Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

A COST-EFFECTIVE CHITOSAN-OXINE BASED THIN FILM FOR VOLATILE ACID VAPOUR SENSING APPLICATION

Akhil Kumar M M [a], V.M. Biju [a*]

[a] Department of chemistry,
National Institute of Technology,
Tiruchirappalli 620015,
Tamil Nadu, India.

[a*]Corresponding author Tel: +91-431-2503638

E-mail: vmbiju@nitt.edu

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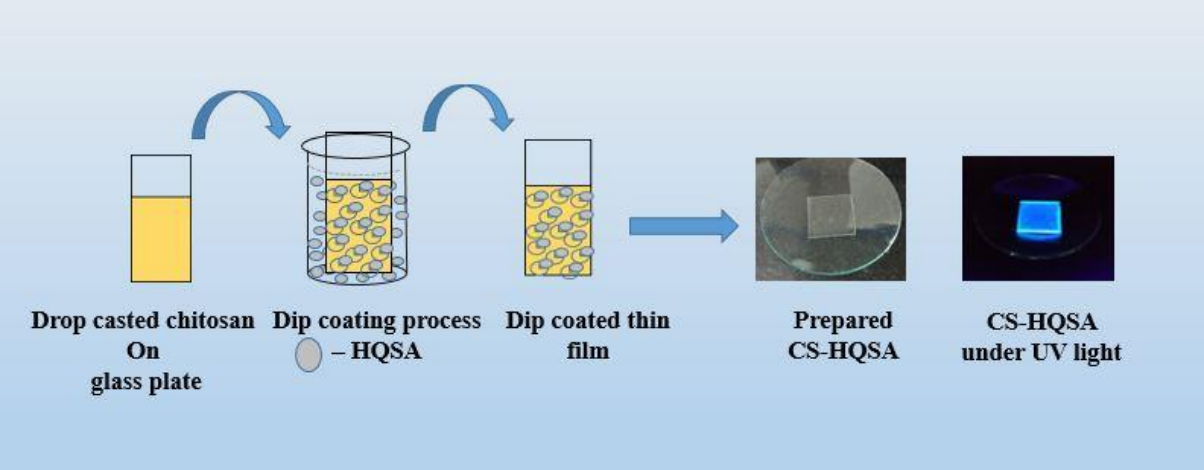

Figure S1 Graphical representation of CS-HQSA thin layer fabrication

Synthesis of 8-hydroxy-2-methyl-quinoline,5,7- sulfonyl chloride (HQSC)

The synthetic process proceeds with a previous method[13], 2g of 2-methyl 8hydroxyquinoline was slowly added into 10 mL of chlorosulphonic acid, then heated to 150 ^{o}C for two hours. The formed reaction mass was allowed to cool at room temperature and quenched into chilled water. Then the product was extracted with dichloromethane. The organic layer was dried with dry potassium carbonate and distilled in a rotary evaporator. The obtained product was directly used for further reaction. ^{1}H NMR (500 MHz, DMSO) δ 9.60 (d, J = 9.0 Hz, 1H), 8.26 (s, 1H), 8.09 (d, J = 9.0 Hz, 1H), 3.02 (s, 3H). ^{13}C NMR (126 MHz, DMSO) δ 159.0, 144.8, 144.6, 135.5, 129.2, 128.8, 125.9, 125.4, 125.2, 20.9 (Figure S2 and S3).

Synthesis of 8-Hydroxy-2-methyl-quinoline-5,7-bis (N, N-dimethyl) sulphonamide(HQSA)

25 mL of 2 M *N*, *N*-dimethylamine in dry THF was taken in an RB flask. The mass was cooled to 20-25 ^{o}C and 8-hydroxy-2-methyl-quinoline-5,6-sulfonyl chloride (200 mg) was slowly added as portion wise for three hours. The reaction mass was stirred for overnight. The solvents were removed under reduced pressure. The obtained product was recrystallized by dissolving into the minimum amount of 6M HCl solution.[13] And the prepared product was characterized by NMR and HRMS data. ^{1}H NMR (500 MHz, $CDCl_3$) δ 9.01 (d, J = 8.5 Hz, 1H), 8.46 (s, 1H), 7.61 (d, J = 9.0 Hz, 1H), 2.94 (s, 6H), 2.82 (s, 9H).^{13}C NMR (126 MHz, D_2O) δ 159.5, 154.5, 138.0, 134.9, 130.4, 126.4, 125.2, 122.8, 117.5, 37.6, 24.8. (Figure S4 and S5) HRMS (ESI) calcd for $C_{14}H_{19}N_3O_5S_2$ $[M+H]^+$ 374.08; found 374.079 (Figure S6).

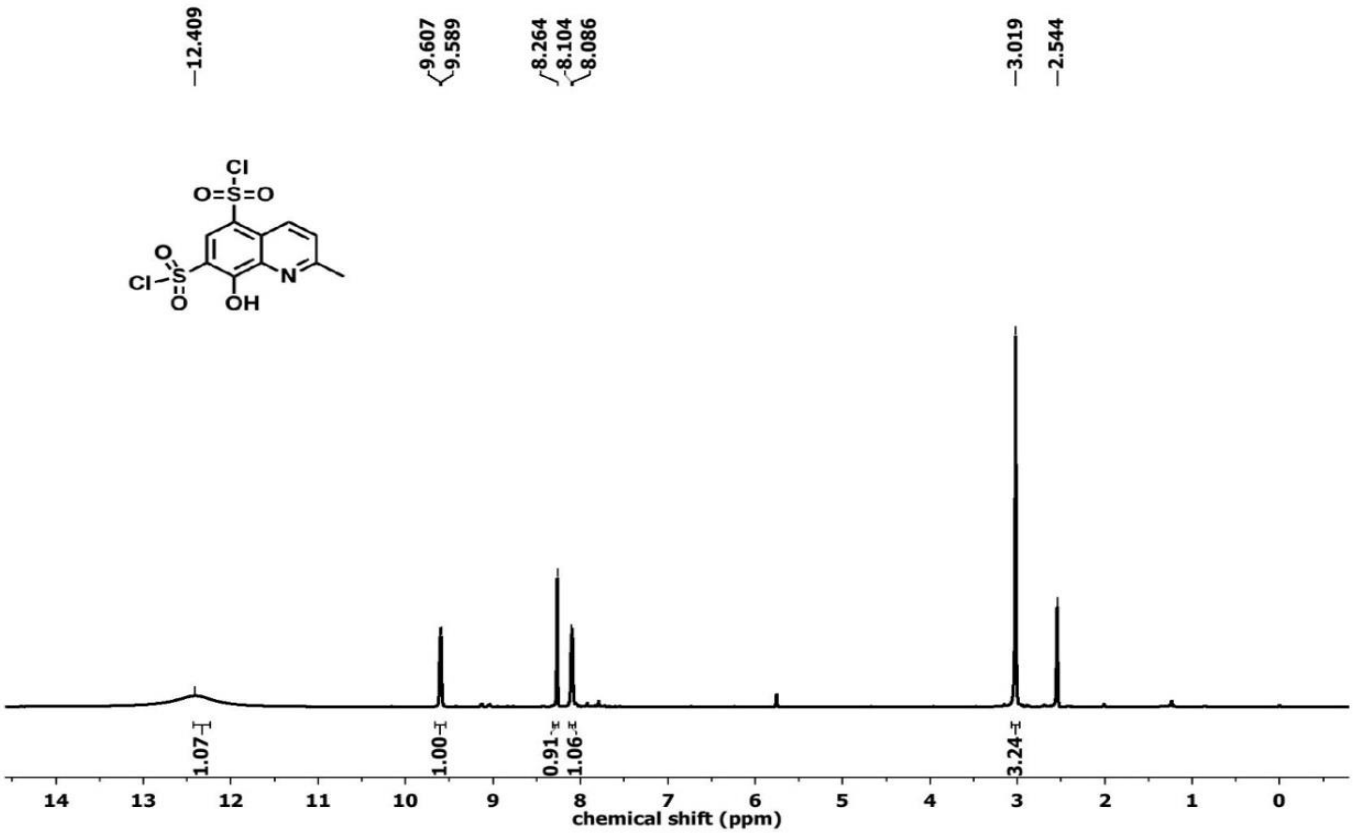

Figure S2 [1]H NMR spectra of HQSC

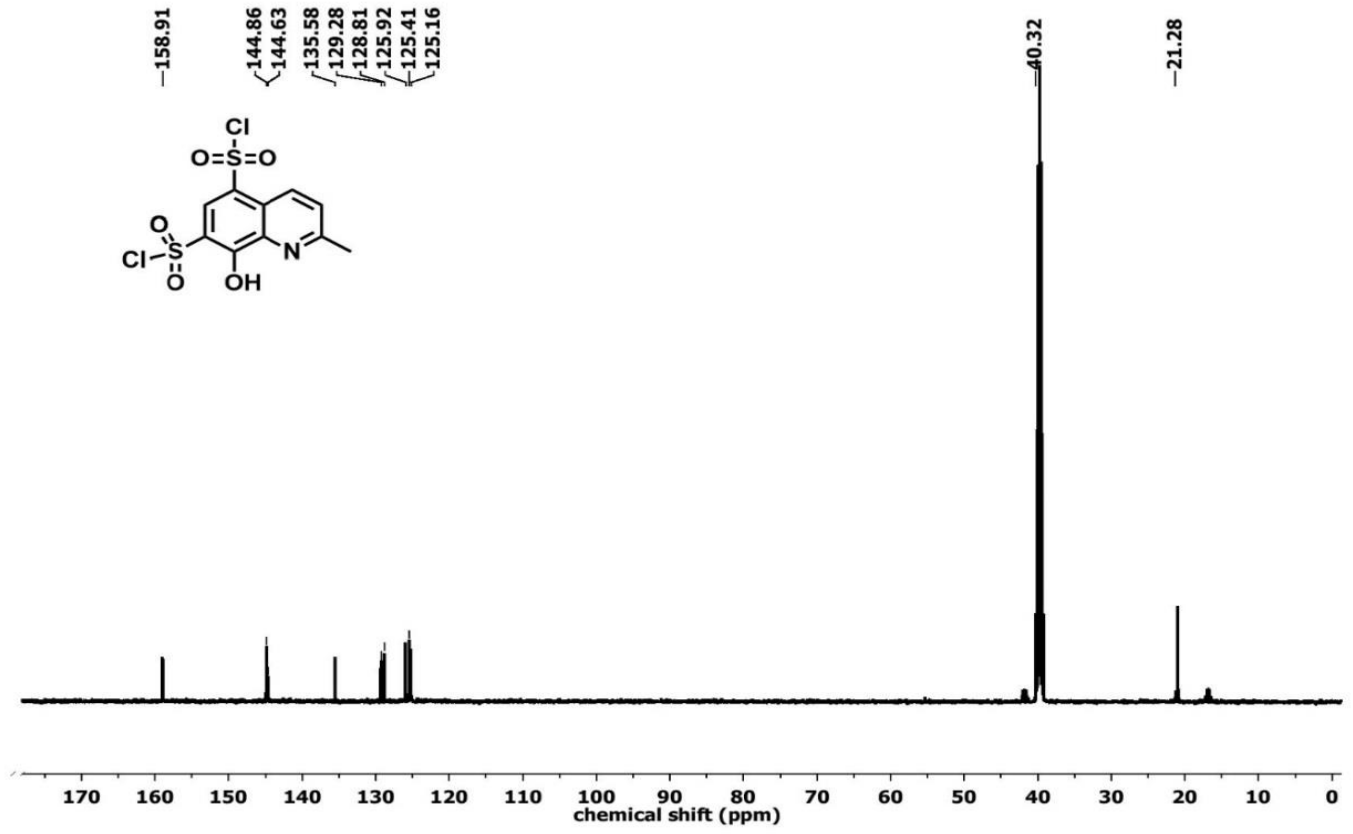

Figure S3 [13]C NMR spectra of HQSC

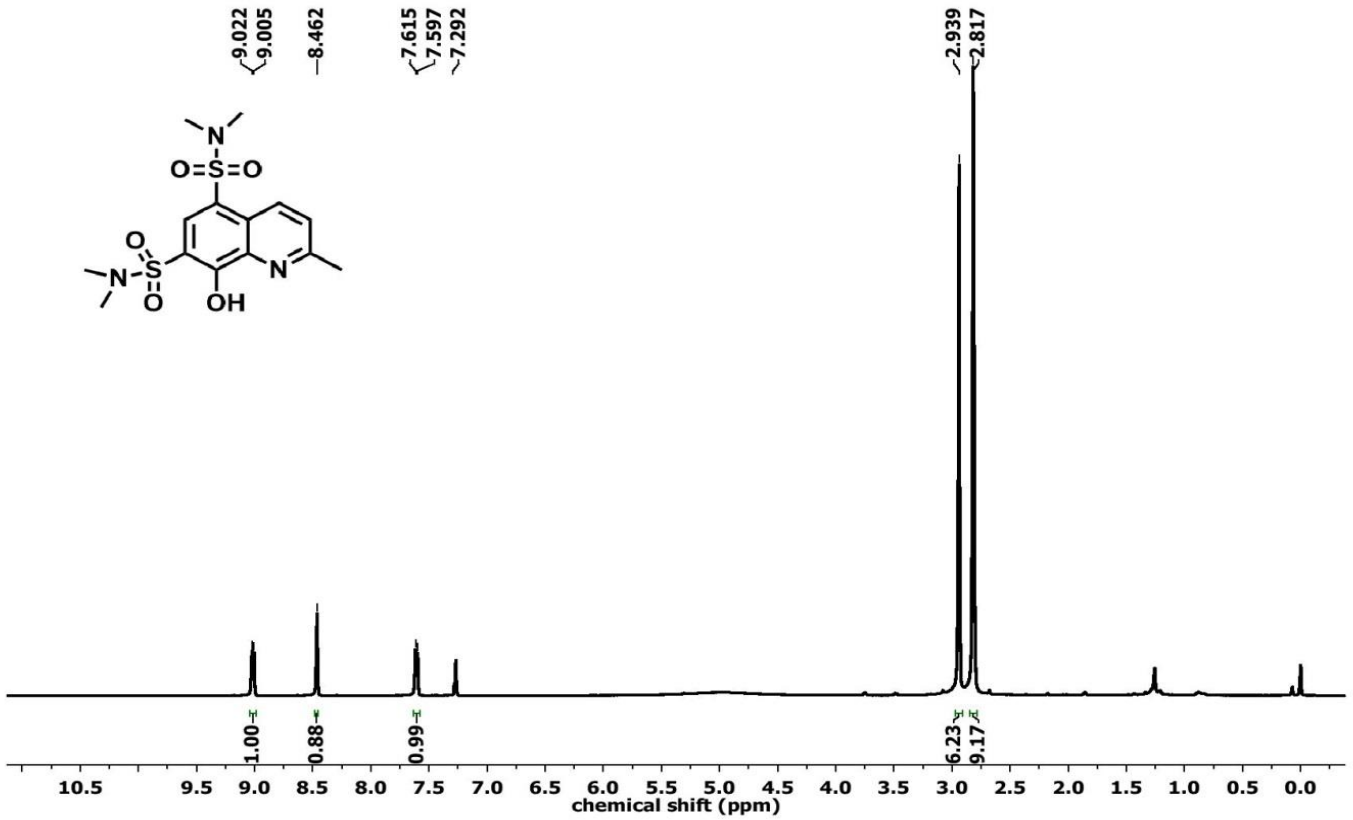

Figure S4 [1]H NMR spectra of HQSA

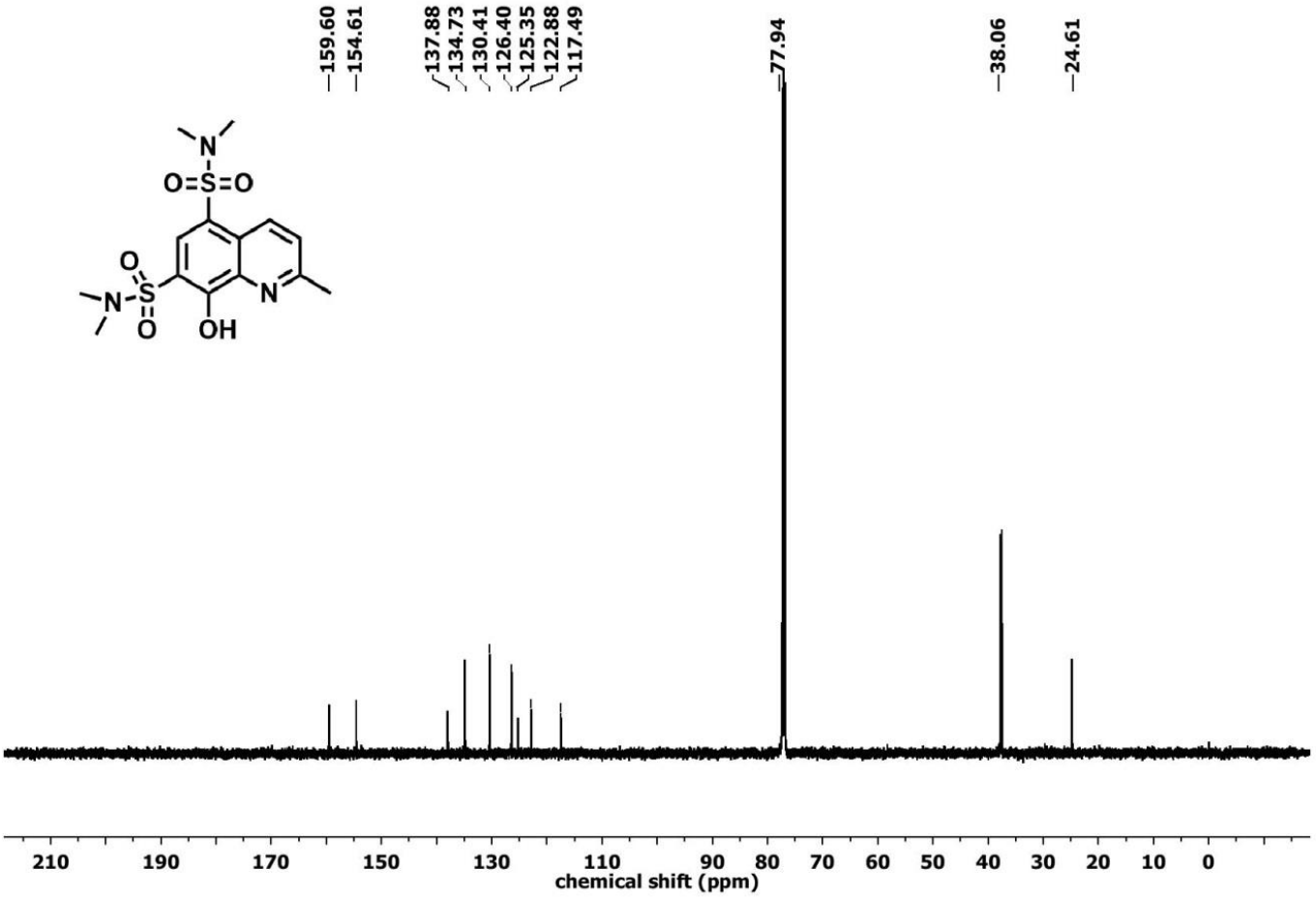

Figure S5 [13]C NMR spectra of HQSA

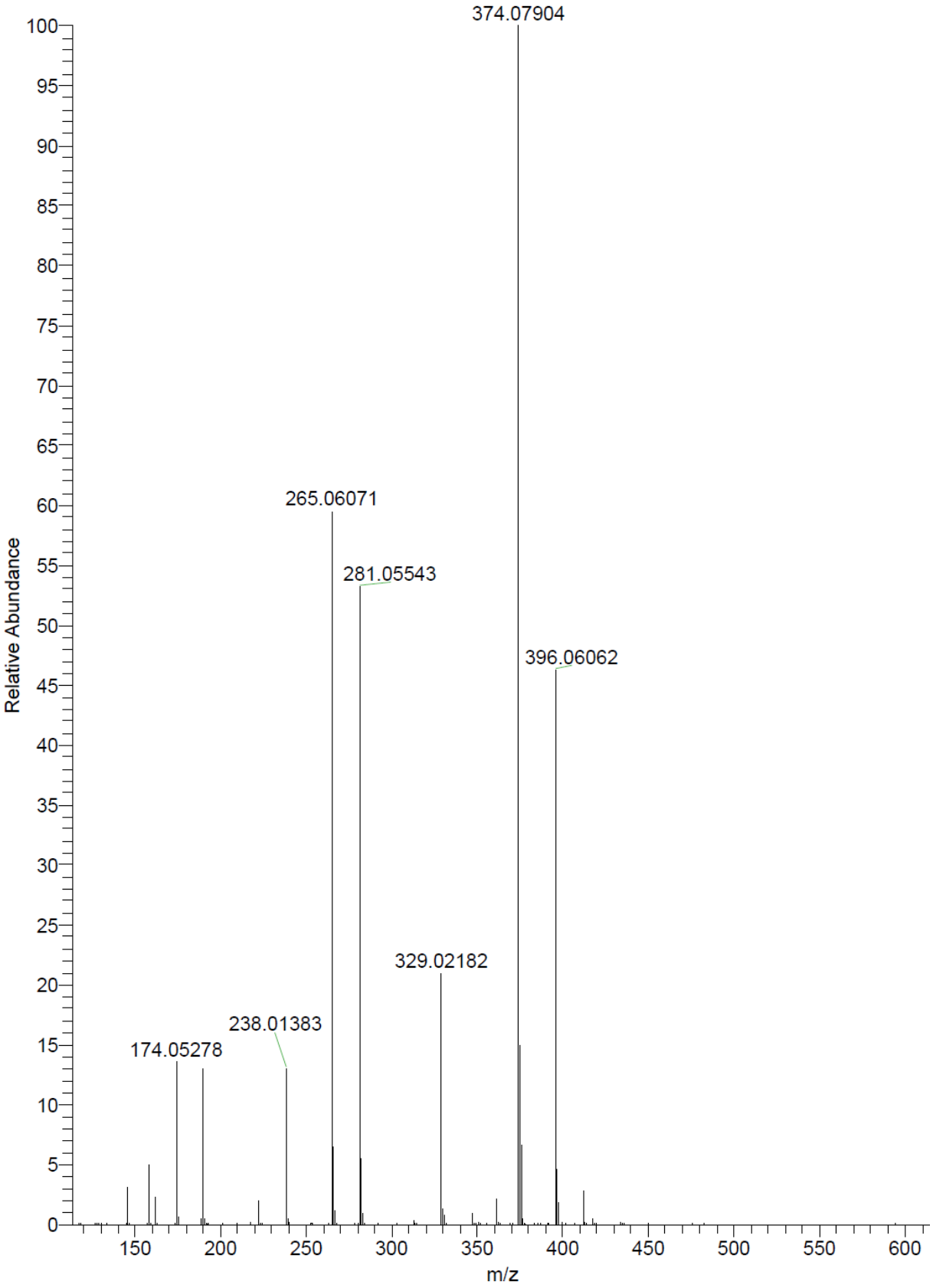

Figure S6 Mass spectrum of HQSA

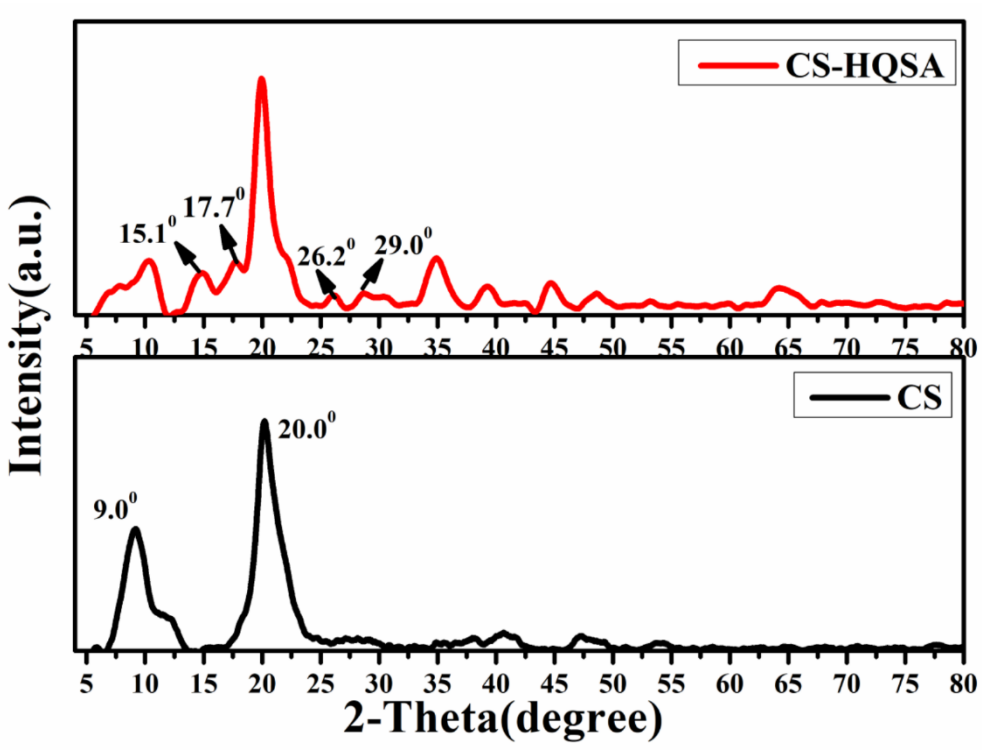

Figure S7 XRD diagram of CS and CS-HQSA

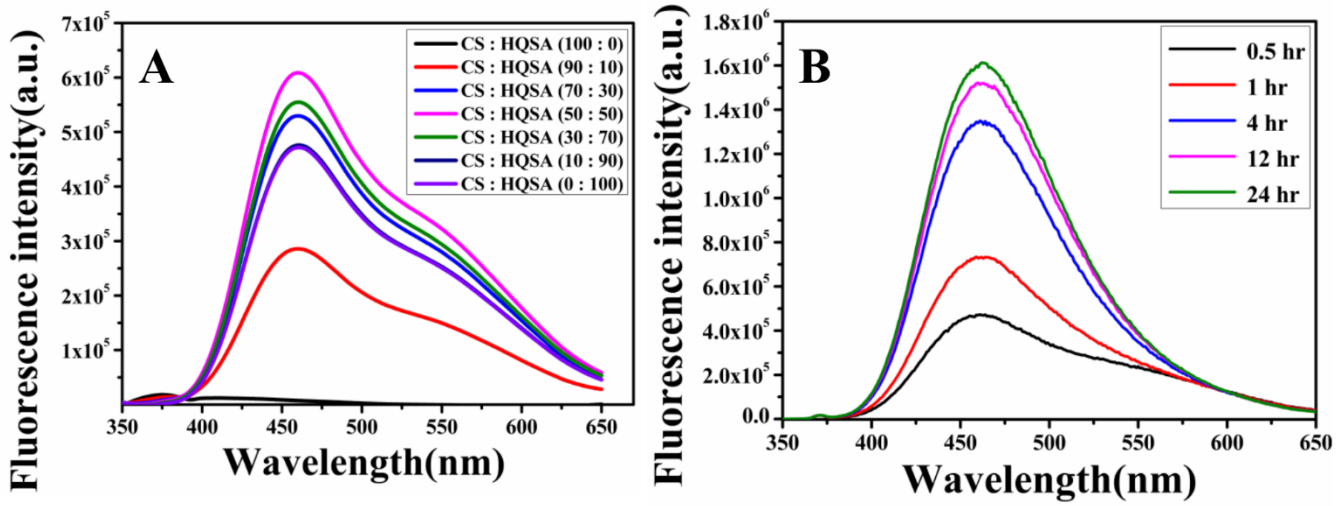

Figure S8 Optimization of experimental parameters: (A) Fluorescence spectra of CS and HQSA at different ratios. (B) Fluorescence spectra for immersion time optimization (0.5 hours to 24 hours).

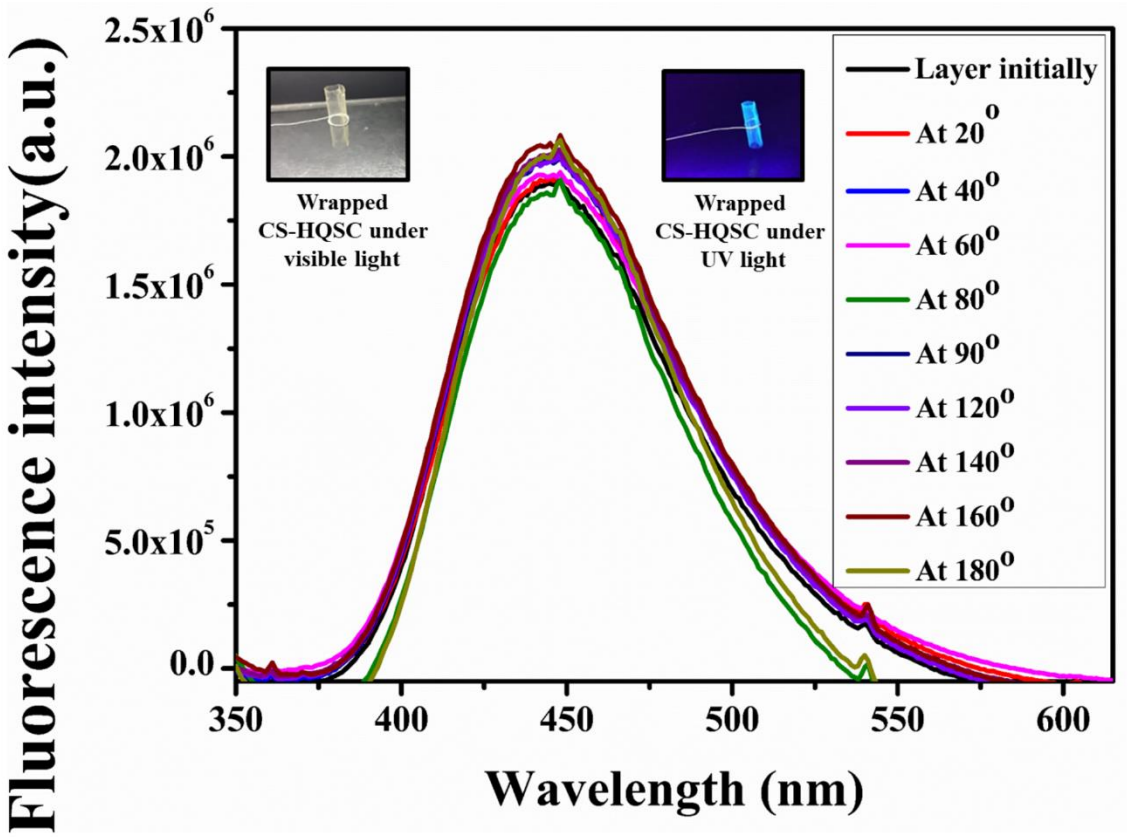

Figure S9 Flexibility analysis of the CS-HQSA layer at a different angle of bending. Inset images of wrapped CS-HQSA under visible light and UV light.

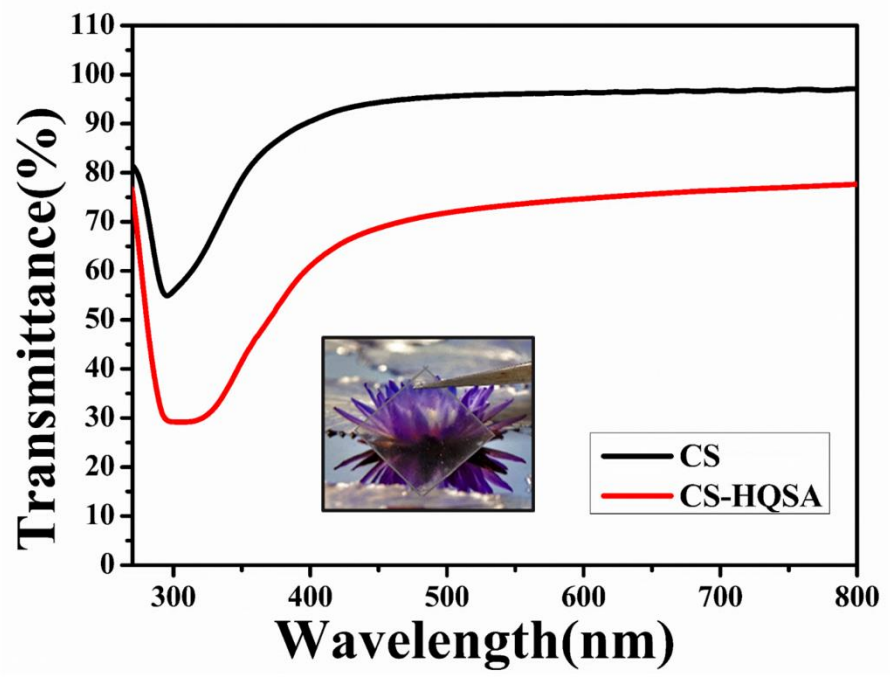

Figure S10 Transmittance spectra of CS-HQSA and CS.

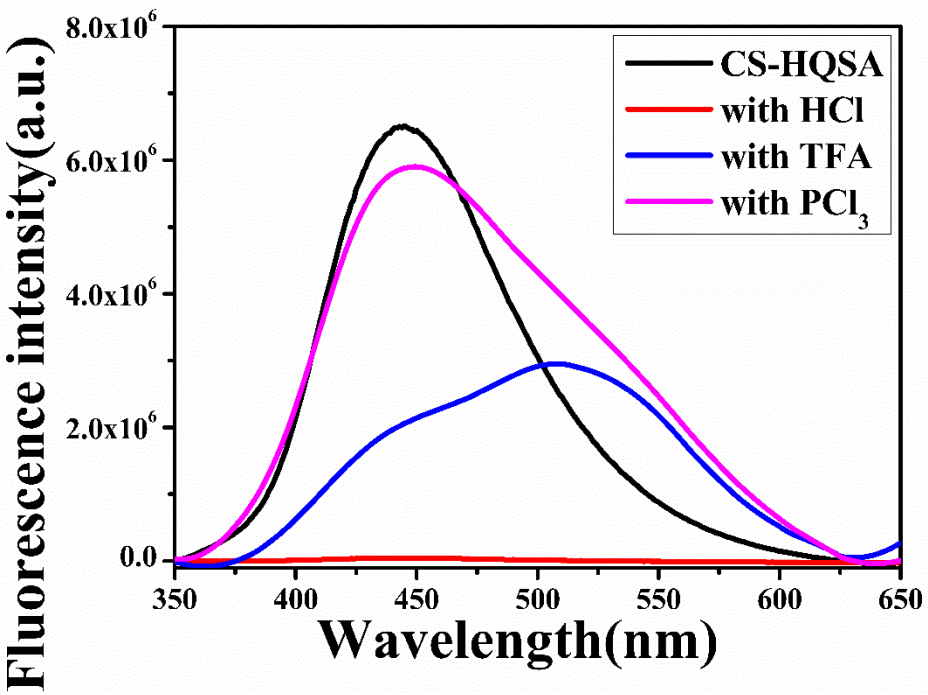

Figure S11Fluorescence spectra of CS-HQSA film with different acid vapours (10μL) each.

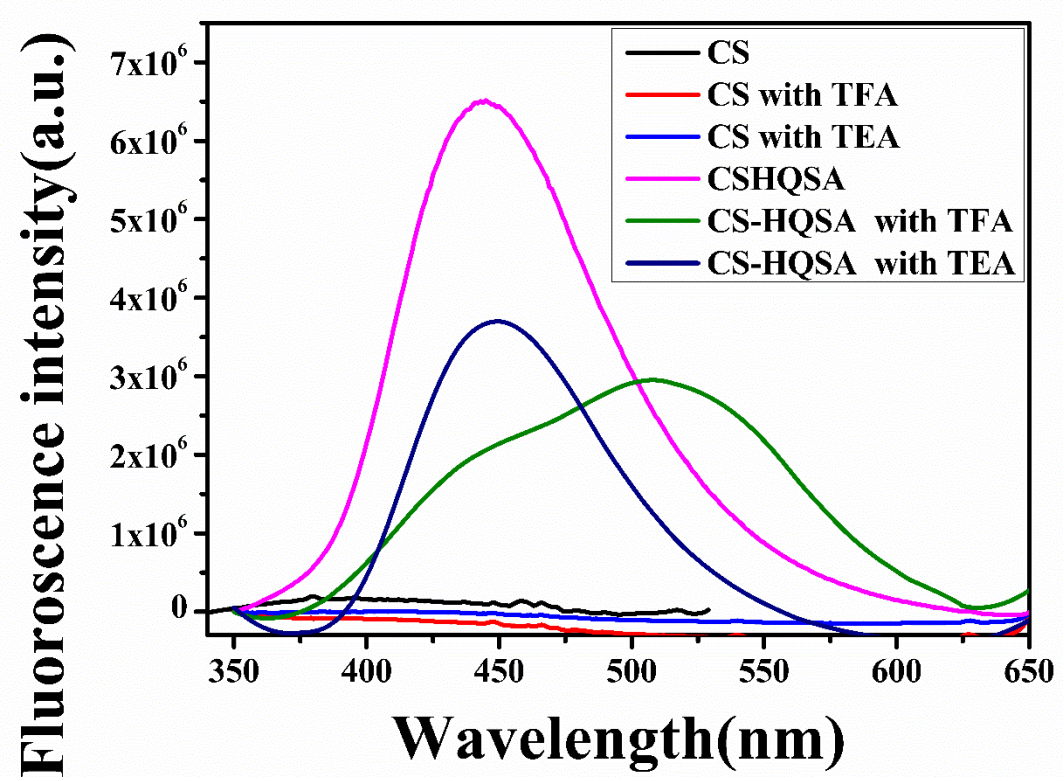

Figure S12 Fluorescence spectra of CS and CS-HQSA with TFA and TEA

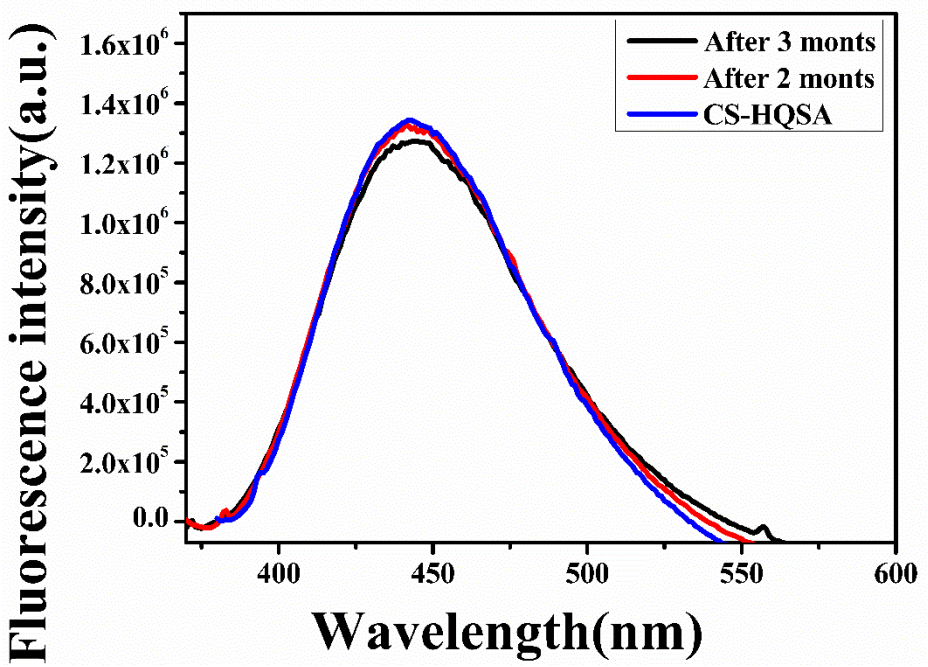

Figure S13 Fluorescence spectra of CS-HQSA after three months.

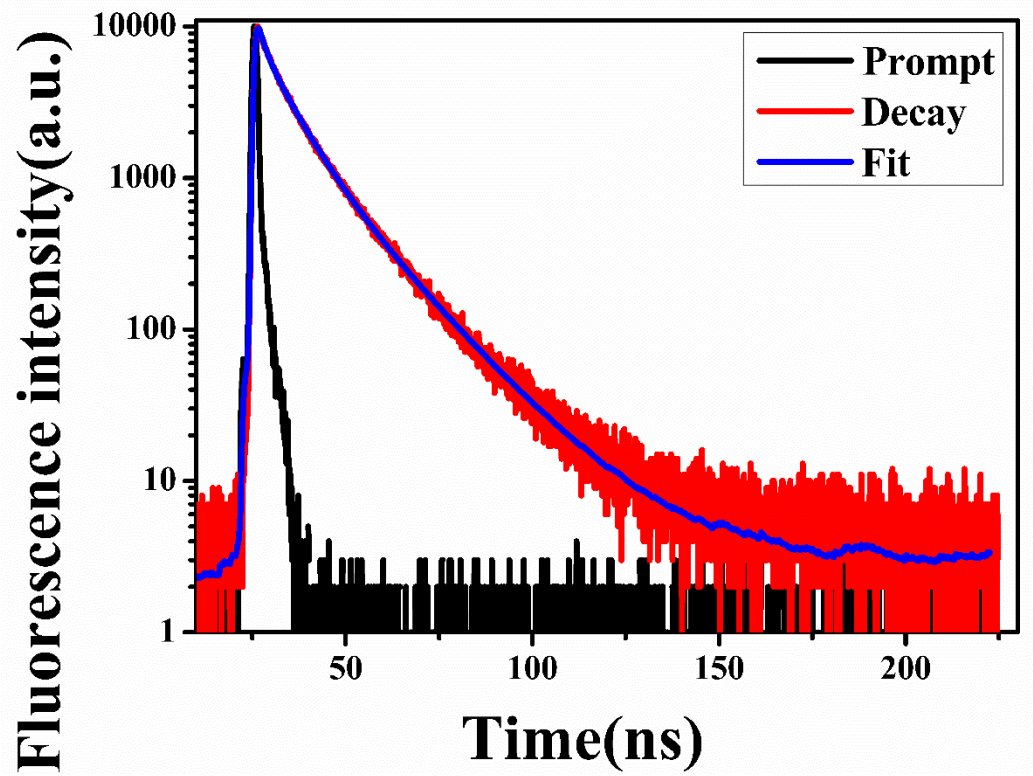

Figure S14 Fluorescence lifetime spectra of CS-HQSA.