ELECTRONIC SUPPLIMENTARY INFORMATION

Synthesis of Gold Nanoparticles and Nanoclusters in Supramolecular Gel and Their Applications in Catalytic Reduction of p-Nitrophenol to p-Aminophenol and Hg(II) Sensing.

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Contents: Page No.

Analytical data for compounds **2** and **3**:

Anal calcd. for $C_{20}H_{20}N_6O_2$, (**2**): C,63.76; H, 5.31; N, 22.31. Found: C, 63.26; H, 5.43; N, 21.52. ^{1}H NMR(500MH$_Z$, dmso-d6, ppm): δ=8.736(2H, s, N-H),8.534(2H, s, N-H), 8.108-8.095(2H, d, Py-H),7.895-7.867(2H,d ,Py-H), 7.260-7.211(6H,m,Py-H), 6.762(2H,s,Py-H), 4.287-4.269(4H,d, CH_2)(See Fig. S20).

FTIR(KBr/cm^1):3282s,3245s,3120w,1666s,1633m,1602w,1583w,1554s,1523s,1473s,1423s,1405 w, 1330w, 1278s, 1232w, 1101w, 1045w, 798w, 779w, 723w, 705m, 686m, 621w, 545w.
HRMS: Calcd. for $C_{20}H_{20}N_6O_2$, 376.41, ; found, 377.31 (M+1).

Anal calcd. for $C_{22}H_{22}N_4O_2$ (**3**): C:70.50, H: 5.87, N: 14.95 . Found; C: 70.32, H: 6.06, N: 14.81.^{1}HNMR(500MH$_Z$,dmsod6,ppm):δ=8.501(2H,s,N-H),7.403-7.377(4H,dd,Py-H),7.259-7.232(4H,d,Ar-H),7.232 (4H,m,Ar-H), 6.904-6.855 (2H,t,Ar-H),6.578-6.539(2H,t,N-H), 4.280-4.260(4H,d, CH_2) (See Fig. S21).
FTIR(KBr/cm^1):3311s,1631s,1595m,1558s,1523w,1494m,1469w,1442w, 1309w, 1294w, 1236s, 1054w, 850w, 752w, 711w, 692w, 663w, 619w, 547w, 497w.
HRMS: Calcd. for $C_{22}H_{22}N_4O_2$ =374.43; found 375.46 (M+1), 397.45(M+23).

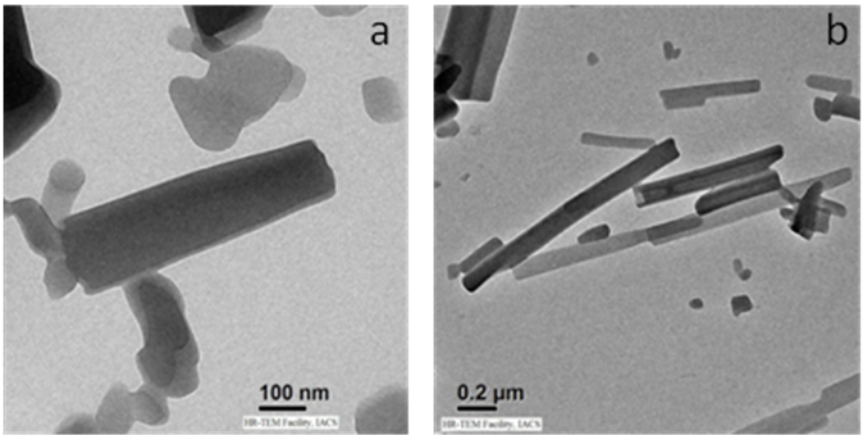


Fig S1: TEM micrgraphs of gels from gelators a) **6** and b) **7** (DMF, water ; 5%, w/v).

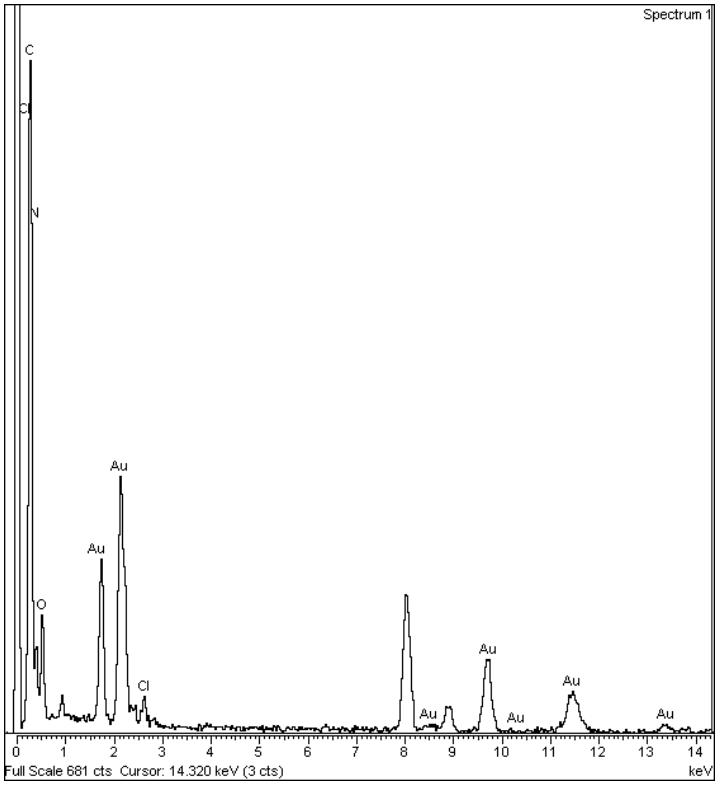


Fig. S2: EDX spectrum of Au nanoparticles on gel.

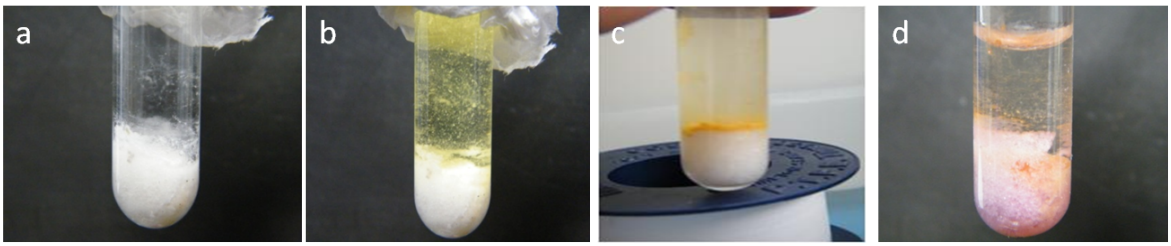


Fig. S3: (a) The freshly prepared gel of 6 (DMF/water, 5%, w/v) , (b) aqueous solution of $HAuCl_4$; xH_2O on the gel bed (photographed instantly), (c) the same solution on the gel bed after few hours ,(d) after 12 hours.

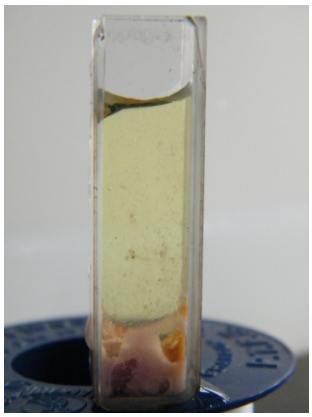


Fig. S4: Aqueous alkaline p-Nitrophenol (p-Nitrophenolate) solution kept on AuNP- embedded gel prepared from gelator **6** [DMF, water ; 5% (w/v)]; generated inside standard UV-Vis cell, in order to facilitate the monitoring of the p-Nitrophenolate→p-Aminophenolate conversion by UV-Vis spectroscopy.

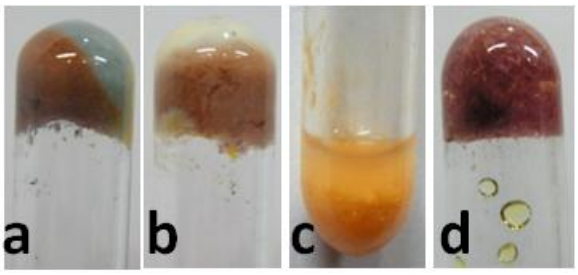


Fig. S5: Different colors of AuNPs; a) within a gel (DMF, water; 5%, w/v) of **1**; b) within a gel (DMF, water; 5%, w/v) of **5**; c) AuNP formed within a precipitate obtained from heated solution of gelator **6** in DMF and subsequent addition of water; d) within a gel (DMF, water; 5%, w/v) of **4**.

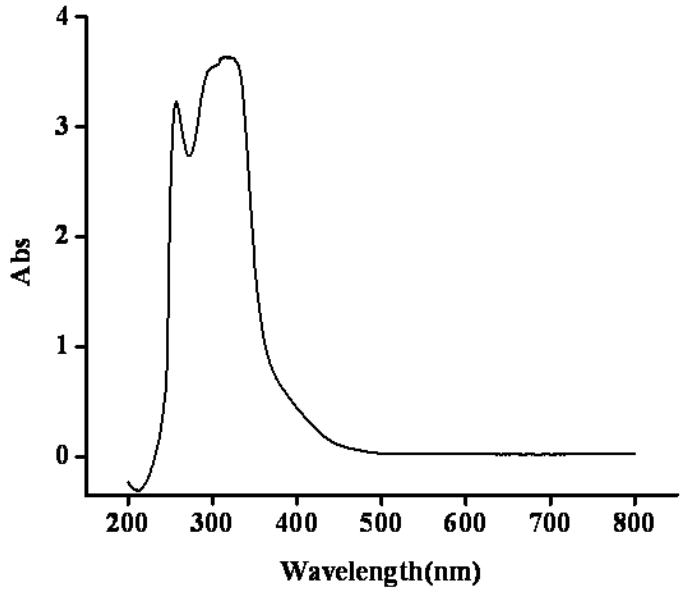


Fig. S6: UV-Vis spectrum of $HAuCl_4$; x H_2O dissolved in DMF solvent, recorded after 48 hrs. There is no surface plasmon band, indicative of no formation of AuNPs.

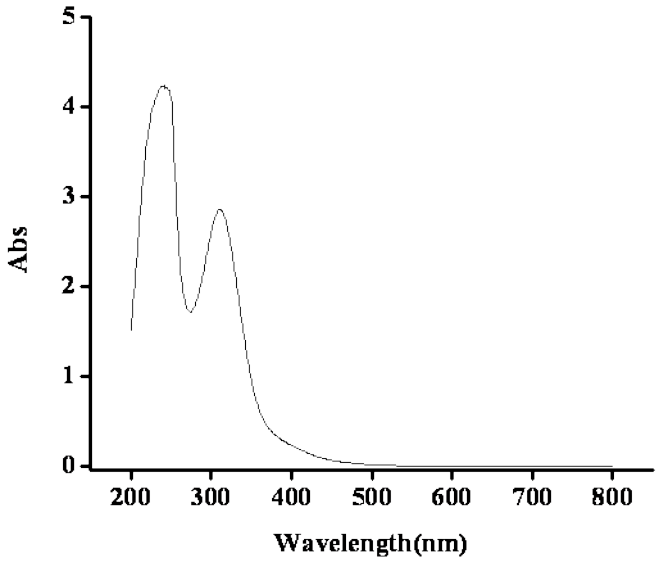


Fig. S7: UV-Vis spectrum of $HAuCl_4$; x H_2O dissolved in Ethylene Glycol solvent, recorded after 48 hrs. No surface plasmon band indicating no formation of AuNPs.

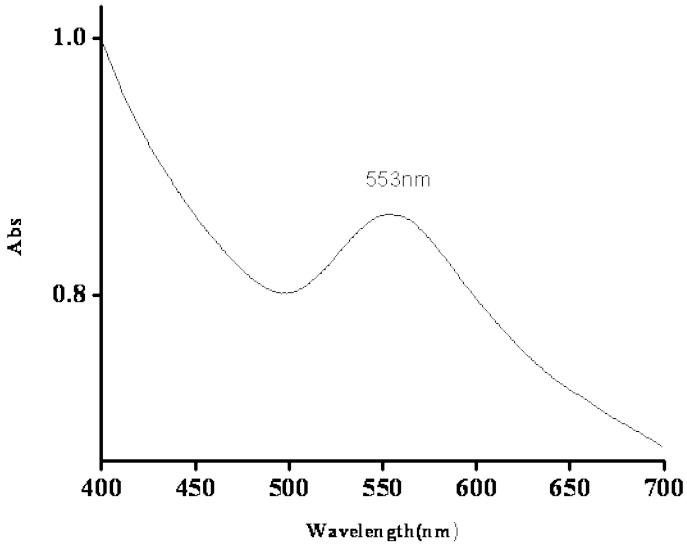


Fig. S8: UV-Vis spectrum of AuNPs generated on the gel bed of **6** (DMF/water medium), showing the surface plasmon band at 553nm.

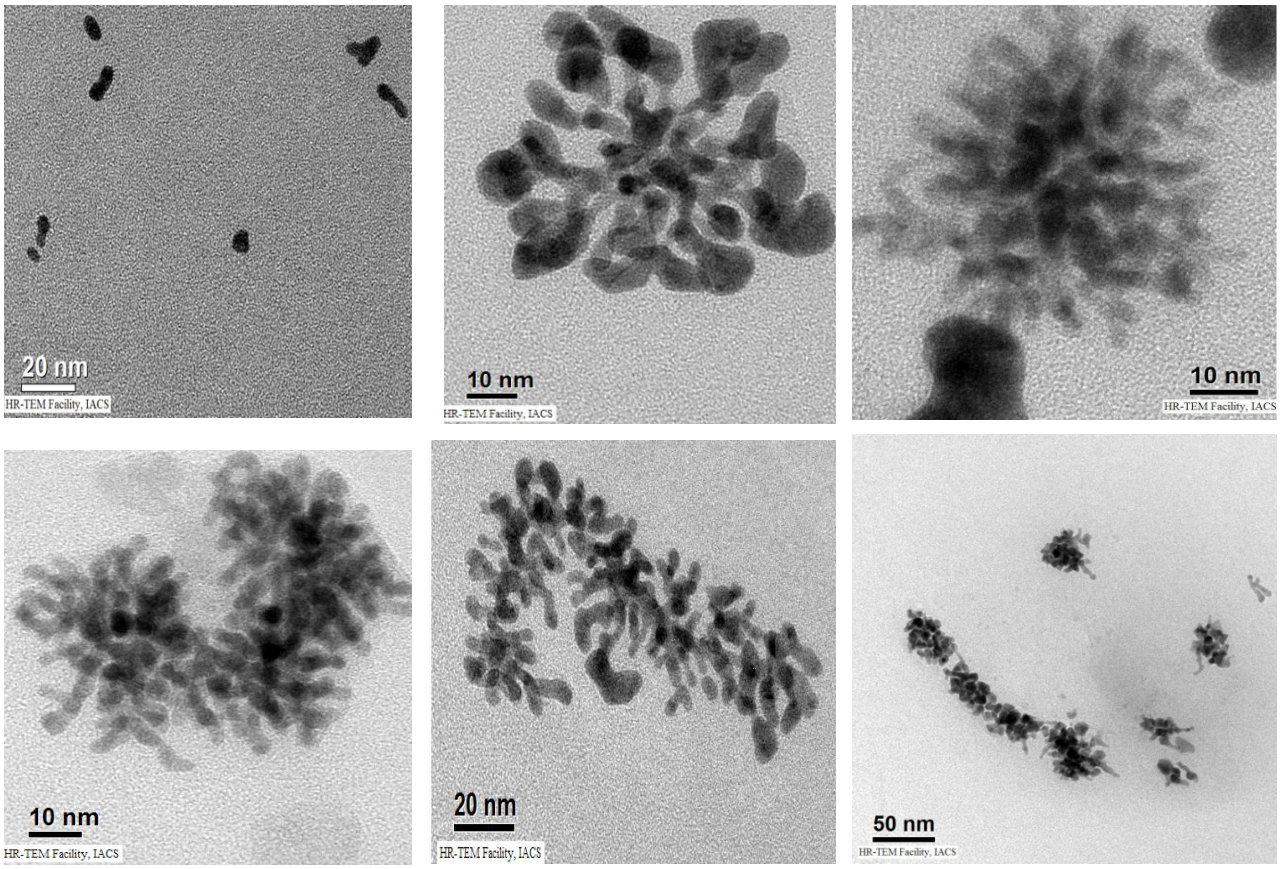


Fig.S9: Highly branched Au-nanodendrites formed when a DMF solution containing the gelators **2** or **6** was heated with $HAuCl_4$; xH_2O; without any addition of water.

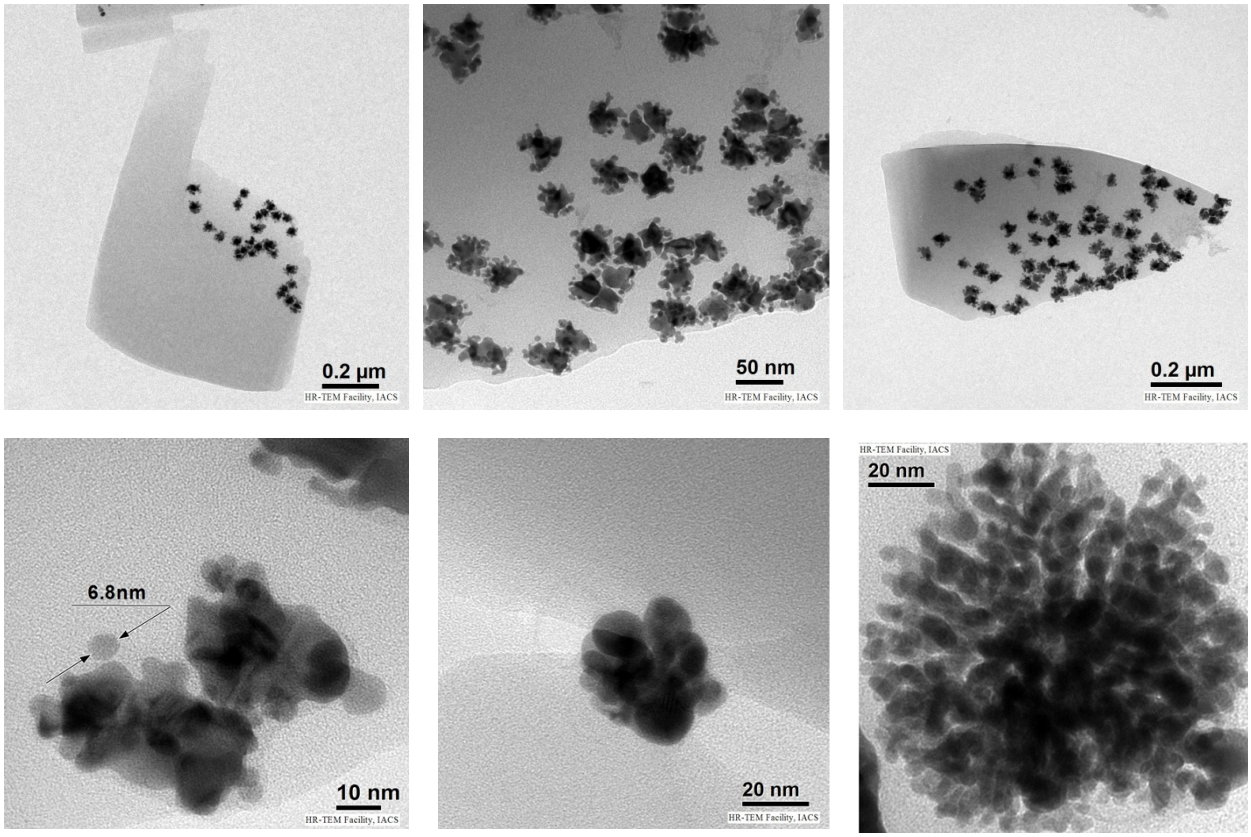
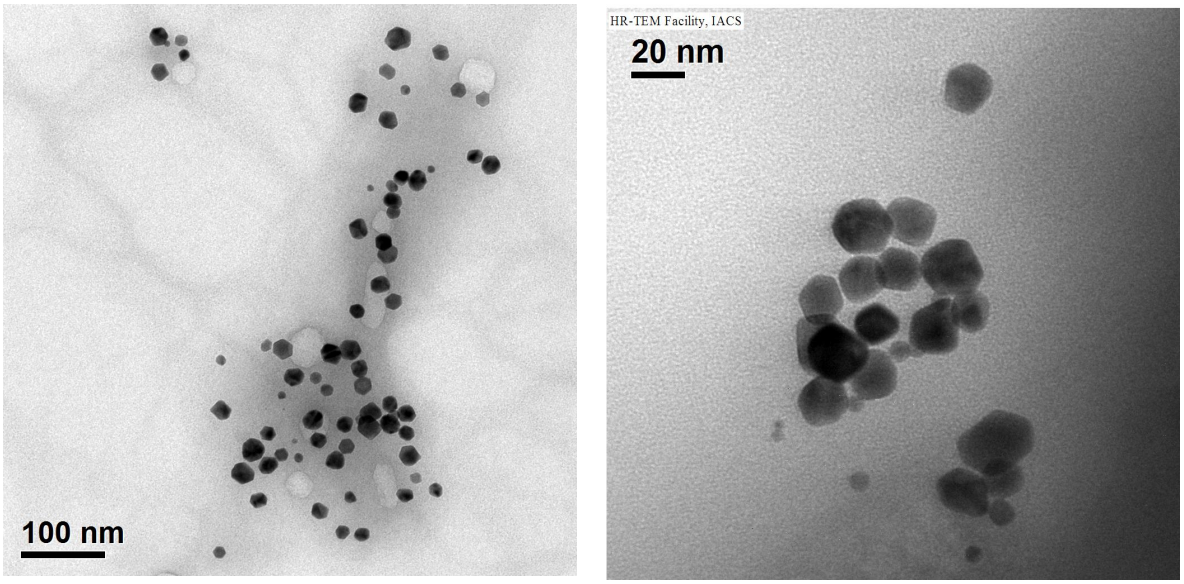


Fig.S10: Highly branched Au-nanodendrites formed in supramolecular gel of **2** (5% (w/v); DMF/water, 1:5 (v/v)).



(A) (B)

Fig. S11: Nanoparticles of different but regular shapes on gels derived from gelators (A) **5** and (B) **6** (5% (w/v), DMF:water, 1:5 (v/v)).

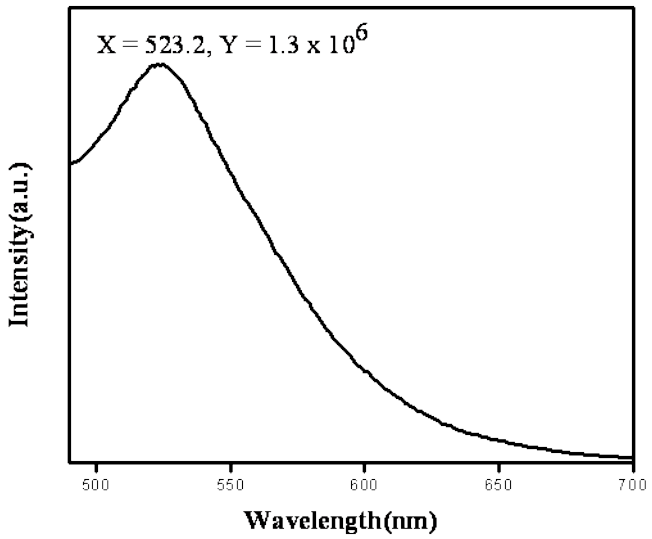


Fig. S12: Emission spectrum of AuNCs generated on the nitrobenzene gel of **6** (λ_{ex}= 470nm).

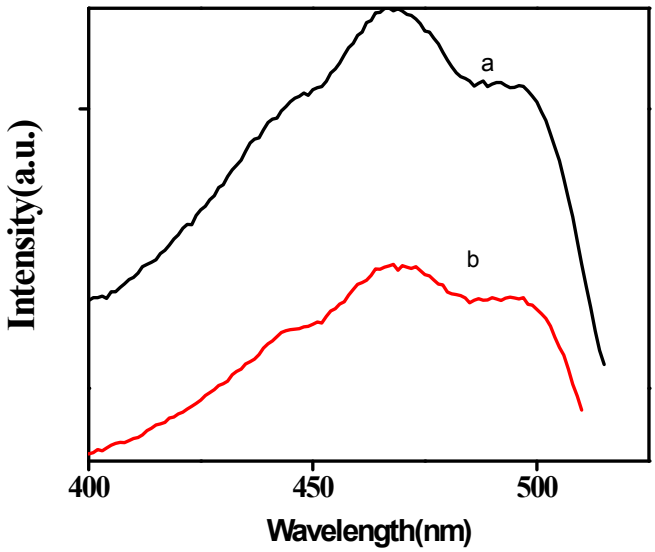


Fig. S13: Excitation spectrum of AuNCs (a) in absence and (b) in presence of Hg(II) (λ_{em}= 525nm).

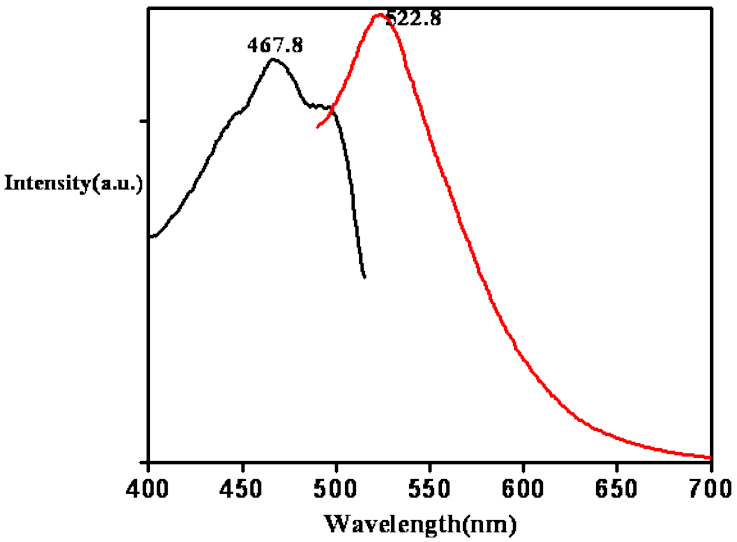
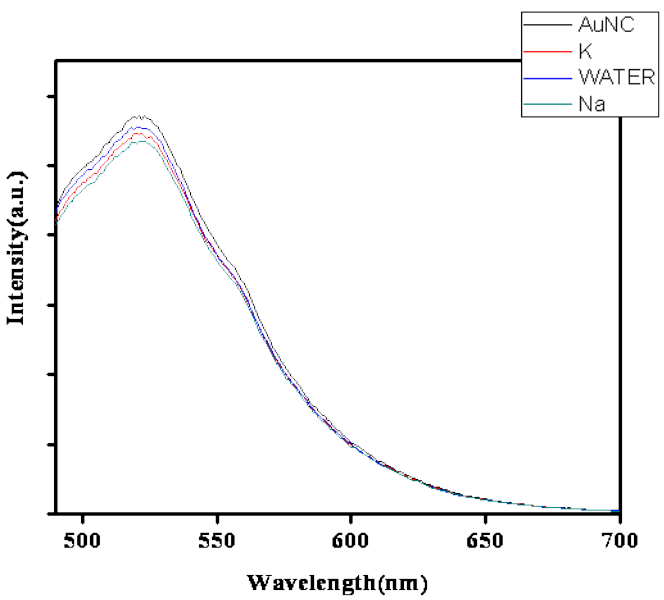
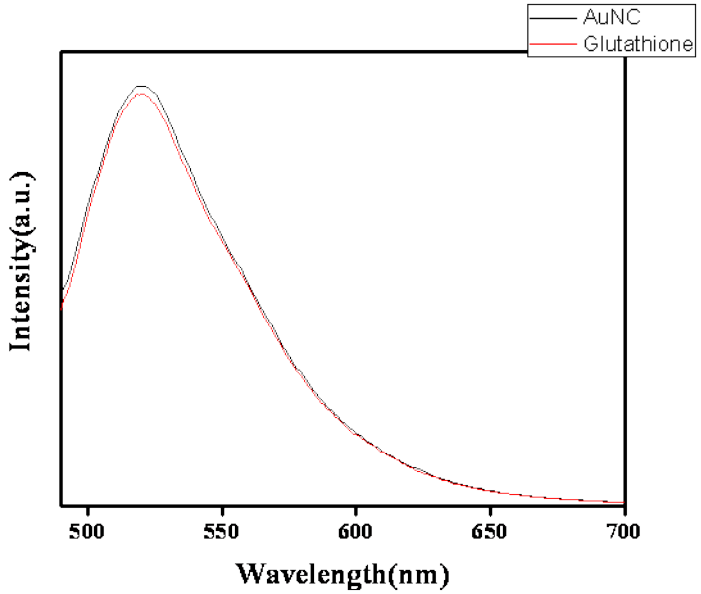


Fig. S14: Excitation (467.8nm) and emission spectrum (522.8nm) of AuNCs.

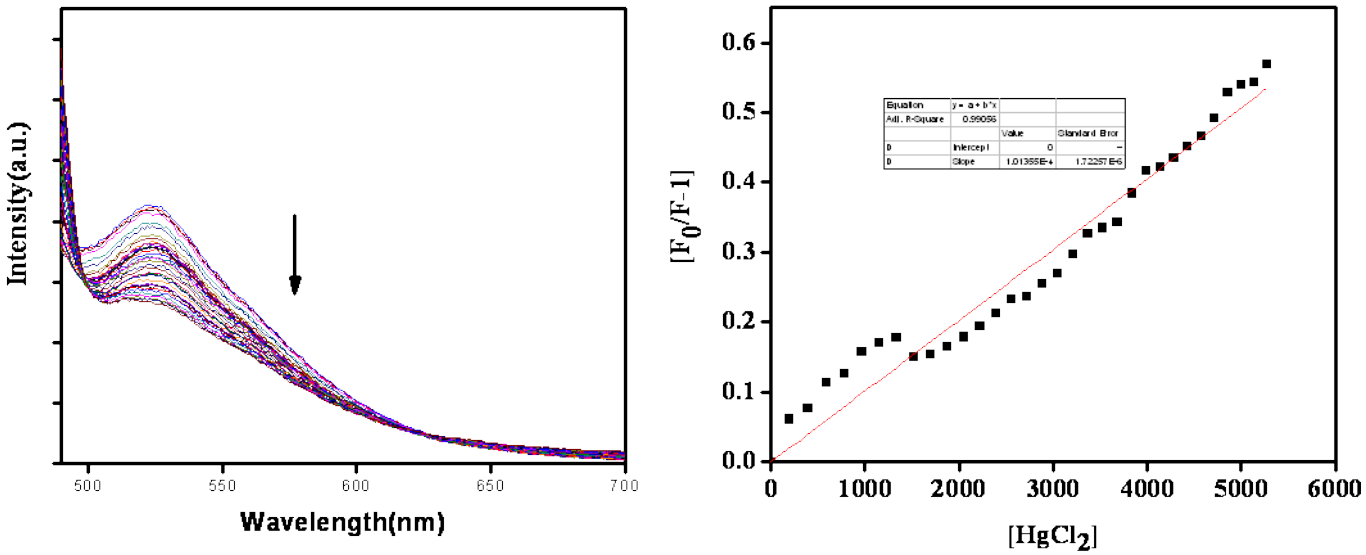


(A)



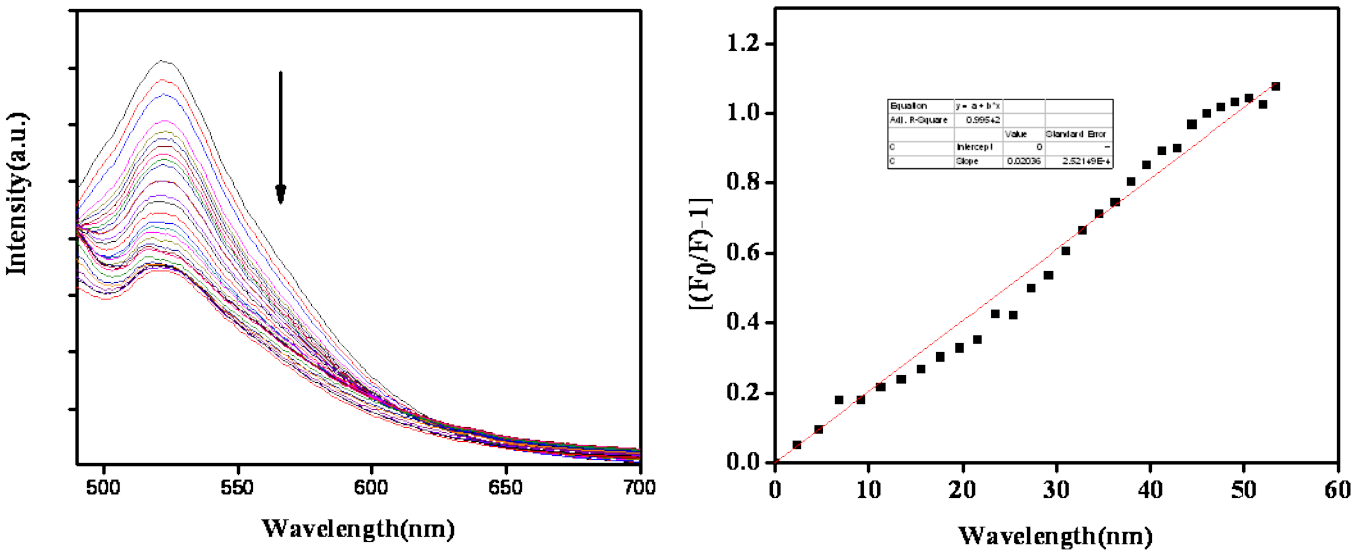
(B)

Fig. S15: The emission spectrum of AuNCs in presence of large excess of (A) NaCl (0.1 M), KCl (0.1 M) and water and (B) glutathione. The fluorescence response was found to be very stable.



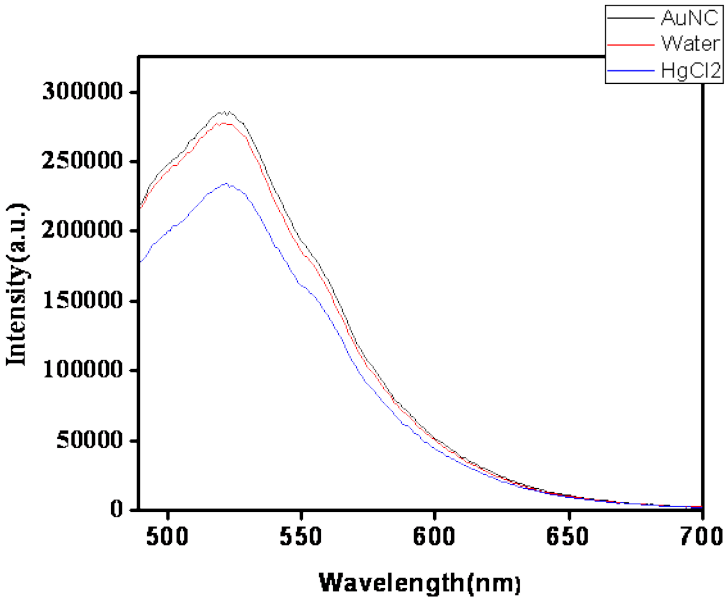
(A) (B)

Fig. S16: (A) Fluorescence quenching of AuNCs on addition of aqueous $HgCl_2$ solution. The concentration of $HgCl_2$ varies from 200 µM to 5000 µM. (B) The subsequent Stern-Volmer plot.

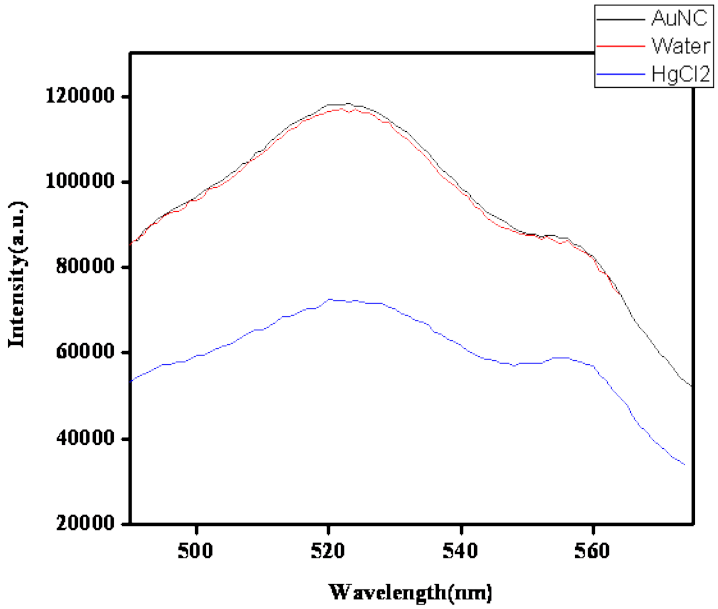


(A) (B)

Fig. S17: (A) Another instance of fluorescence quenching of AuNCs on addition of aqueous $HgCl_2$ solution. The concentration of $HgCl_2$ varies from 2 mM to 50 mM. (B) The subsequent Stern-Volmer plot.



(A)



(B)

Fig S18: Comparison of fluorescence response upon (A) addition of water and 1.42 mM, aqueous solution of $HgCl_2$ and (B) water and 60 nM aqueous solnution of $HgCl_2$. The quenching-response was more pronounced in dilute solution of AuNCs as evidenced in (B) which contained a more dilute solution of AuNCs than in (A); (18% quenching in A, whereas in B the extent of quenching was 39%) .

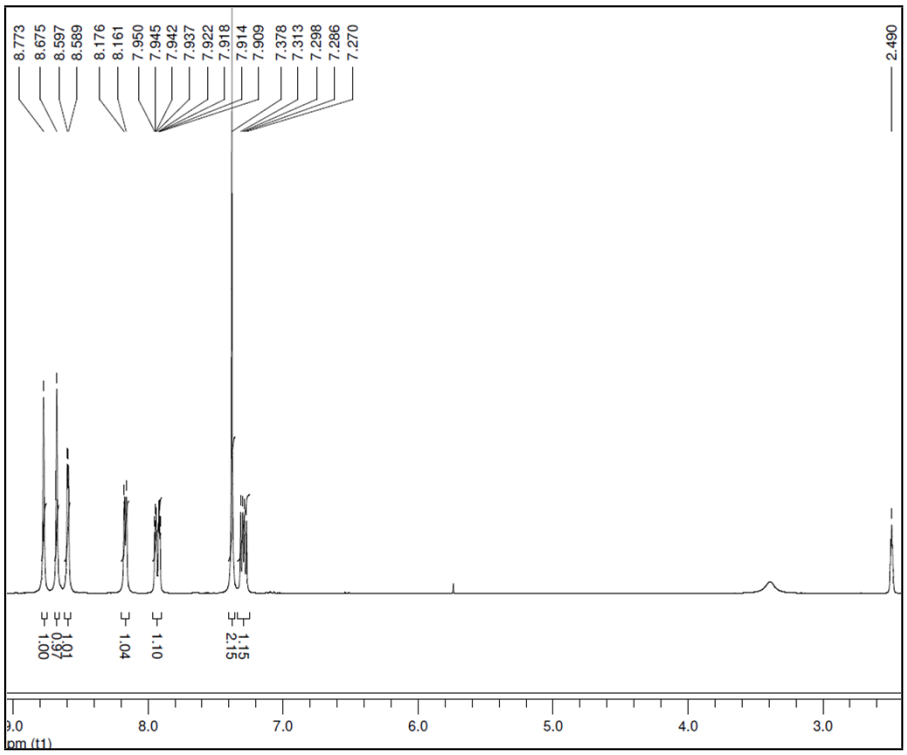


Fig. S 19: ^{1}H NMR of gelator **1**.

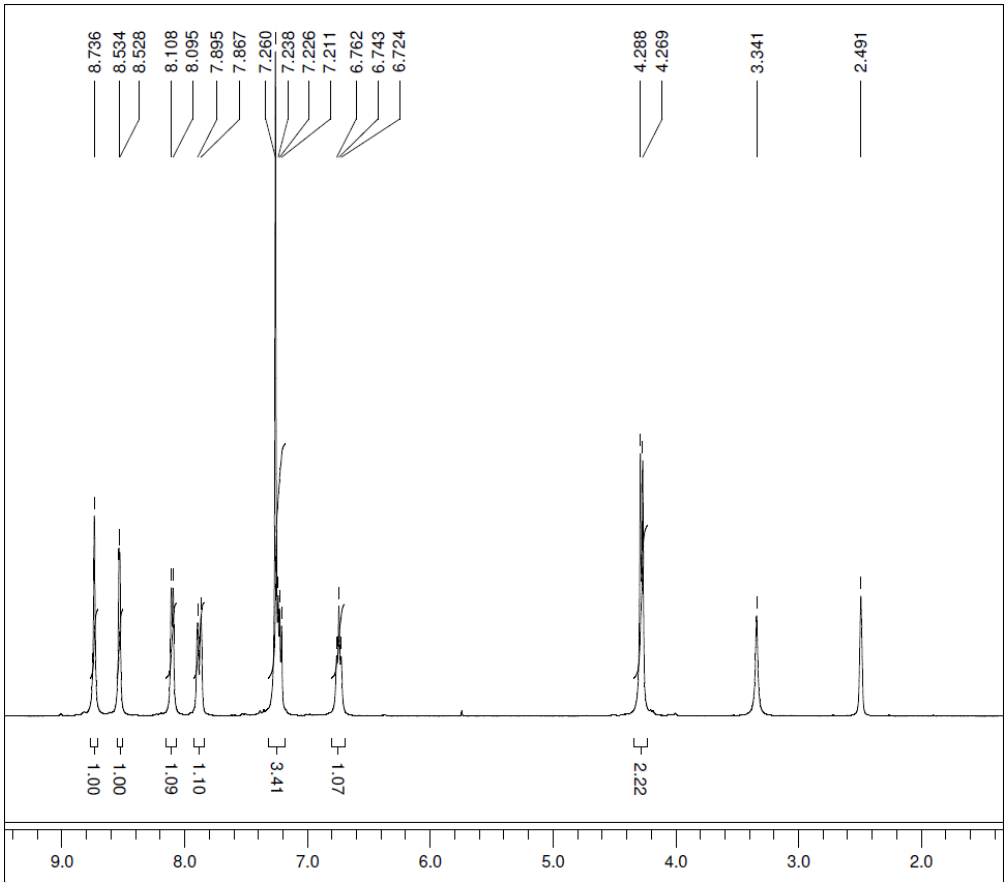


Fig. S20: ^{1}H NMR of gelator **2**

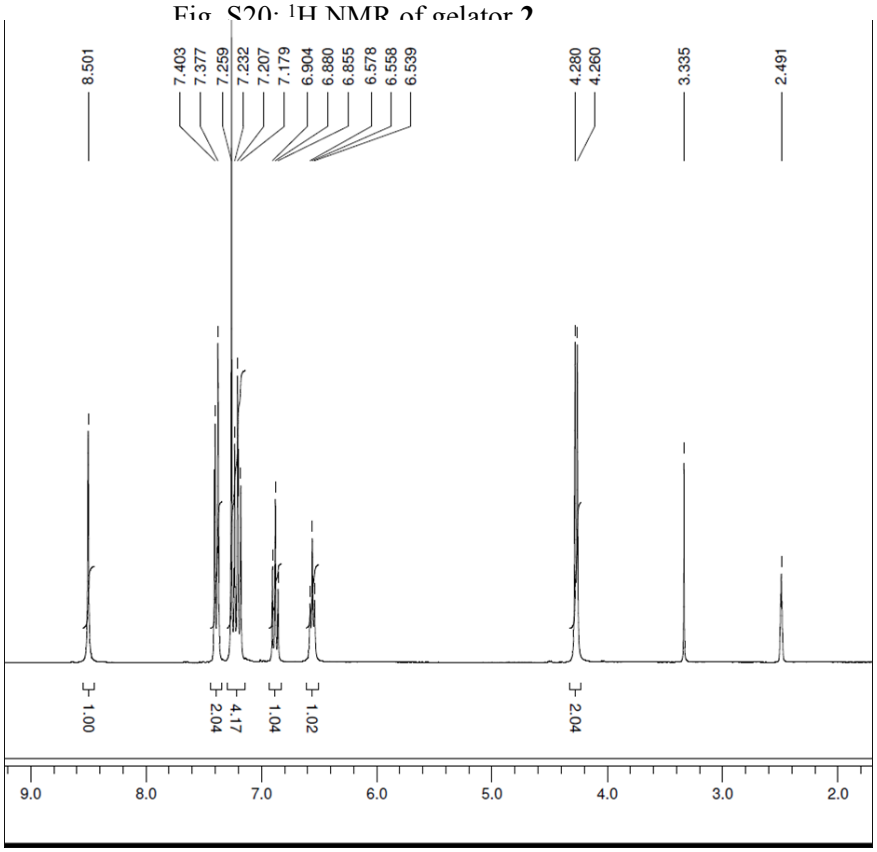


Fig. S21: ^{1}H NMR of gelator **3**.

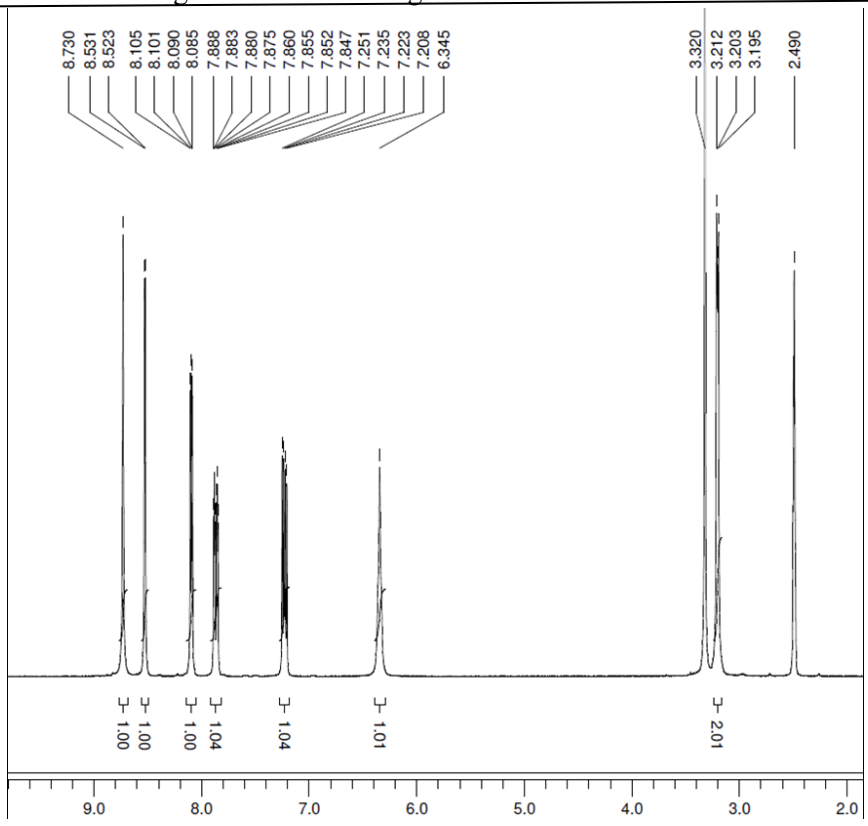


Fig. S22: ^{1}H NMR of gelator **4**.

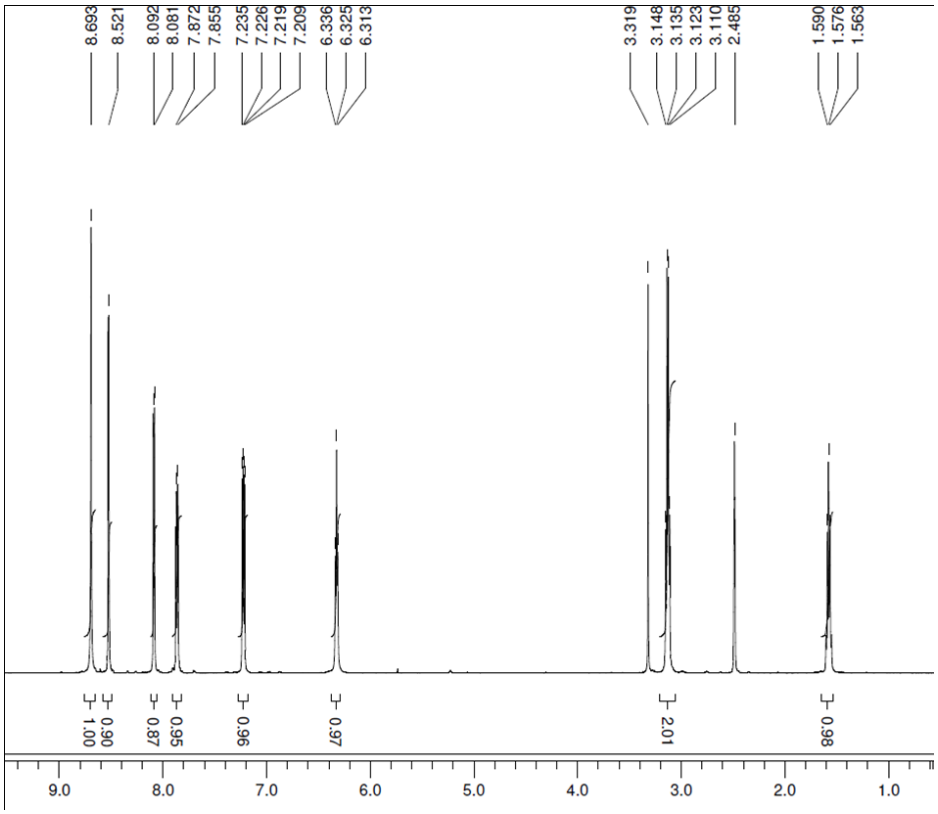


Fig. S23: ^{1}H NMR of gelator **5**.

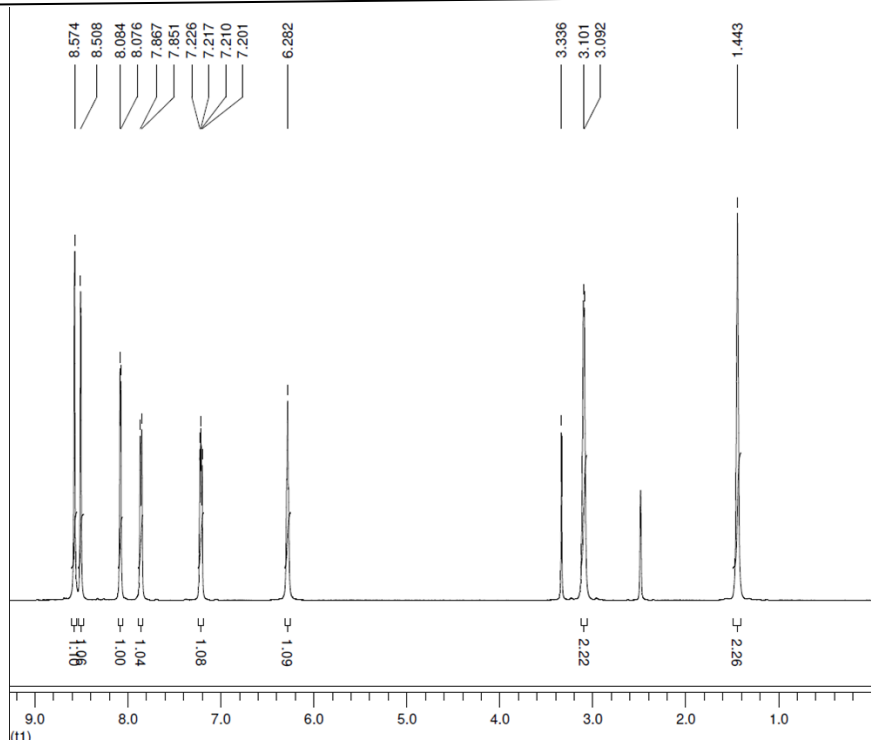


Fig. S24: ^{1}H NMR of gelator **6**.

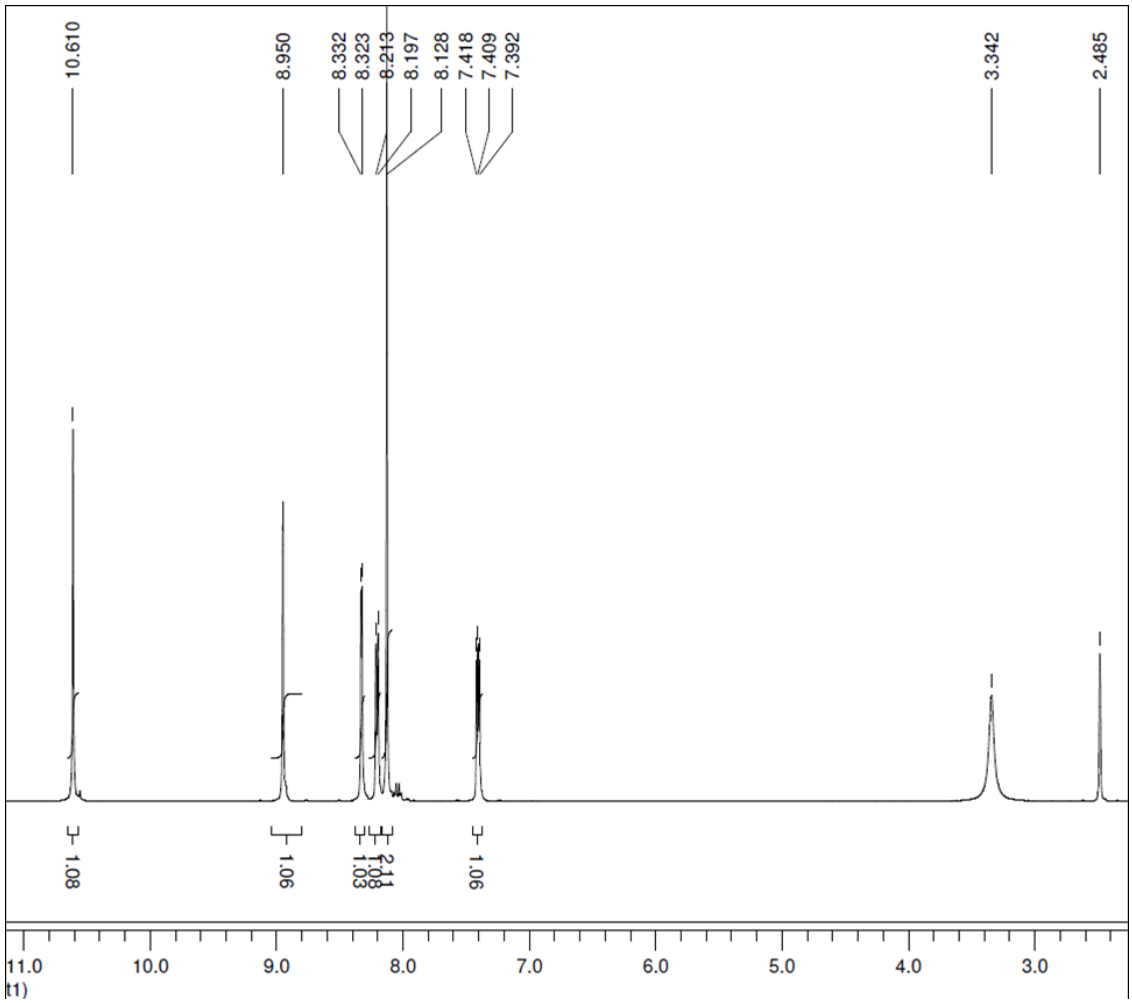


Fig. S25: ^{1}H NMR of gelator **7**.