Supporting Information

Fluorescent Nanoparticles from Mature Vinegar: Their Properties and Interaction with Dopamine

Lin Cao,[ab] Xunyu Song,[ab] Yukun Song,[ab] Jingran Bi,[ab] Shuang Cong,[ab] Chenxu Yu[bc] and Mingqian Tan[ab*]

[a]*School of Food Science and Technology, National Engineering Research Center of Seafood, Dalian Polytechnic University, Qinggongyuan1,Ganjingzi District, Dalian 116034, Liaoning, People's Republic of China*

[b]*Engineering Research Center of Seafood of Ministry of Education of China, Dalian 116034, Liaoning, People's Republic of China*

[c]*Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, IA 50011, USA*

*Corresponding author (Tel& Fax: +86-411-86318657, E-mail: M. Tan, 2468750030@qq.com, ORCID: 0000000275350035).

Contents

Experimental section

Stability study of the FNs

Effect of pH on fluorescence intensity of the FNs. Different amounts of 0.2 mol L^{-1} NaOH solution were added to the Britton−Robinson buffer consisting of 0.04 M H_3BO_3, 0.04 M H_3PO_4 and 0.04 M CH_3COOH to prepare various pH (pH 2–11) solutions. 200 μL of FNs solution (3.5 mg mL^{-1}) was added to 2 mL of pH-adjusted Britton–Robinson buffer and the fluorescence intensity at excitation wavelength of 320 nm was recorded for each of the samples, and triplicate measurements on each sample were averaged to yield the recorded value for the sample.

Effect of Ionic strength on fluorescence intensity of the FNs. In this work, sodium ions solutions of different concentrations (5.0, 4.5, 4.0, 3.5, 3.0, 2.5, 2.0, 1.5, 1.0, 0.5 mol L^{-1}) were prepared with sodium chloride (NaCl) to study the effect of ionic strength on the fluorescent property of the FNs. 200 μL of FNs solution (3.5 mg mL^{-1}) was added to 1.8 mL of each of the NaCl solution samples to prepare a set of 2 mL of FN-NaCl solutions with various NaCl concentrations. A blank control is prepared with 200 μL of FNs solution added into 1.8 mL of pure water. The fluorescence intensity of each of the samples was recorded at the excitation wavelength of 320 nm, and triplicate measurements on each sample were averaged to yield the recorded value for the sample.

Effects of Metal ions on fluorescence intensity of the FNs. 200 μL FNs solution (5 mg mL^{-1}) was added to solutions of different metal ions ($MnSO_4 \cdot H_2O$, $CaCl_2 \cdot 2H_2O$, $CuCl_2 \cdot 2H_2O$, $FeCl_2 \cdot 4H_2O$, $MgCl_2 \cdot 6H_2O$, $FeCl_3 \cdot 6H_2O$, $NiCl_2 \cdot 6H_2O$, $Co(NO_3)_2 \cdot 6H_2O$

and $ZnSO_4 \cdot 7H_2O$, all at the concentration of 1 mmol L^{-1}) to a final volume of 2 mL, respectively. The FNs solution without metal ions was used as the blank control. The fluorescence intensity of each of the samples was recorded using 320 nm wavelength as excitation, and triplicate measurements on each sample were averaged to yield the recorded value for the sample.

Effect of irradiation time on fluorescence intensity of the FNs. 2 mL of FNs aqueous solution (1.75 mg mL^{-1}) was irradiated at 10, 20, 30, 40, 50, 60, 70, 80 min, respectively, by an UV lamp at 365 nm. Fluorescence intensity after irradiation was recorded with 320 nm wavelength as excitation. The fluorescence intensity at 0 min irradiation was treated as an initial control. Triplicate measurements on each sample were averaged to yield the recorded value for the sample.

Results

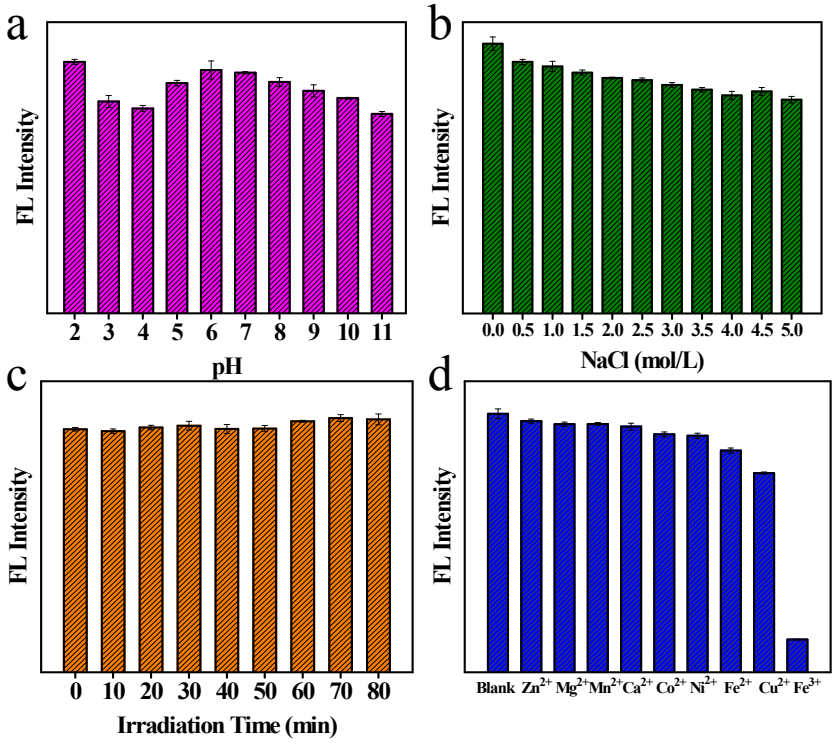


Figure S1 (a) The fluorescence responses of FNs towards different pH. (b) The fluorescence responses of FNs towards different NaCl concentration. (c) The fluorescence responses of FNs towards different irradiation time. (d) The fluorescence responses of FNs towards different metal ions.

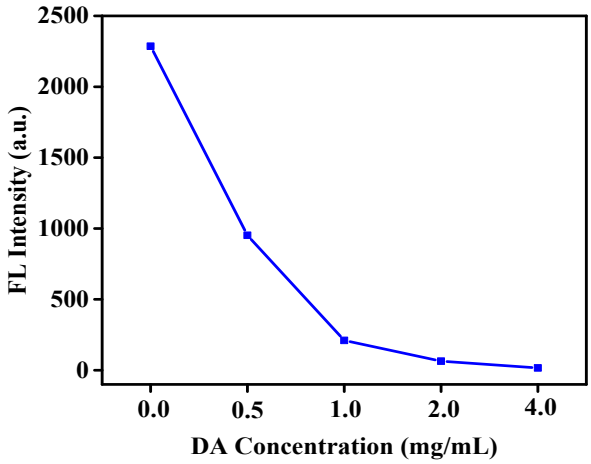
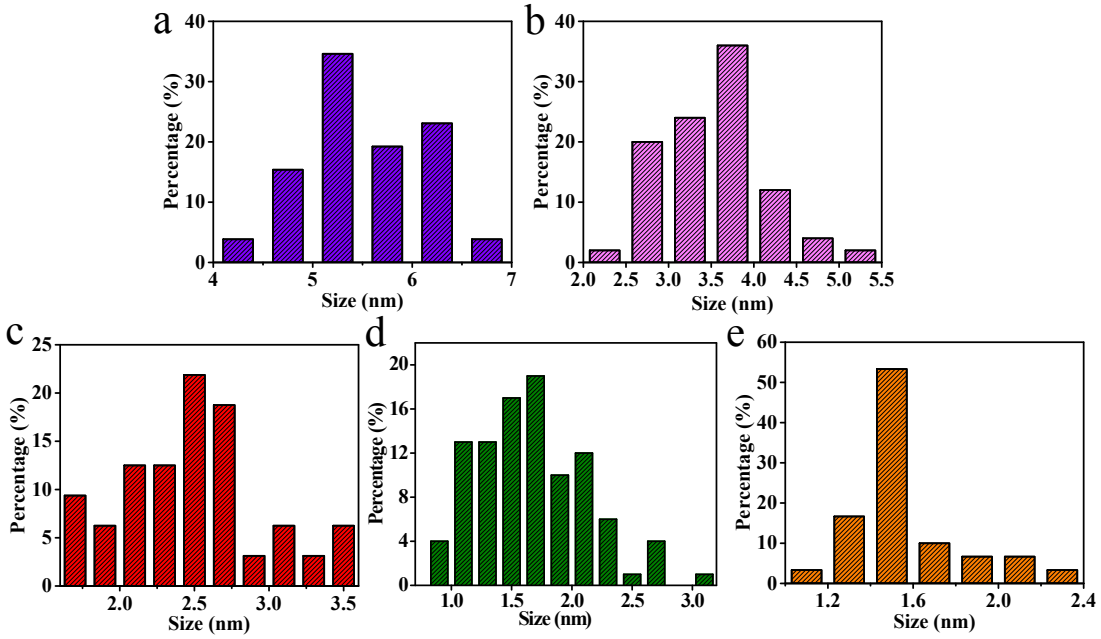


Figure S2 Fluorescence intensity of FNs (3.75 mg mL^{-1}) with the addition of different concentration of dopamine. λ_{ex}=330 nm, λ_{em}=407 nm.



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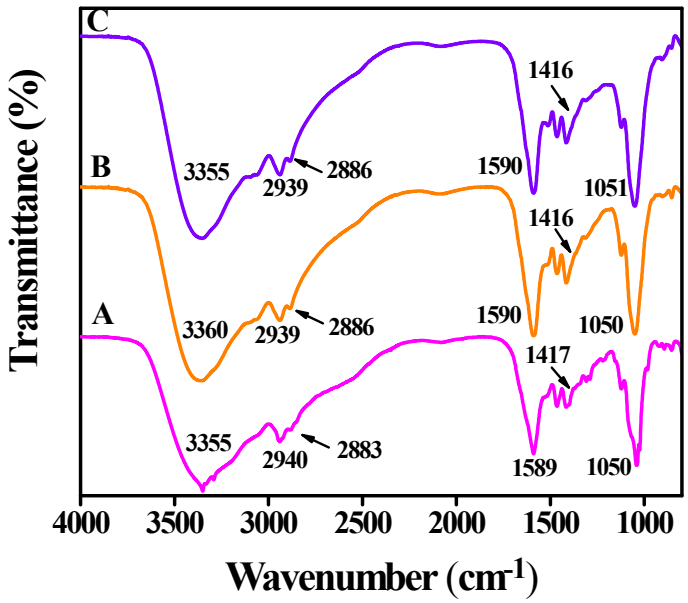
99 **Figure S3** Corresponding particle size histogram of (a) PDA- FCs, (b) FNs-FCs-0.5,

100 (c) FNs-FCs-1, (d) FNs-FCs-2 and (e) FNs-FCs-4, respectively.



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102 **Figure S4** FT-IR spectra of (A) FNs-FCs-0.5, (B) FNs-FCs-1 and (C) FNs-FCs-2,

103 respectively.

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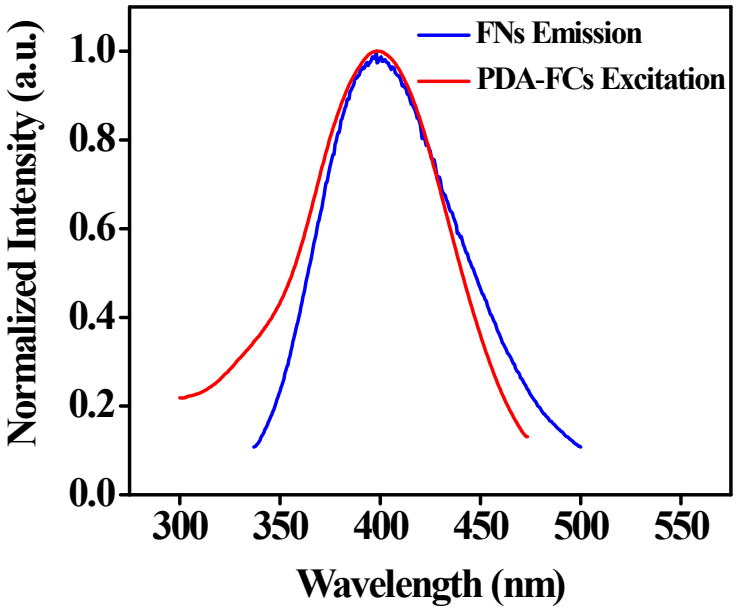

Figure S5 Fluorescence emission spectra of FNs (Ex=320nm) and the excitation spectra of PDA-FCs (Em=400nm).

Table S1 Quantum yield results of FNs, PDA-FCs and FNs-FCs samples.

	FNs	PDA-FCs	FNs-FCs-0.5	FNs-FCs-1	FNs-FCs-2	FNs-FCs-4
R^2	0.994	0.997	0.995	0.993	0.999	0.992
QY	5.71%	0.59%	1.61%	1.05%	0.94%	0.36%

Table S2 XPS survey analysis results of FNs, PDA-FCs and FNs-FCs-4 samples.

Sample	C(%)	O(%)	N(%)	O/C(%)	N/C(%)
FNs	63.99	33.97	2.03	53.09	3.17
PDA-FCs	74.53	20.46	4.68	27.45	6.28
FNs-FCs-4	71.80	24.76	3.16	34.48	4.40

Table S3 Fluorescence lifetime fitting parameters of FNs, FNs-FCs and PDA-FCs samples.

Sample	χ^2	τ_1(ns)	τ_2(ns)	A_1(%)	A_2(%)	τ(ns)
FNs	0.993	1.23	7.93	24.34	75.66	6.30
FNs-FCs-0.5	1.259	1.58	9.20	49.93	50.07	5.40
FNs-FCs-1	1.179	1.36	7.53	42.43	57.57	4.91
FNs-FCs-2	1.281	1.40	8.25	58.63	41.37	4.23
FNs-FCs-4	1.186	1.34	6.20	67.57	32.43	2.92
PDA-FCs	1.074	1.02	4.65	15.82	84.18	4.08