Electronic Supplementary Material (ESI) for RSC Advances.

N-doped oxidized carbon dots for methanol sensing in alcoholic beverages

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SUPPORTING INFORMATION

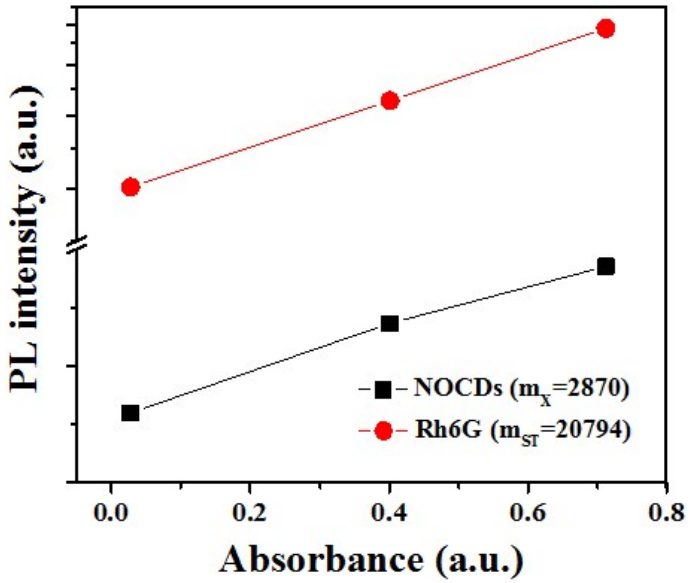

Fig. S1 The quantum yield was determined by slope method using the reference of rhodamine 6G (Rh6G): the graph compares the absorbance values and the integrated photoluminescence intensity (340 nm excitation) of the NOCDs samples with Rh6G as reference.

The fluorescence quantum yield of the NOCDs was calculated as follows

$$\Phi_X = \Phi_{ST} (m_X/m_{ST}) (\eta^2_X/\eta^2_{ST})$$

$$\Phi_X = 100\% (m_X/m_{ST}) (1)$$

$$\Phi_X = 100\% (2870/20794)$$

$$\Phi_X = 13.80\%$$

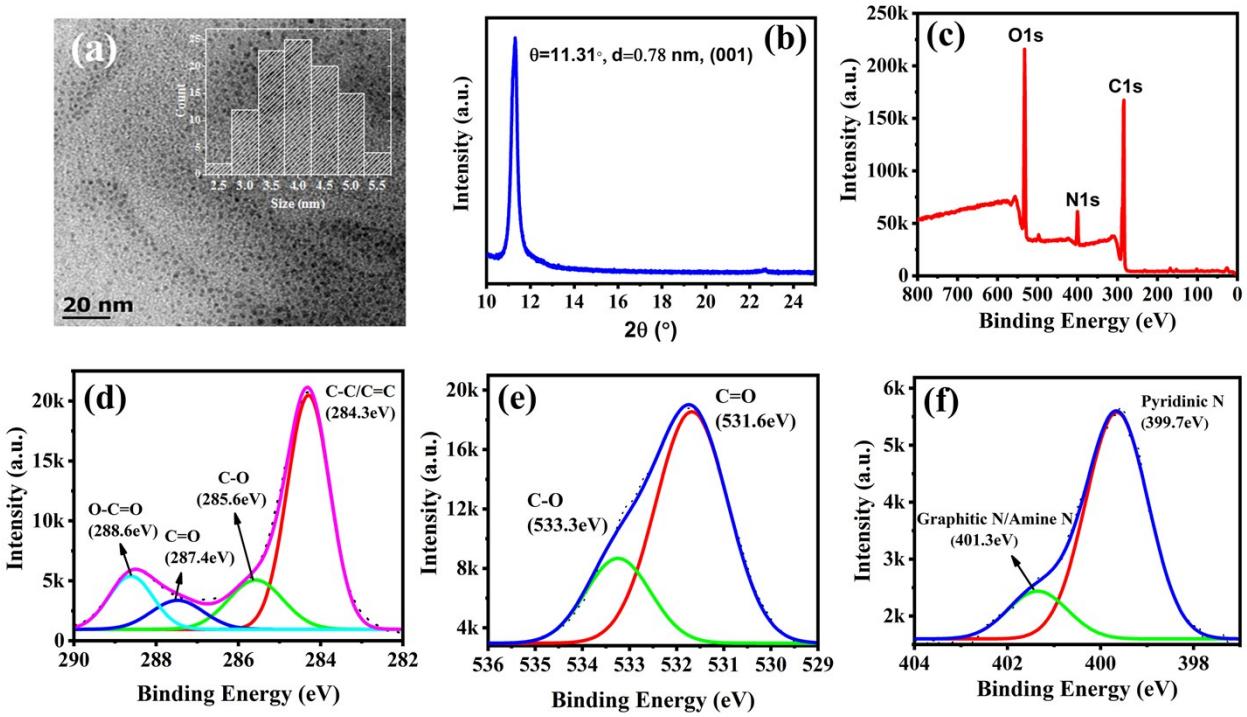

Fig. S2 Basic characterization of as-prepared NOCDs. (a) TEM image. Size distribution is shown in the inset, (b) XRD patterns, (c) Survey XPS scan. De-convoluted XPS spectra of (d) C1s, (e) O1s and (f) N1s peaks.

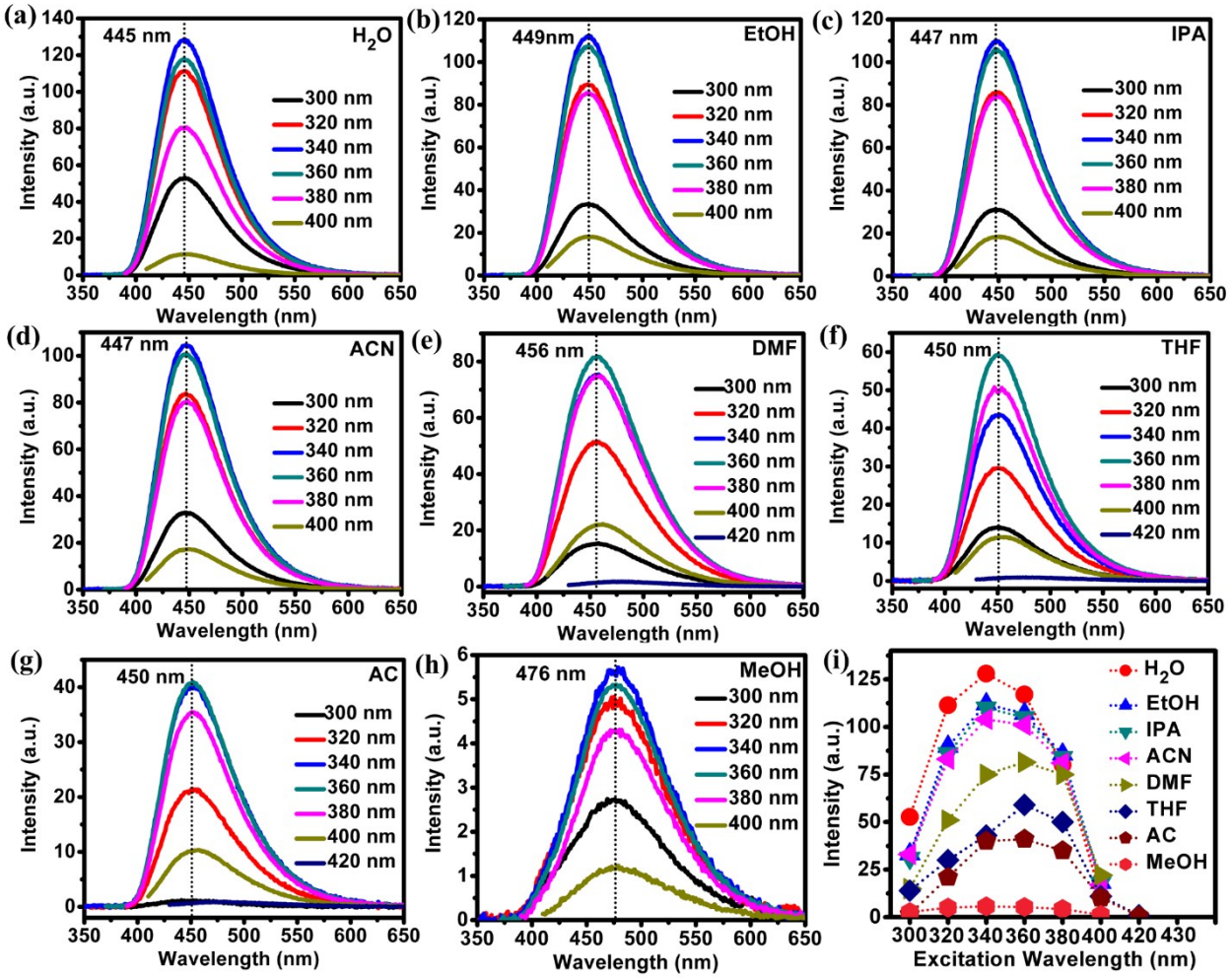

Fig. S3 PL emission spectra of NOCDs at different excitation wavelengths varying from 300 to 420nm in different solvents (a) water; emission maxima=445nm (b) EtOH; emission maxima =449nm (c) IPA; emission maxima =447nm (d) ACN; emission maxima=447nm (e) DMF; emission maxima=456nm (f) THF; emission maxima=450nm (g) AC; emission maxima=450nm (h) MeOH; emission maxima =476nm (i) Variation of PL peak emission as a function of excitation wavelength.

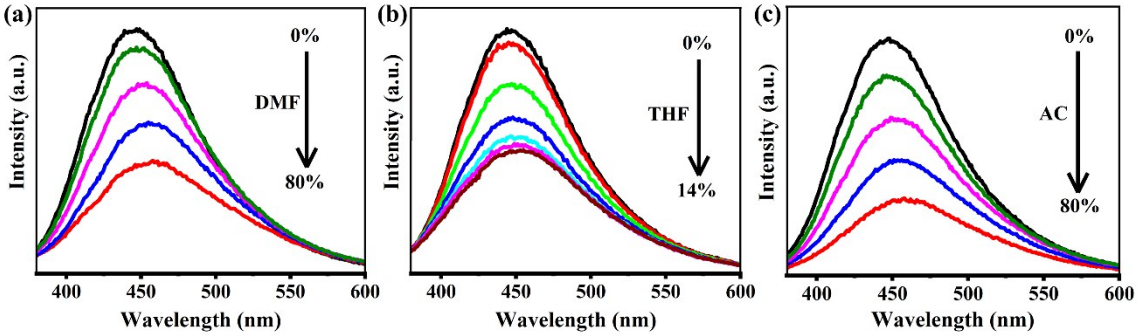

Fig. S4 PL emission spectra of nitrogen doped CDs at different concentration of organic solvents (a) dimethylformamide (DMF), (b) tetrahydrofuran (THF) and (c) acetone (AC) respectively.

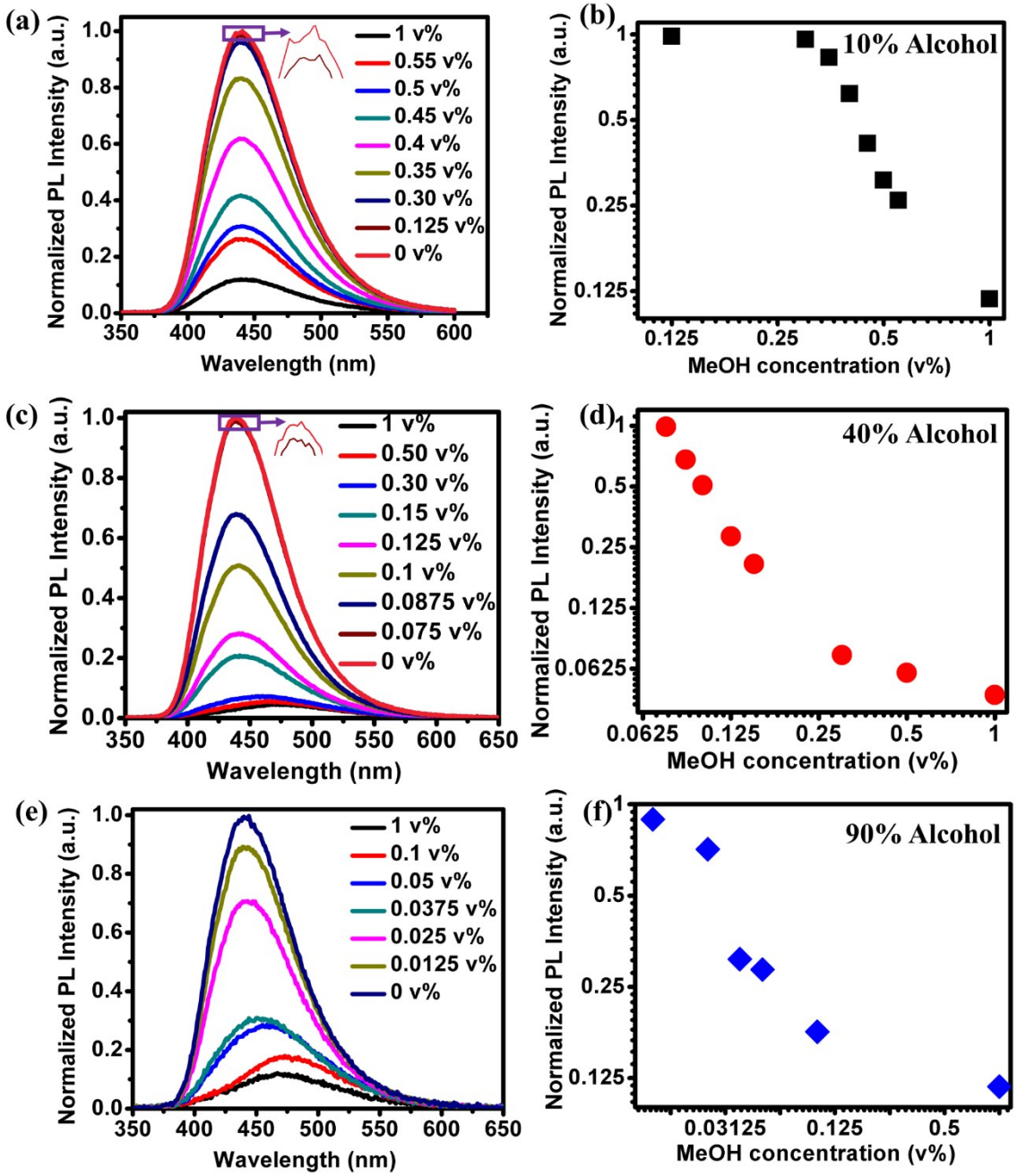

Fig. S5 PL spectra (left) and maximum intensity (right) for various concentrations of MeOH (v%) and total alcohol (EtOH + MeOH) concentration in water. (a, b) 10%, (c, d) 40% and (e, f) 90% using 8μL NOCDs and able to detect from 0.0125 to 1v%, while the peak position shifted towards higher wavelength as the MeOH concentration increases.

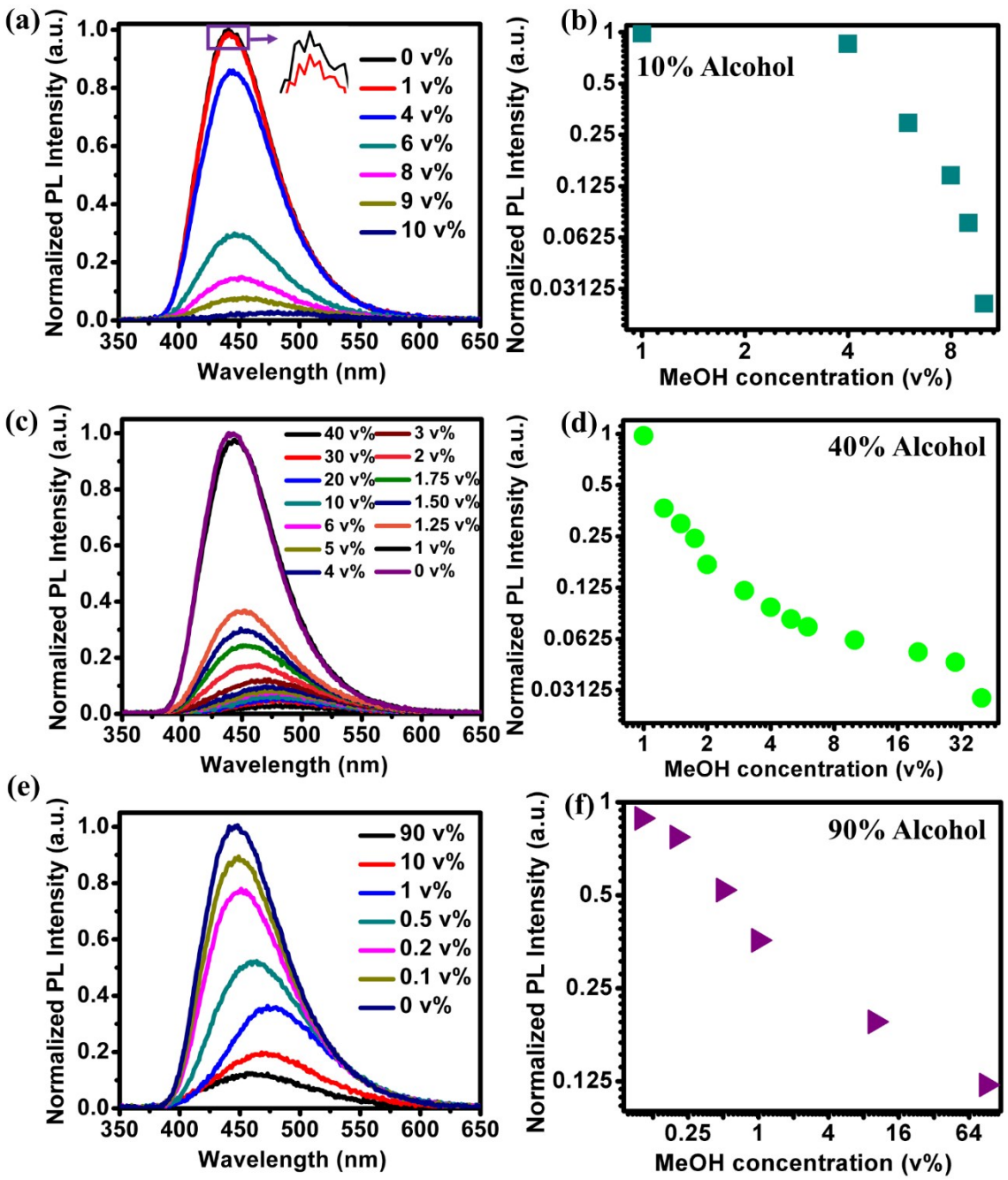

Fig. S6 Different v% MeOH in different v% of alcohols (mixture of MeOH and EtOH) such as (a, b) 10%, (c, d) 40% and (e, f) 90% using 70µL NOCDs and detected from 0.1 to 10v% with peak shift towards higher wavelength.