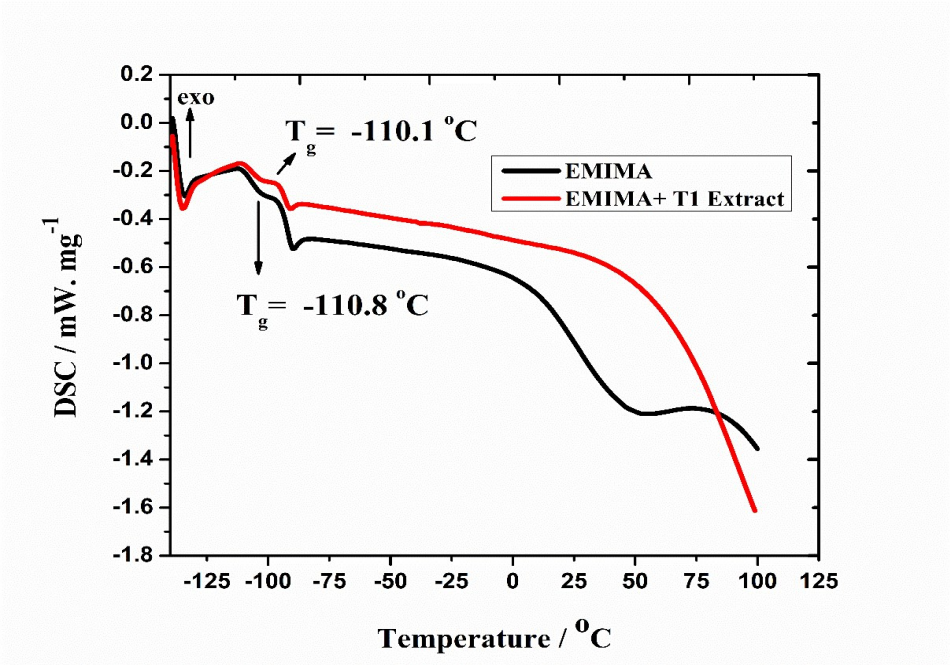

Fig. S7 DSC analysis of pure ionic liquid (EMIMAc) and RIBC solutions after lipid fractionation extraction.

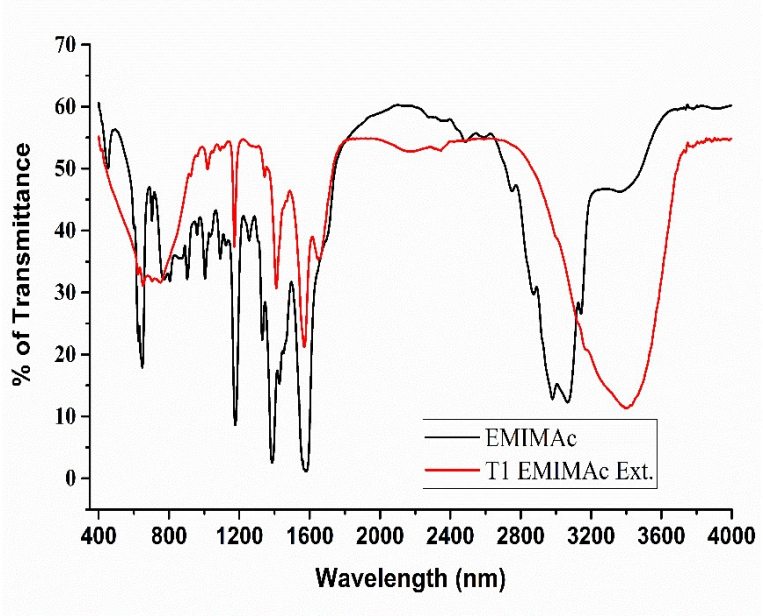

Fig. S8 Fourier transform infrared spectroscopy annotation of pure ionic liquid [EMIM][Ac] and RIBC solutions after the lipid extraction.

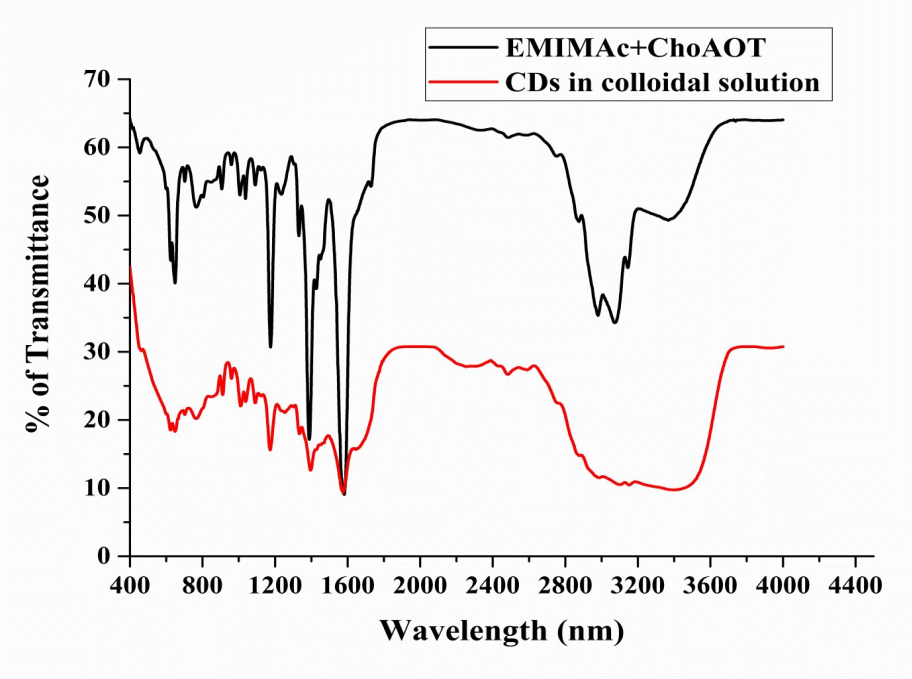

Fig. S9 Fourier transform infrared spectroscopy annotation of pure colloidal solution ([EMIM][Ac]+ AOT) and CDs loaded fluorescent colloidal solution.

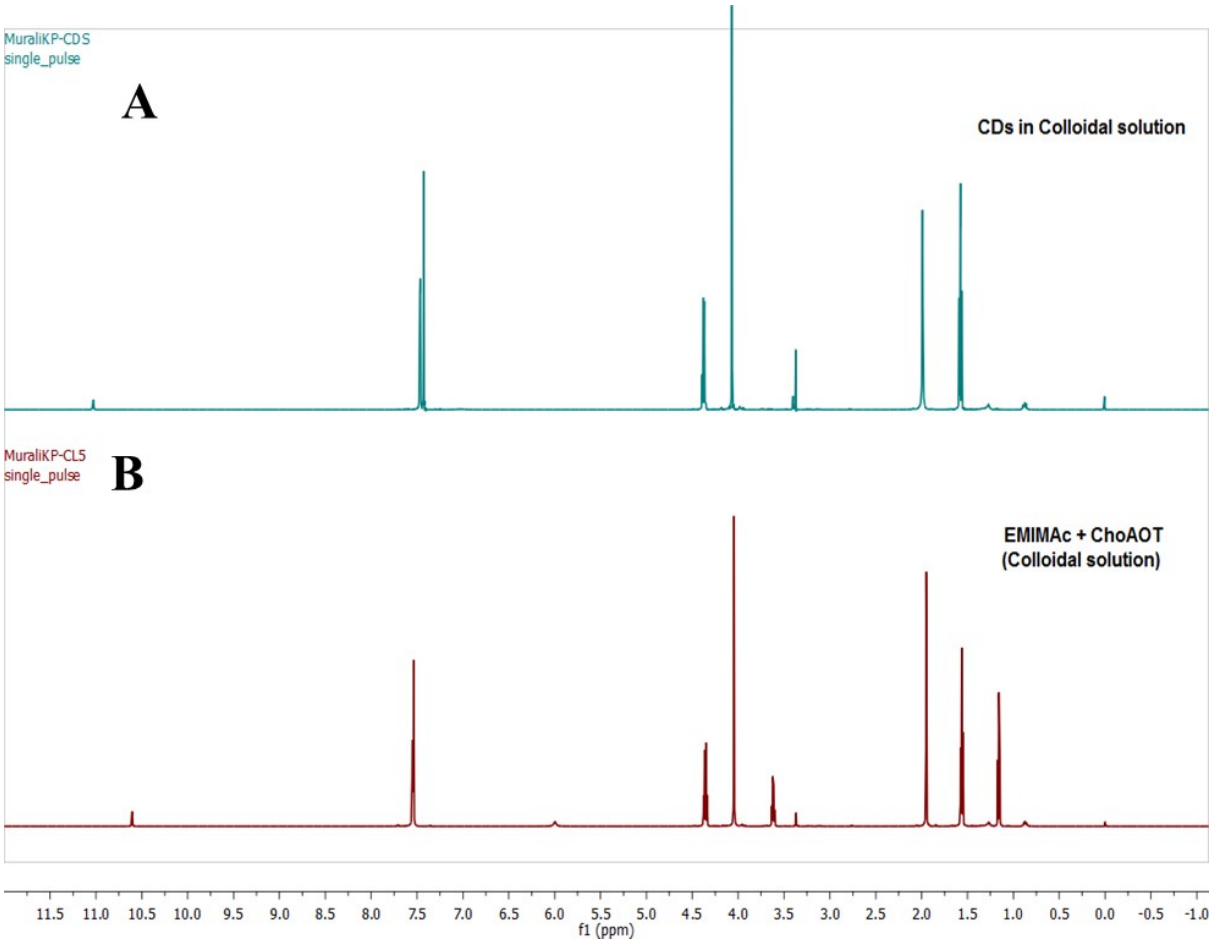

Fig. S10 FT-NMR spectral confirmation of compositional changes in synthetic colloidal solution during fluorescent carbon dots synthesise. (**A**) Pure synthetic colloidal solution ([EMIM][Ac]+AOT), (**B**) Fluorescent carbon dots synthesised colloidal solution.

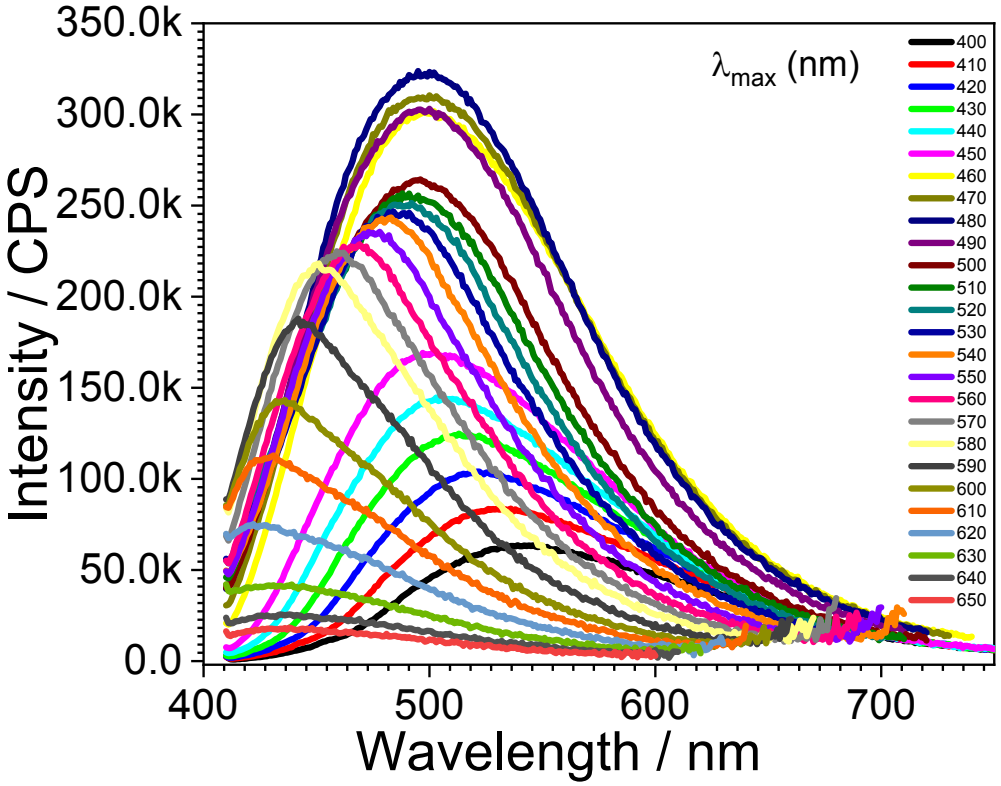

Fig. S11 Fluoresce emission spectra at different excitation energy (400nm to 650nm, are provided) of CDs loaded colloidal solution.