Supporting information

Multi-responsive organogel and colloid based on self-assembly of Ag(Ⅰ)-azopyridine coordination polymer

Botian Li,*[a] Da Xiao,[a] Xiaodong Gai,[a] Bo Yan,[a] Haimu Ye,[a] Liming Tang,[b] and Qiong Zhou*[a]

[a] Department of Materials Science and Engineering, China University of Petroleum, Beijing, 102249, P. R. China.

[b] Key Laboratory of Advanced Materials of Ministry of Education of China, Department of Chemical Engineering, Tsinghua University, Beijing, 100084, P. R. China.

E-mail: botian.li@cup.edu.cn (B. Li); zhouqiong_cn@163.com (Q. Zhou)

Characterization

Elemental analysis of gel

The prepared *trans*-AgD gels with different Ag(Ⅰ)/*trans*-D feeding ratio (2/2, 3/2, 4/2) were soaked in 5 mL DMF, and then filtered. The resultant powder was washed by DMF for three times to remove the residual silver ion and ligand. Afterwards, the solid was dried in vacuum to give the coordination polymer *trans*-AgD for elemental analysis.

Measurement of gel-sol phase transition temperature

The *trans*-AgD gel was heated with the heating rate of 0.5 ℃/min, the gel-sol transition temperature was recorded when the gel totally transformed to solution at the certain temperature.

Chemical response

Ammonia in DMF solution (0.8 mg/0.04 g) was added in the *trans*-AgD gel (0.8 wt%, 3/2 Ag(Ⅰ)/*trans*-D ratio), the gel gradually collapsed from the top, and transformed to a transparent solution. Then, $AgNO_3$ (2.1 mg) dissovled in 0.04 g DMF was introduced into the solution, and a yellow translucent gel quickly formed. The *trans*-AgD gel (0.8 wt%, 3/2 Ag(Ⅰ)/*trans*-D ratio) was placed in a glass jar, and then H_2S was charged in. The black precipitation was produced immediately, which resulted in a dark suspension.

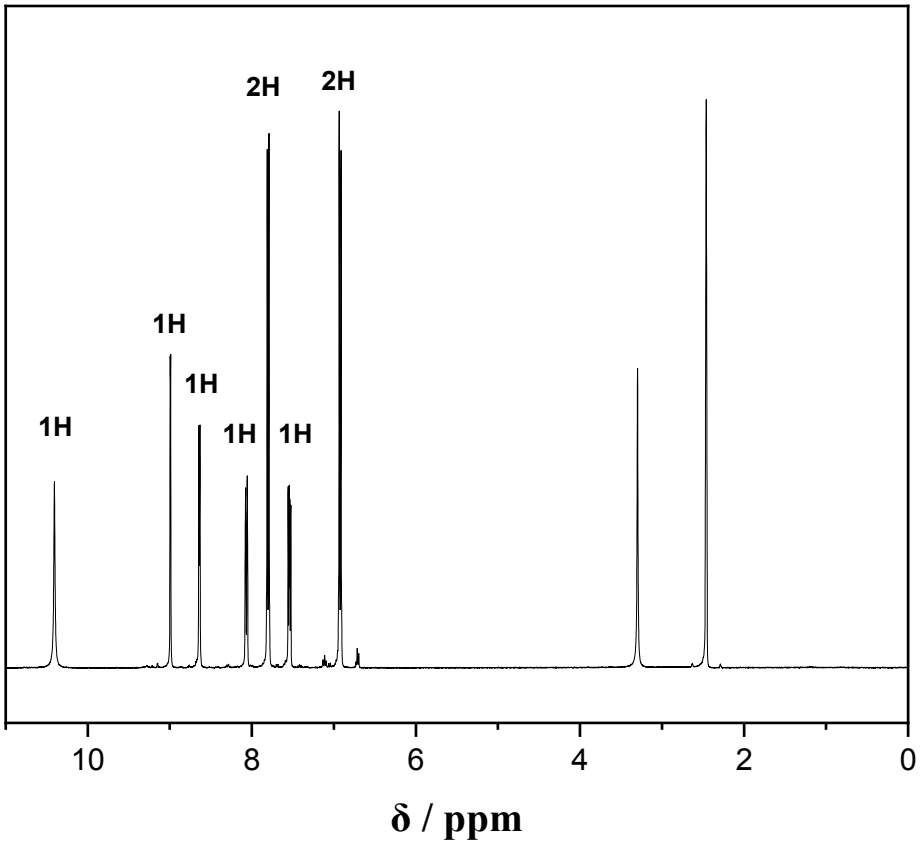

Fig. S1 ^{1}H NMR of 4-(3-pyridylazo)phenol.

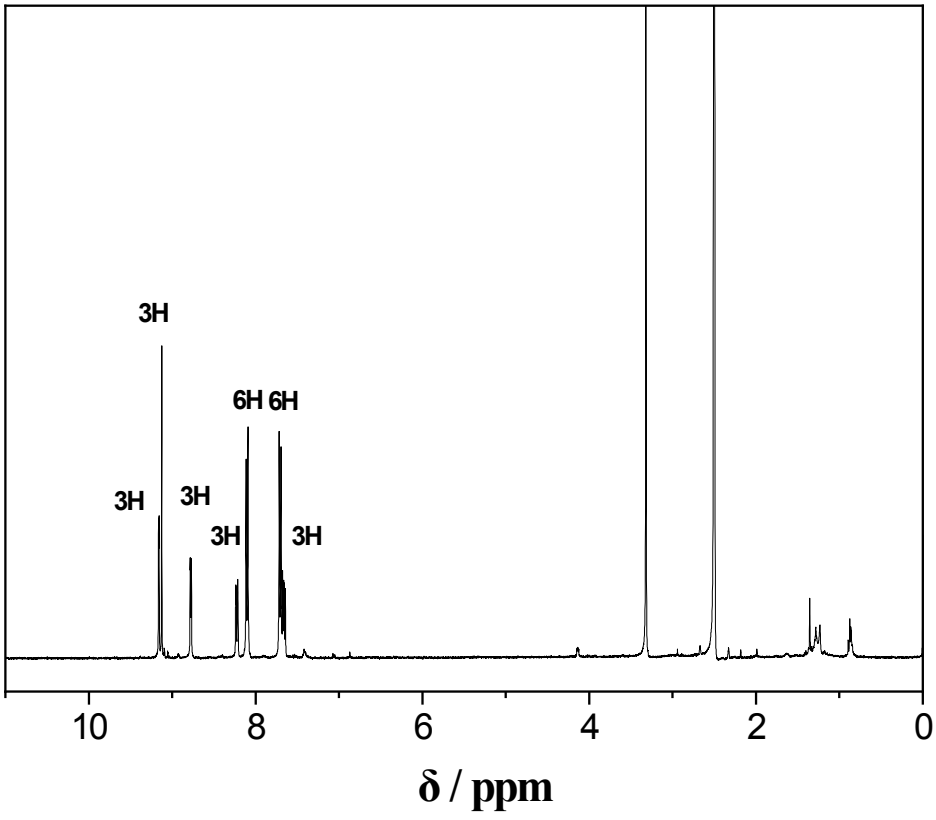

Fig. S2 ^{1}H NMR of ligand *trans*-D.

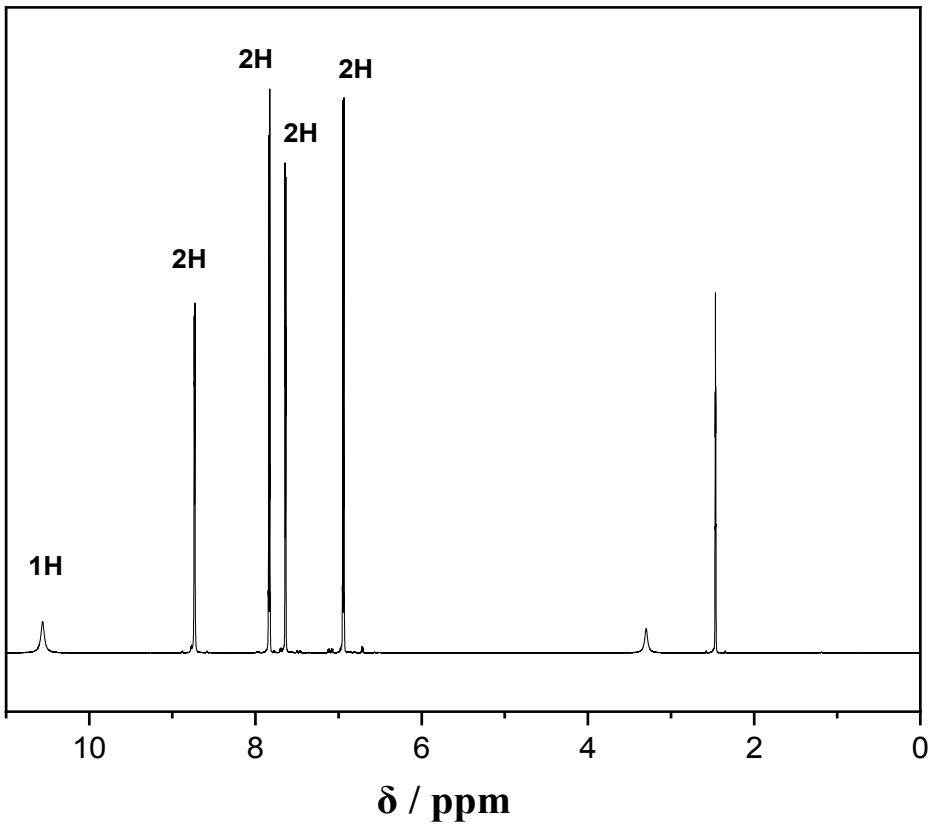

Fig. S3 ^{1}H NMR of 4-(4-pyridylazo)phenol.

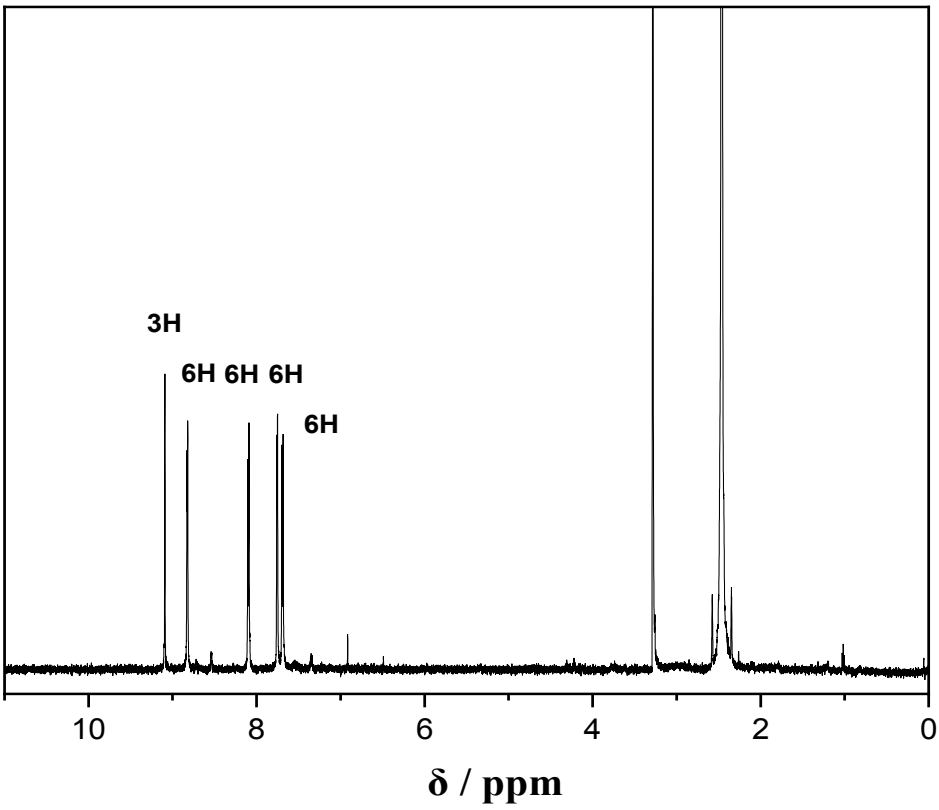

Fig. S4 ^{1}H NMR of *trans*-Z.

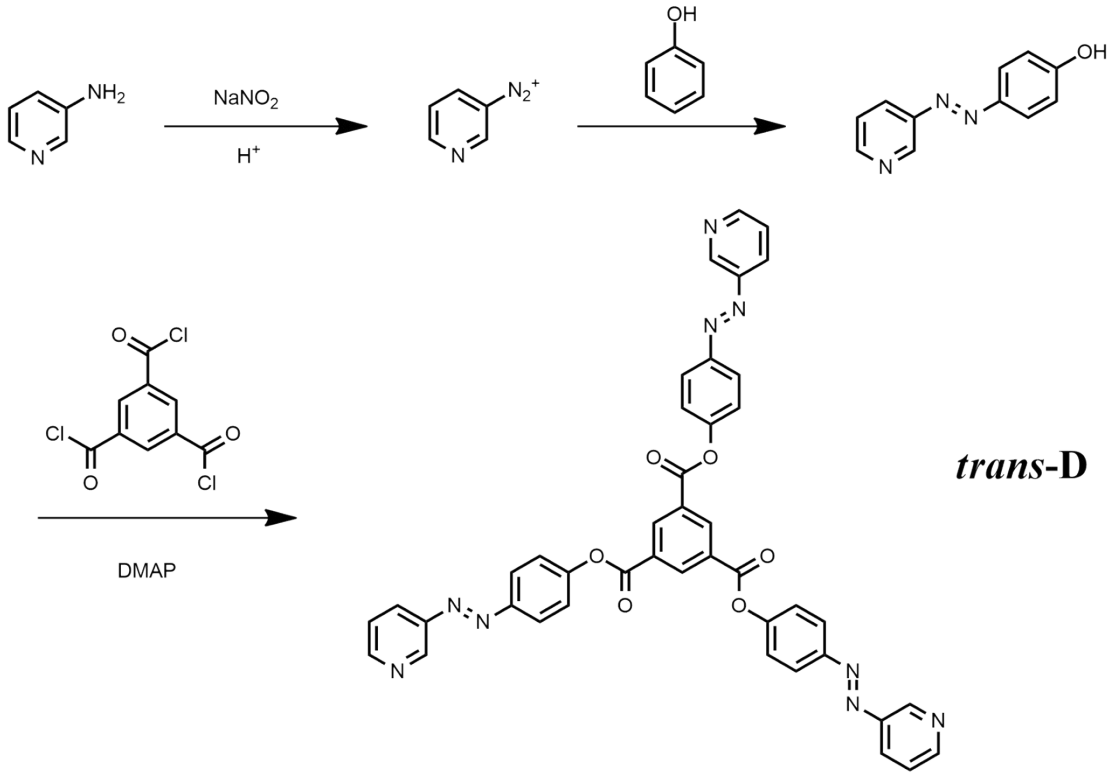

Fig. S5 Synthesis route of ligand *trans*-D.

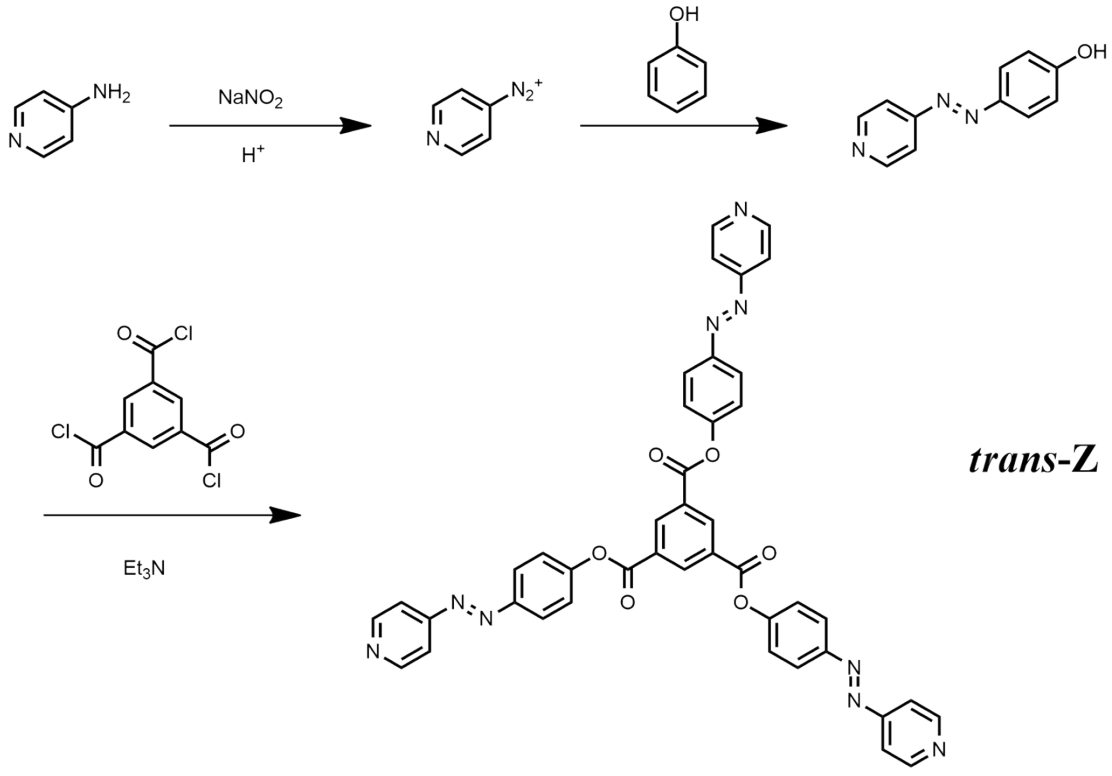

Fig. S6 Synthesis route of ligand *trans*-Z.

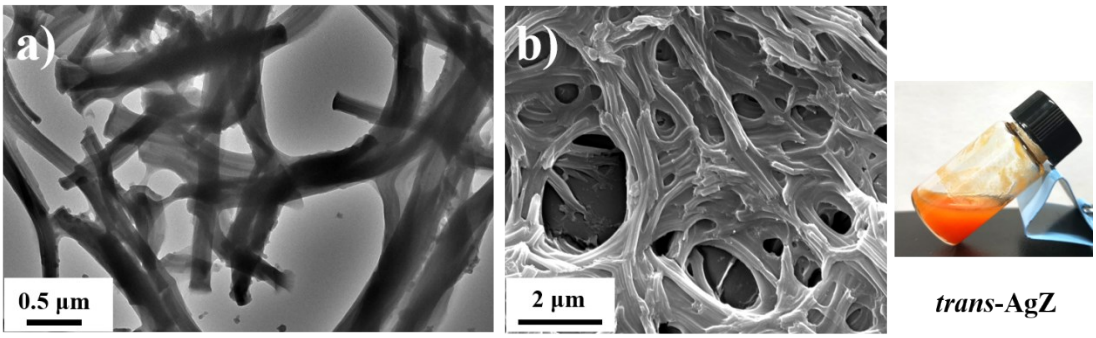

Fig. S7 (a) TEM image and (b) SEM image of *trans*-AgZ aggregates.

Table S1 Elemental compositions of *trans*-AgD and the calculated values of Ag(Ⅰ)/*trans*-D under different feeding ratios of Ag(Ⅰ)/*trans*-D.

Entry	$AgNO_3$/*trans*-D feeding ratio	N(%)	C(%)	H(%)	O(%)	Ag(%)	$AgNO_3$/*trans*-D (calculated from C element)	$AgNO_3$/*trans*-D (calculated from N element)
1	2/2	15.74	53.24	3.344	16.97	10.706	0.94	0.87
2	2/2	15.00	53.19	3.476	17.07	11.264	0.99	0.97
3	3/2	14.95	53.22	3.506	17.15	11.174	0.98	0.97
4	3/2	14.59	52.95	3.477	17.10	11.883	1.05	1.06
5	4/2	14.49	52.95	3.420	18.17	10.970	0.97	0.98
6	4/2	14.60	51.90	3.378	18.11	12.012	1.08	1.08

Table S2 The gelation time and zeta potentials of *trans*-AgD gel under different feeding ratios of Ag(Ⅰ)/*trans*-D.

Entry	$AgNO_3$/*trans*-D feeding ratio	Gelation time(s)	Zeta potential (mV)
1	2:2	60	+9.3 mV
3	3:2	10	+13.1 mV
5	4:2	3	+11.2 mV

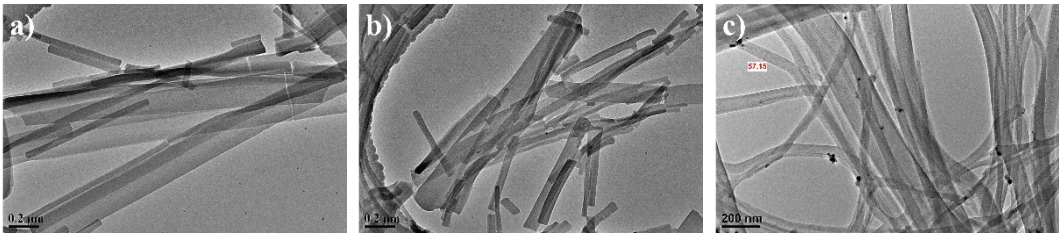

Fig. S8 TEM images of trans-AgD gel with the Ag(Ⅰ)/*trans*-D ratio of (a)1:1 (b)3:2 (c)2:1.

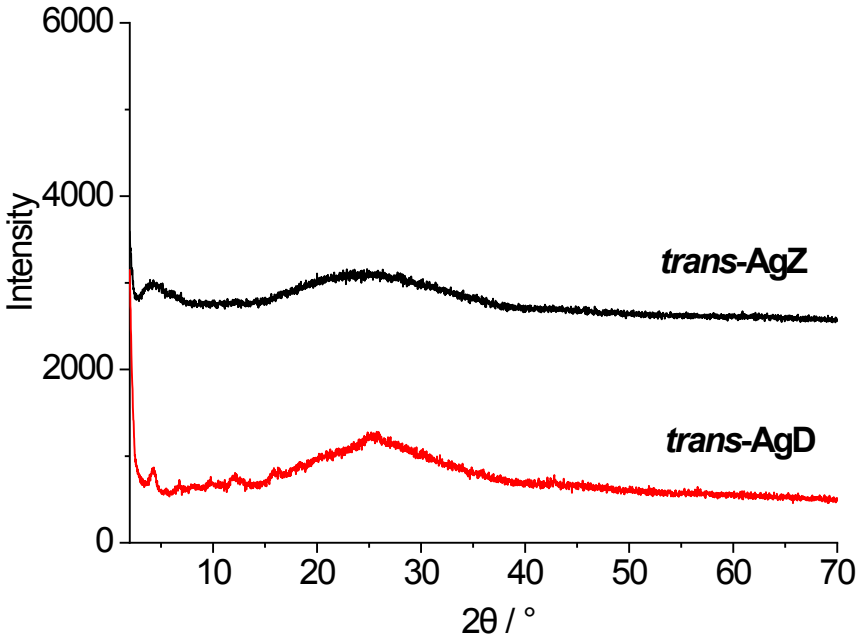

Fig. S9 PXRD patterns of *trans*-AgD and *trans*-AgZ powders.

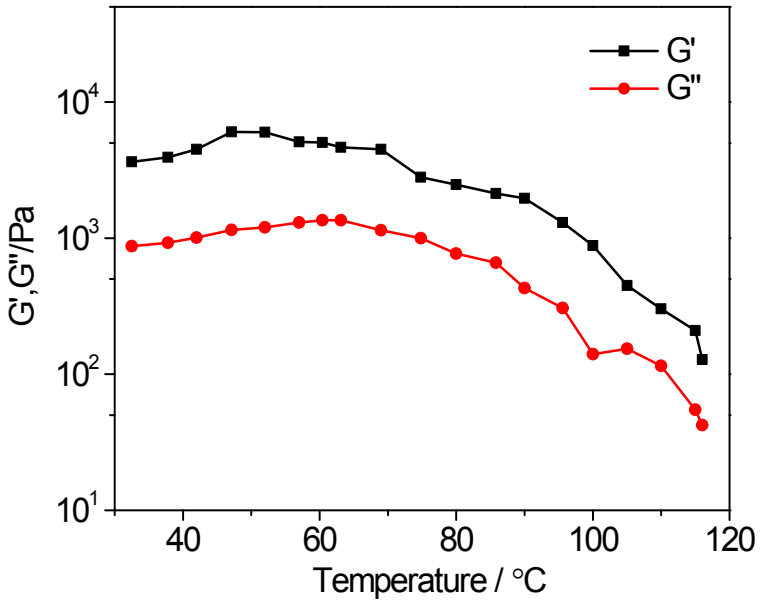

Fig. S10 Storage modulus G' and loss modulus G'' values of gel under different temperatures (strain=0.1%, frequency=1 Hz).

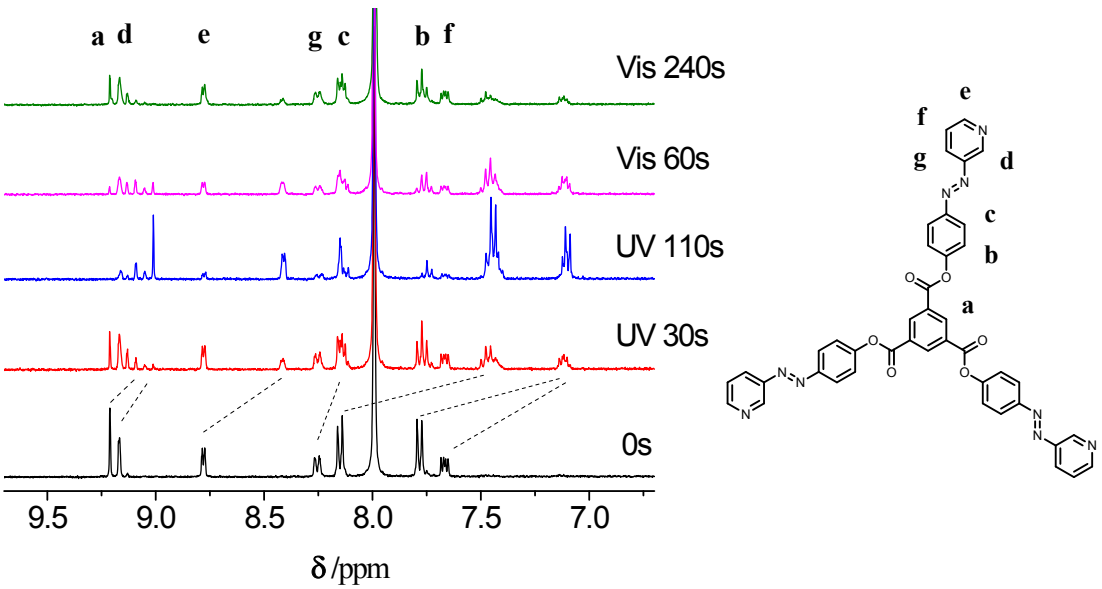

Fig. S11 ^{1}H NMR of *trans* D-*cis* D isomerization under UV-visible light irradiation (600 MHz, DMF-d_7)

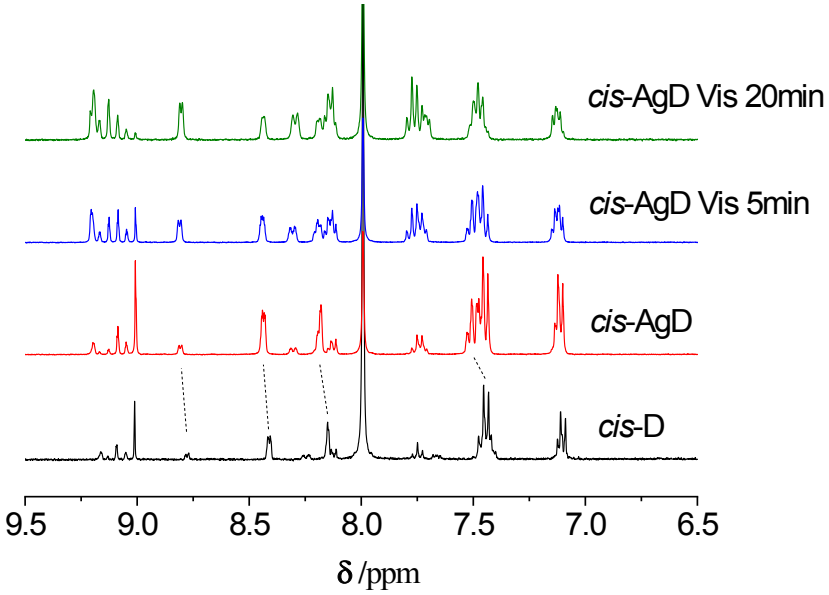

Fig. S12 ^{1}H NMR of *cis*-D and *cis*-AgD under visible light irradiation at different times (600 MHz, DMF-d_7)

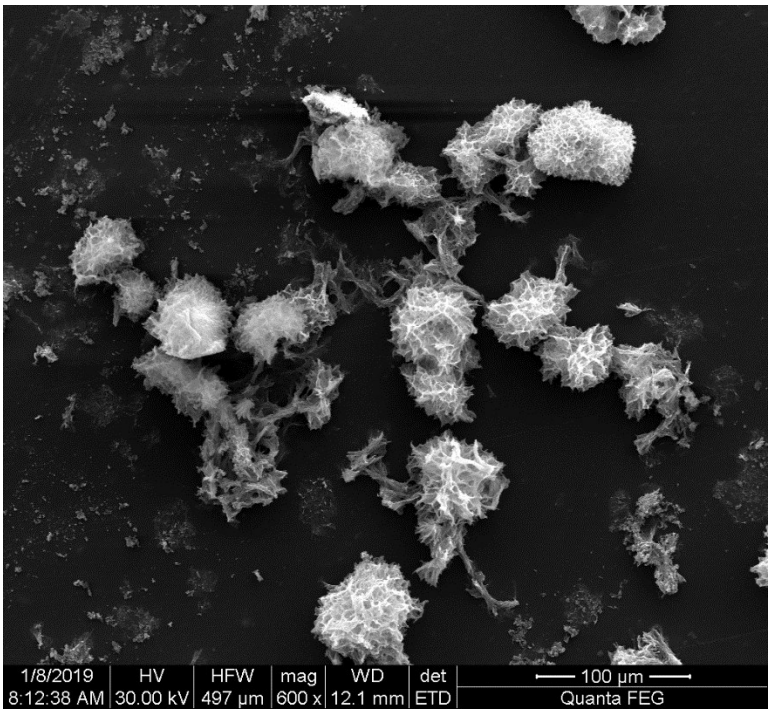

Fig. S13 SEM image of the aggregated particles obtained from *cis*-AgD solution after 30 min vis-light irradiation