Supporting information for

DES-N-Doped Oxygenated Carbon Dots Colloidal Solutions for Light Harvesting and Bio-imaging Applications

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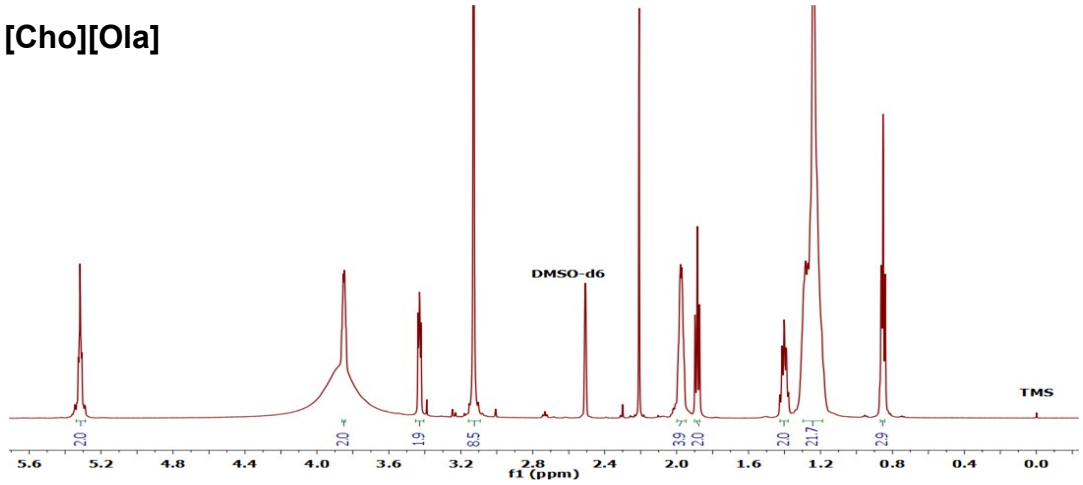

Fig. S1 ^{1}H NMR spectra of [Cho][Ola].

Choline Oleate, [Cho][Ola]: ^{1}H-NMR; 600MHz, DMSO-d6, δ_H) 0.9 (t, 3H), 1.3 (m, 20H), 1.4 (q, 2H), 1.9 (t, 2H), 2.0 (q, 4H), 3.1 (s, 9H), 3.4 (t, 2H), 3.9 (m, 3H), 5.3 (d, 2H); ESI-MS: $[C_5H_{14}NO]^+$ m/z:104.10, $[C_{18}H_{33}O_2]^-$ m/z = 285.6.

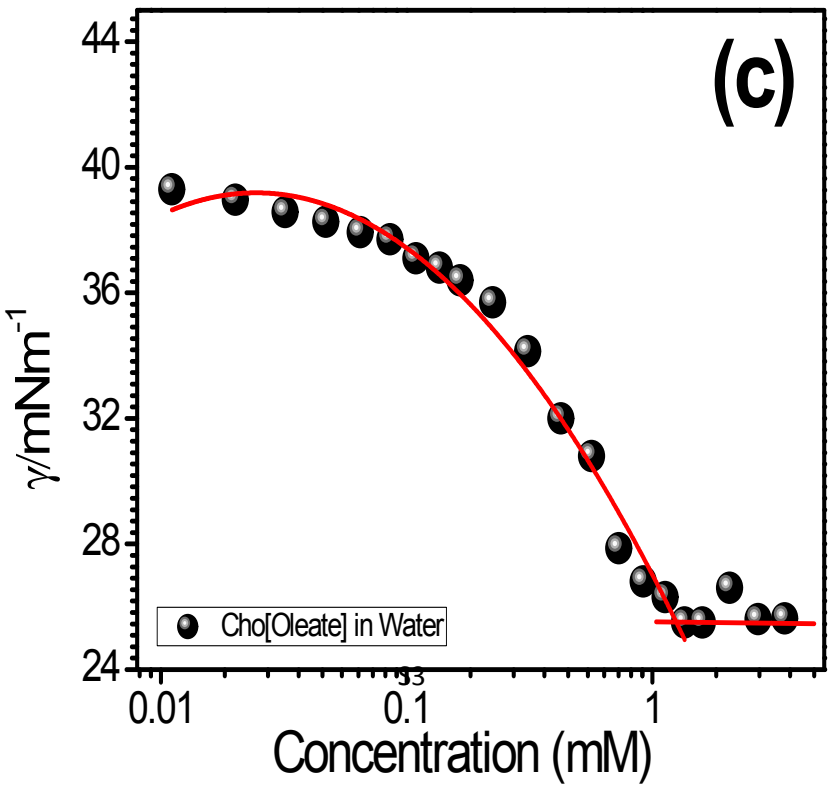

Fig. S2 Plot shows the Surface tension of [Cho][Ola] in aqueous system.

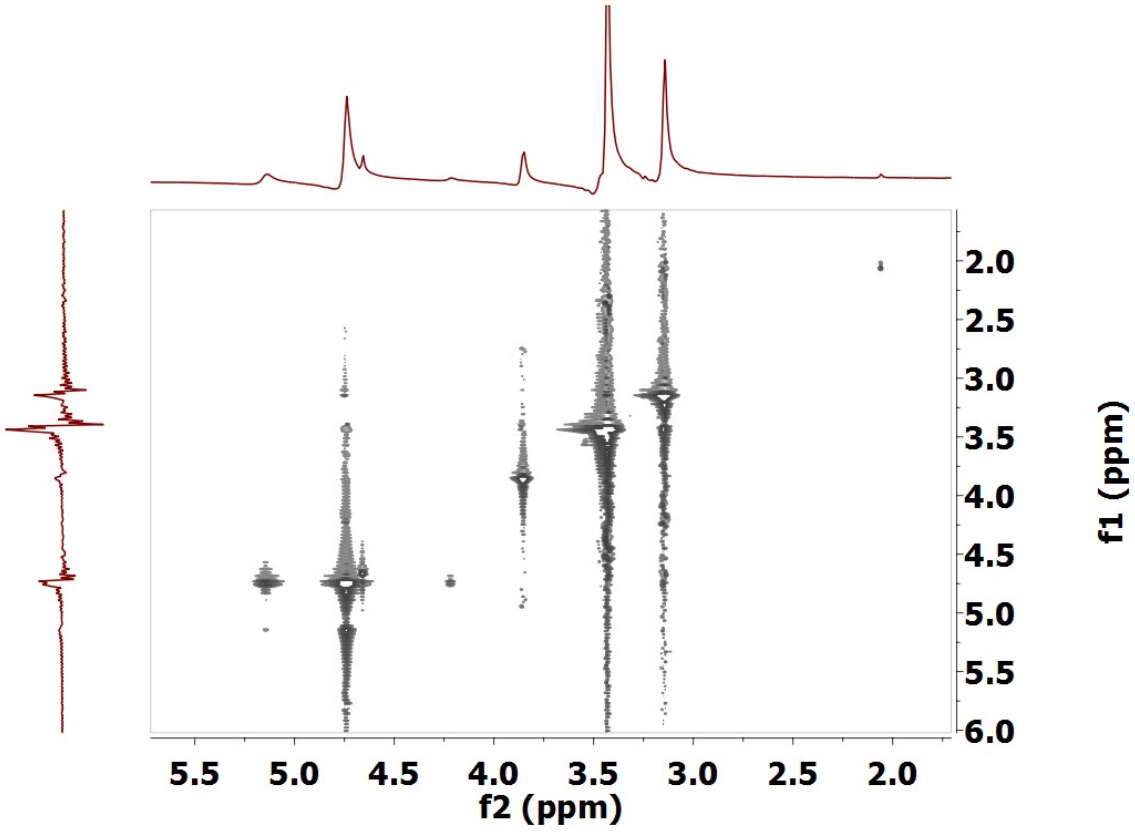

Fig. S3 2D NMR NOESY spectra spectra of [Cho][Ola] in choline chloride-ethylene glycol (1:2 mole ratio) deep eutectic solvent (DES).

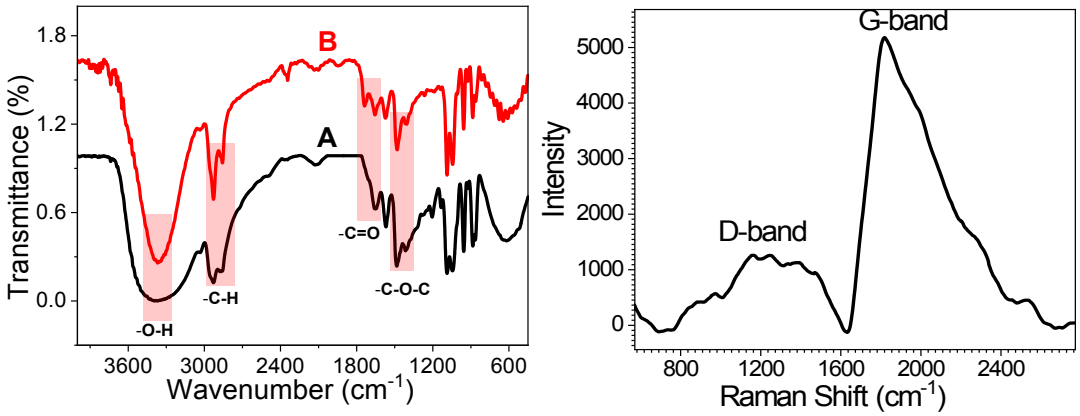

Fig. S4 (a) FT-IR spectra of (A) [Cho][Ola]-DES colloidal solutions and (B) N doped CDs-[Cho][Ola] -DES colloidal solutions, and (b) Raman spectra of N doped CDs-[Cho][Ola] -DES colloidal solutions.

Fig. S5 Fluorescence spectra, of N doped CDs-[Cho][Ola]-DES colloidal solution.

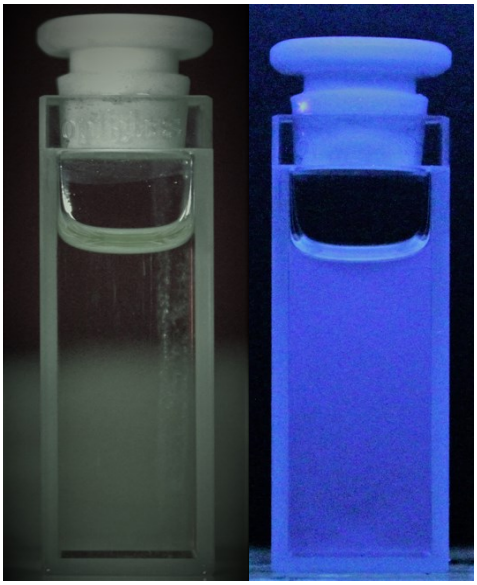

Fig. S6 Photographs of blue emission from N doped CDs dispersed in toluene.

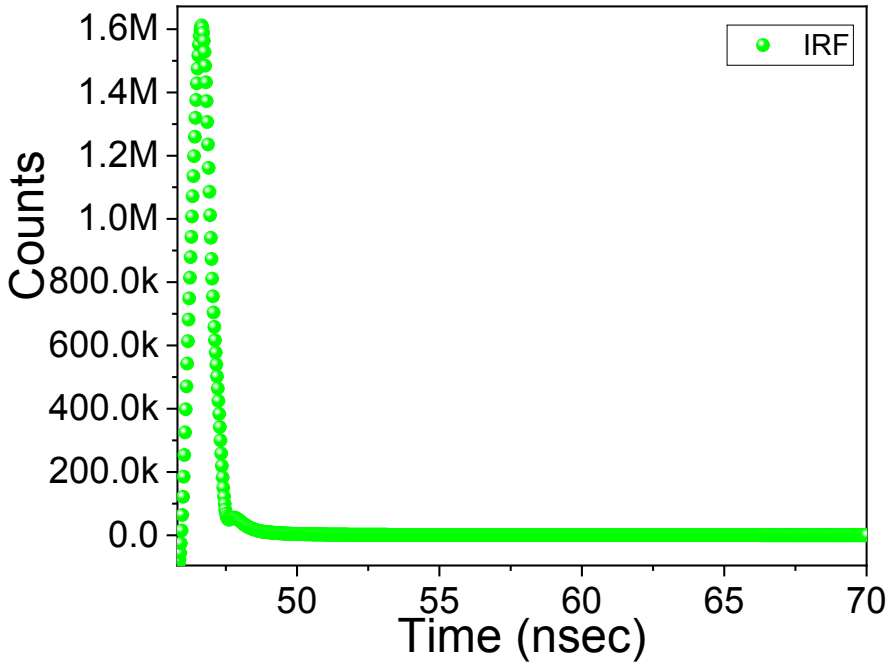

Fig. S7 TrPL life time IRF spectra.

Quantum efficiency calculations: Quantum yield (QY) of N doped CDs-[Cho][Ola] -DES colloidal solutions was calculated using Fluorescein dye as a standard having, QY = 0.79 (79%). We prepared 0.1M NaOH solution of dye to measure the QY and it was calculated using following equation:

$$\phi = \phi_R \times \frac{I}{I_R} \times \frac{A_R}{A} \times \frac{\eta^2}{\eta_R^2}$$

Where,

ϕ, ϕ_R = Quantum yield of sample and reference respectively,

I, I_R = Emission of the sample and reference respectively,

A, A_R = optical density of the sample and reference respectively,

η^2, η_R^2 = refractive index of the sample and reference respectively.

Table S1. Comparison of quantum yields of CDs vis. a vis. method of preparation.

S.No.	Type of material	Synthetic route	Quantum yield	Application	Reference/s
1	DES-N-CDs micelles	100°C	0.82	Light harvesting and bioimaging	**Present study**
2	N-CDs	Microwave @ 160 °C	0.93	pH response	1
3	N-CDs	Autoclave at 180 °C	0.47	Light harvesting	2
4	N-CDs	autoclave @ 180 °C	0.31	bioimaging	3
5	N-CDs	Autoclave at 200 °C	0.16	bioimaging	4
6	N-CDs	Microwave @ 180 °C	0.14	bioimaging	5
7	Co-doped CDs	Autoclave at 200 °C	0.73	Light harvesting	6
8	S-doped CDs	240 °C	0.67	Fe(III) ion detection	7
9	Silica functionalised CDs	240 °C	0.47	bioimaging	8
10	Polyamine doped CDs	< 200 °C	0.42	chemical sensing	9

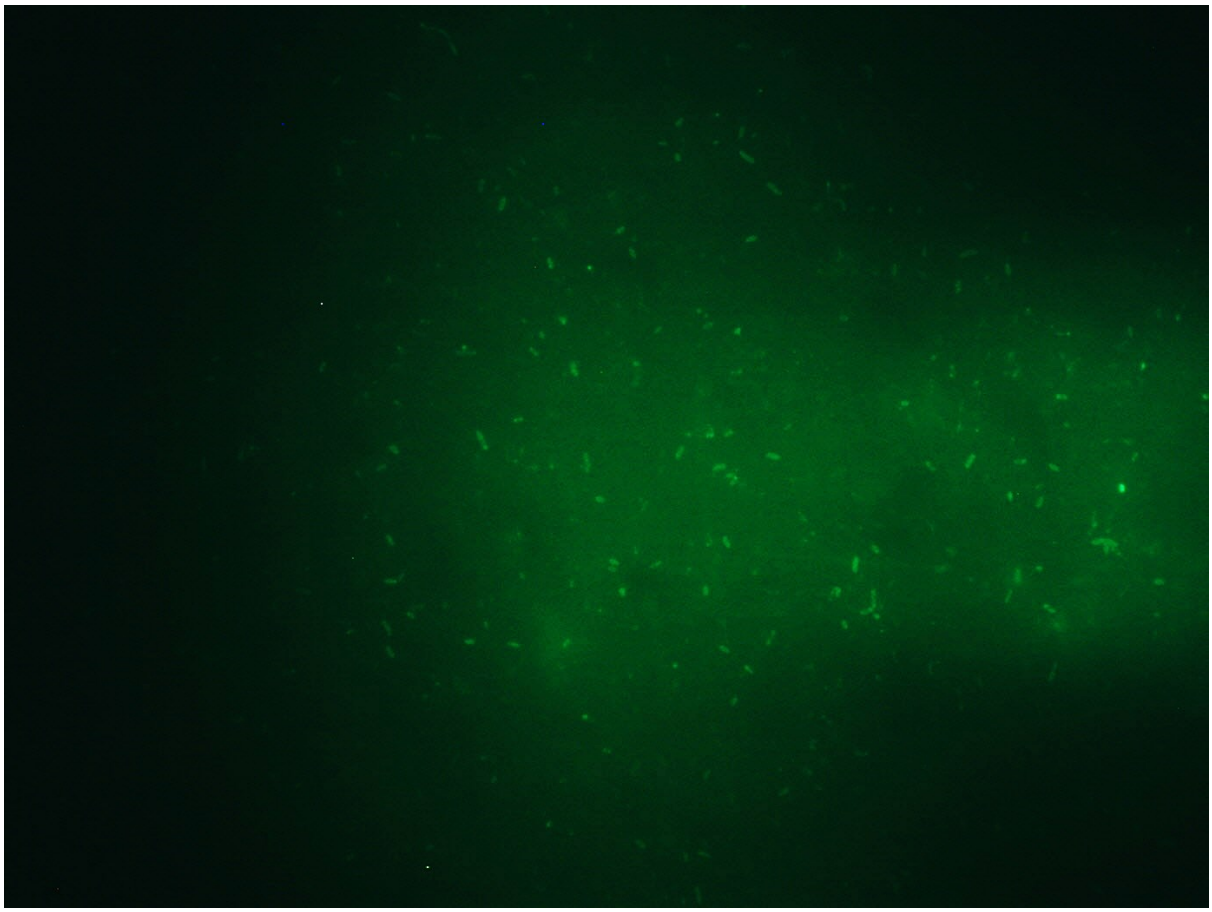

Fig. S8 Fluorescence microscopic images of *Escherichia coli* with the N-doped carbon dots under and through green filter.

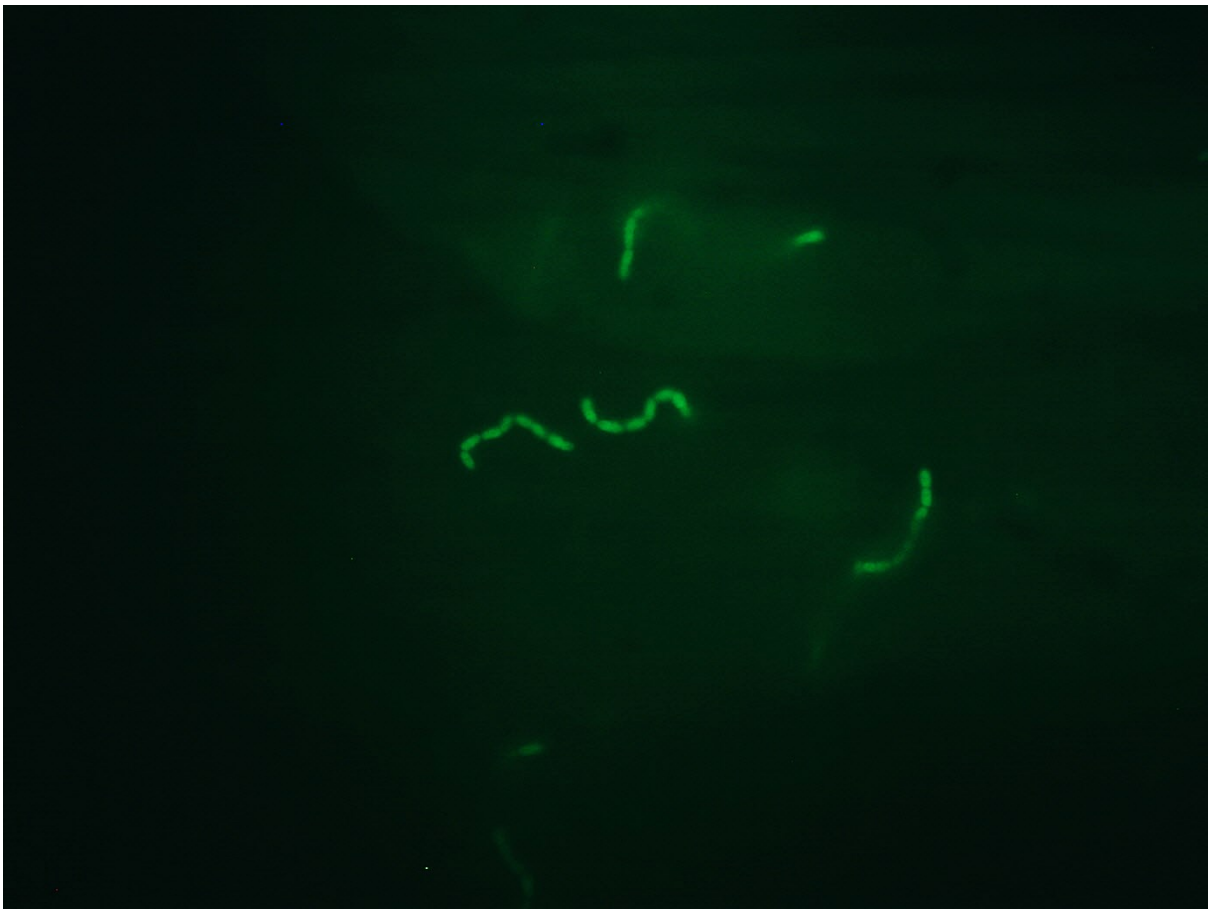

Fig. S9 Fluorescence microscopic images of *Bacillus cereus*, labeled with the N-doped carbon dots under and through green filter.

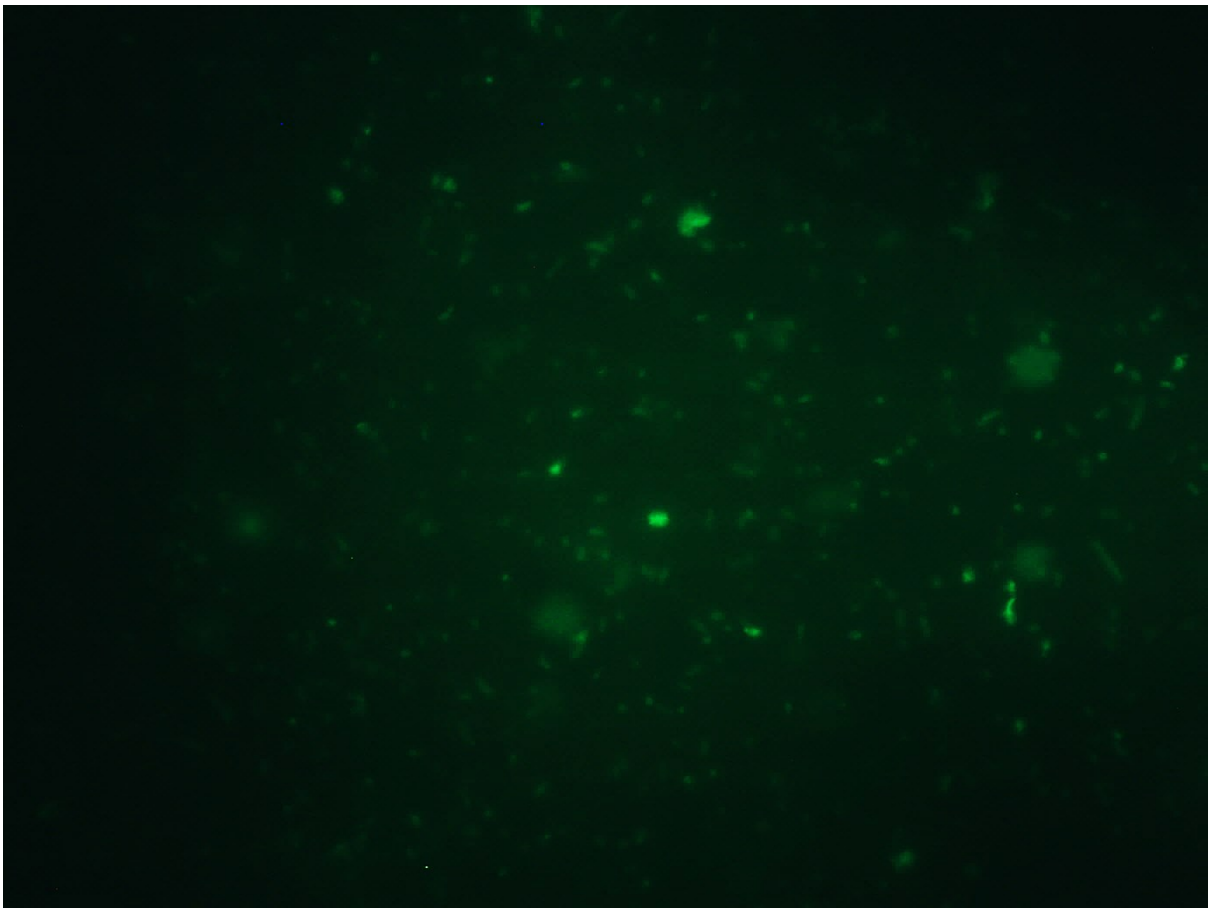

Fig. S10 Fluorescence microscopic images of *Vibrio owensii*, labeled with the N-doped carbon dots under and through green filter.

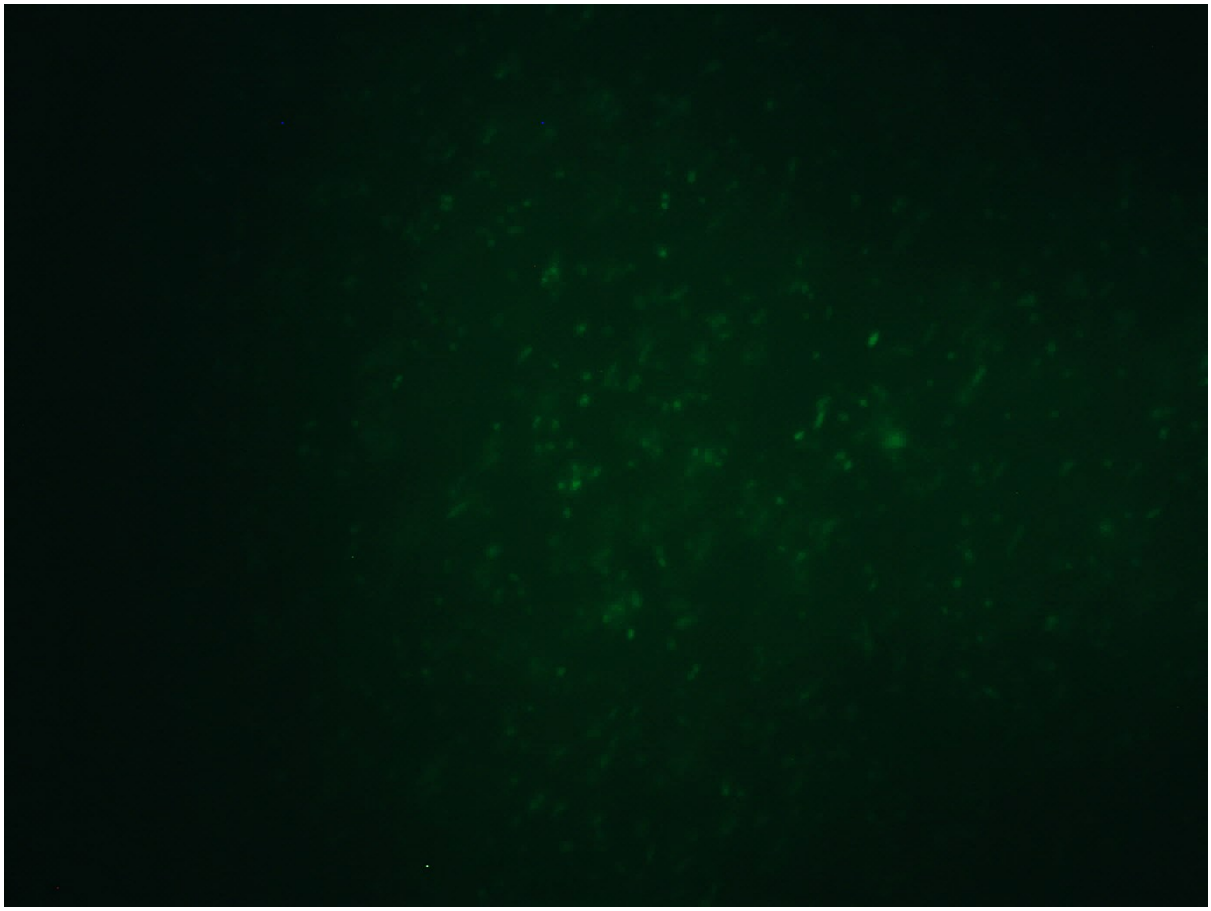

Fig. S11 Fluorescence microscopic images of *Vibrio alginolyticus* of OD_{600} 0.6, labeled with the N-doped carbon dots under and through green filter.

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