Supporting Information

Photo Responsive Metal-Organic Gels of Rigid Phenylene-1,3-di-Substituted Angular Diene with Metal Halides: Gel-to-Gel Transformation triggered by [2+2] Polymerization

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Table S1 Gelation in different solvents for **MOG1-5**.

Gels	(M:L)	Solvent (Total vol =2ml)
MOG1	**$CdCl_2$ (1:1)**	**MeOH**
MOG2	**$CdBr_2$ (1:1)**	**MeOH**
MOG3	**$HgCl_2$ (4:1)**	**MeOH:H_2O (1:1)**
MOG4	**$HgBr_2$ (4:1)**	**MeOH:H_2O (1:1)**
MOG5	**HgI_2 (4:1)**	**MeOH:H_2O (1:1)**

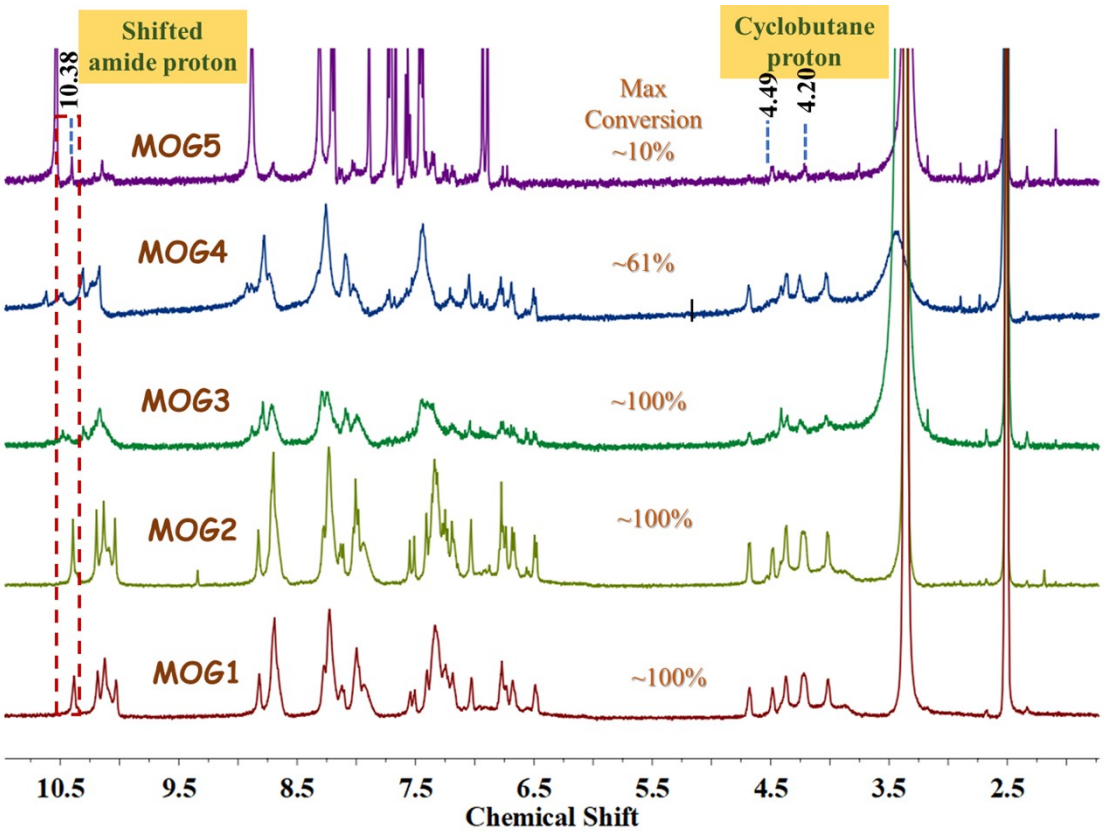

Fig. S1 ^{1}HNMR spectra in DMSO-d_6 and % conversion of **MOG1-5** after 24h of UVA irradiation.

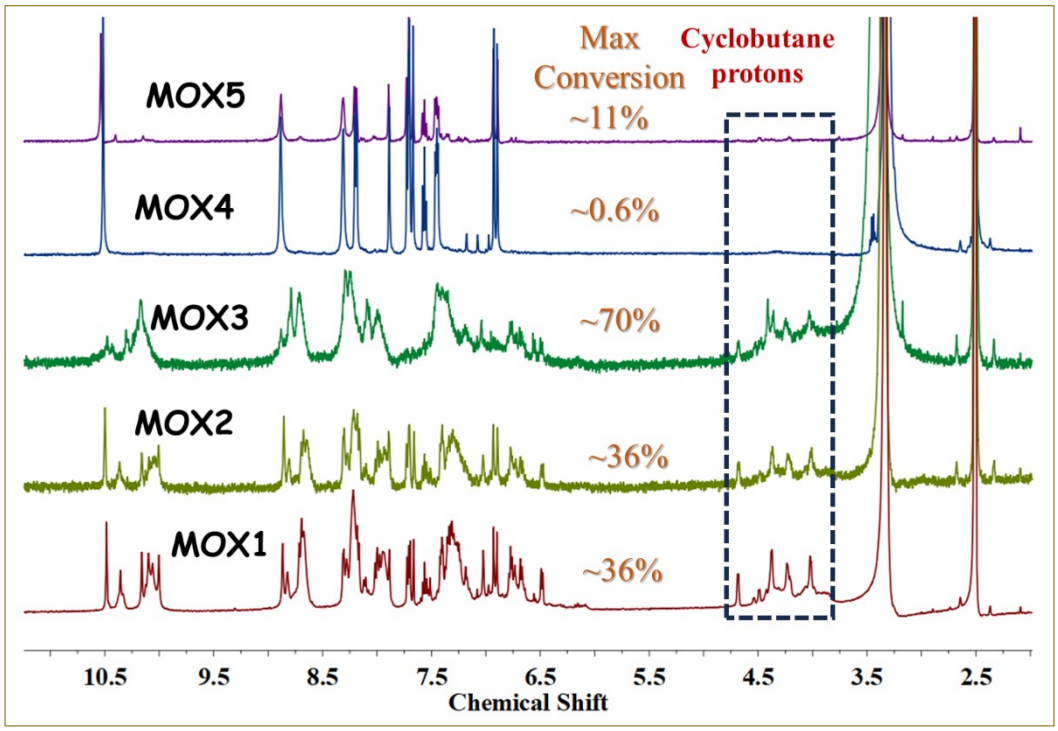

Fig S2 [1]HNMR spectra in DMSO-d_6 of xerogels of **MOG1-5** at 24h of irradiation. Yield of the reaction has been calculated by taking into account the integration ratios of unreacted olefinic protons appearing at 6.89 ppm with newly formed cyclobutane peak at 4.21 ppm. [1]

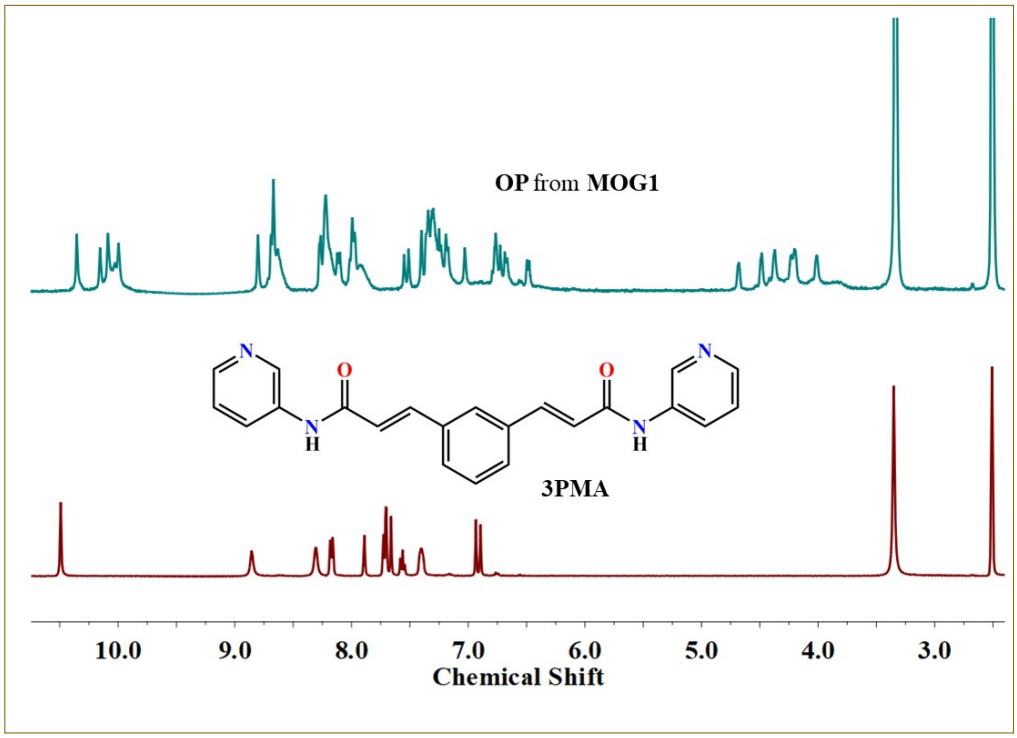

Fig. S3 [1]HNMR spectra of **3PMA** and the separated organic polymer in DMSO-d_6.

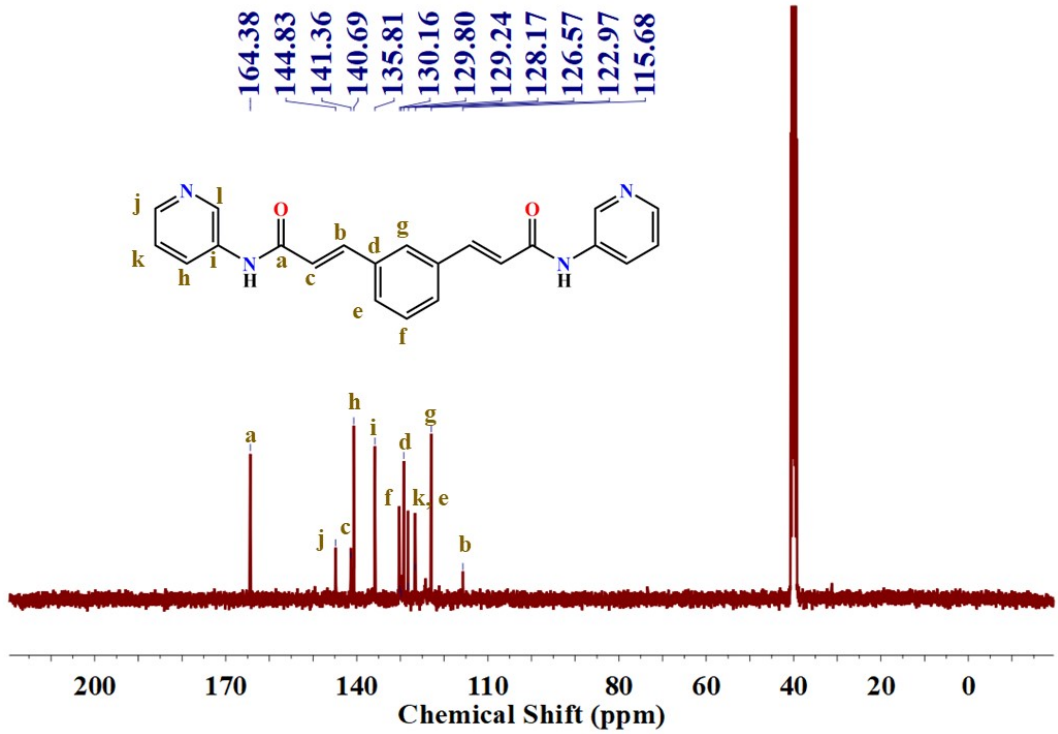

Fig. S4 ^{13}CNMR spectra of **3PMA** in DMSO-d_6.

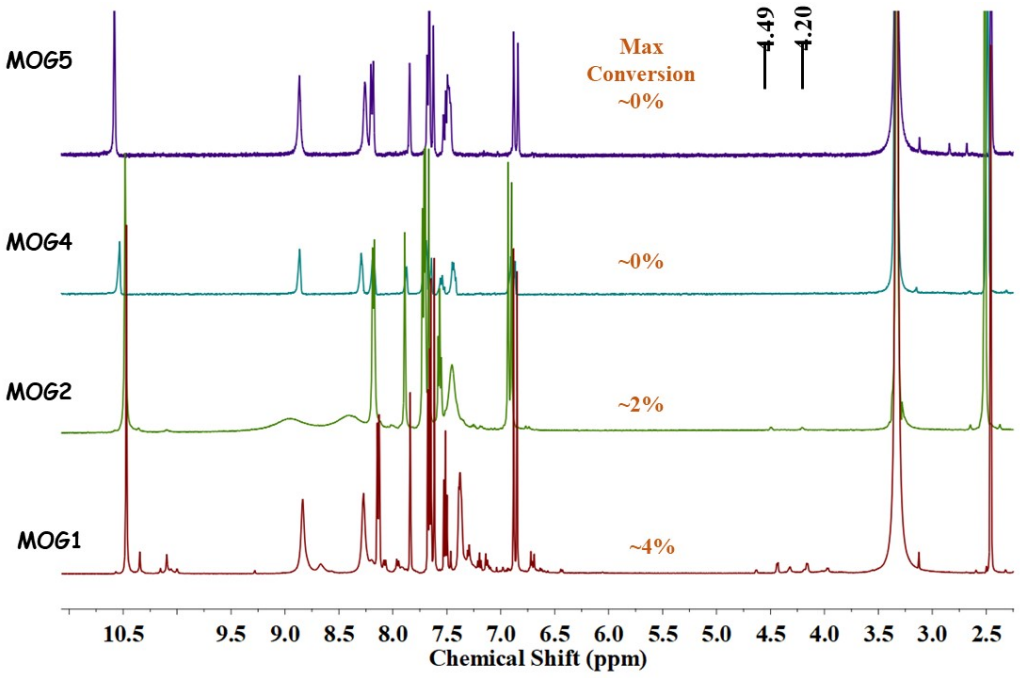

Fig. S5 ^{1}HNMR spectra illustrating % conversion of **MOG1-2** and **MOG4-5** upto the point of self-persistent nature in DMSO-d_6.

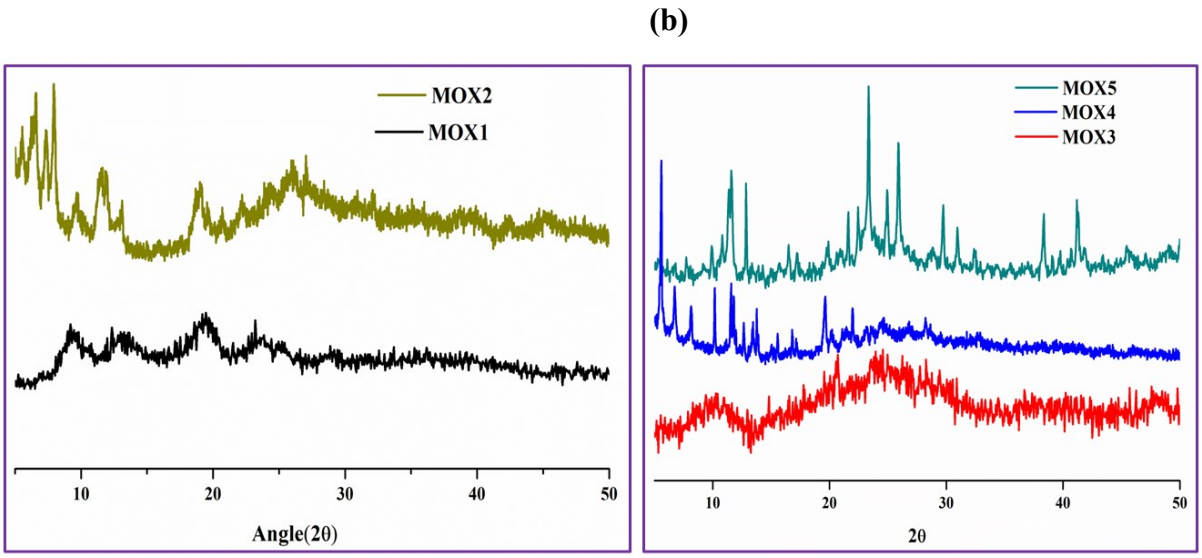

Fig. S6 XRPD pattern for all the xerogels of: (a) Cd(II) MOGs (b) Hg(II) MOGs.

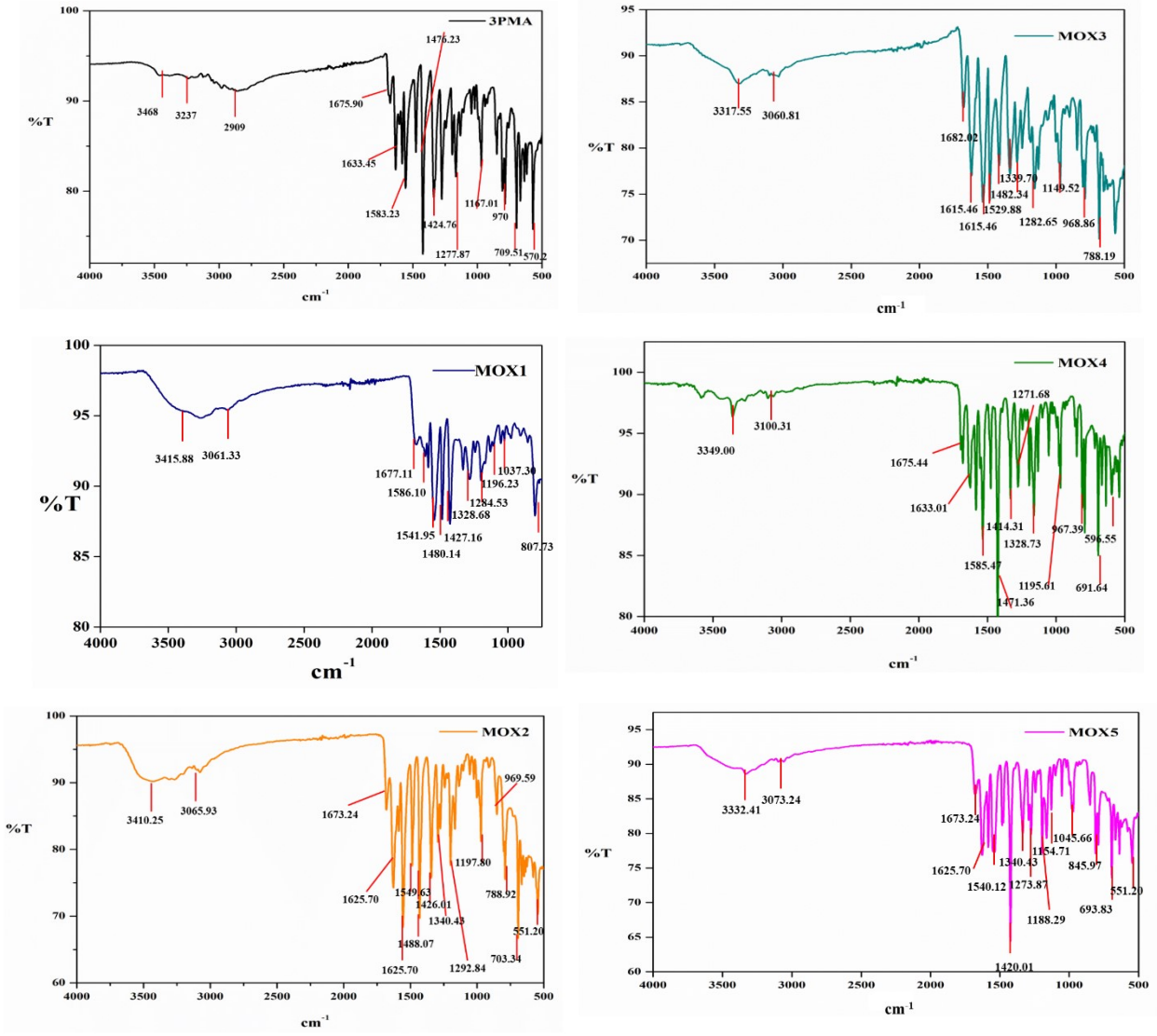

Fig. S7 FT-IR spectra of **3PMA** and xerogel of **MOG1-5**.

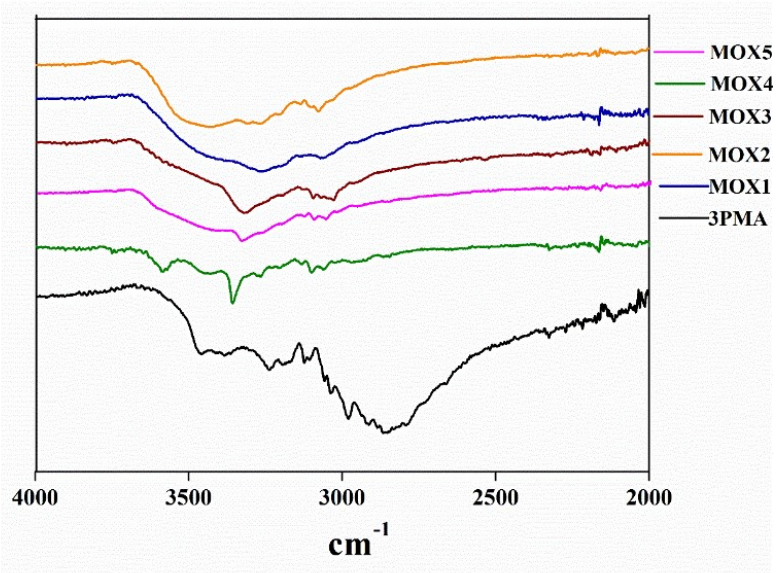

Fig. S8 FT-IR spectra of **3PMA** xerogel of **MOG1-5** in 4000-2000 cm^{-1} region. Notice the effect of intramolecular H bonding on secondary amine band.

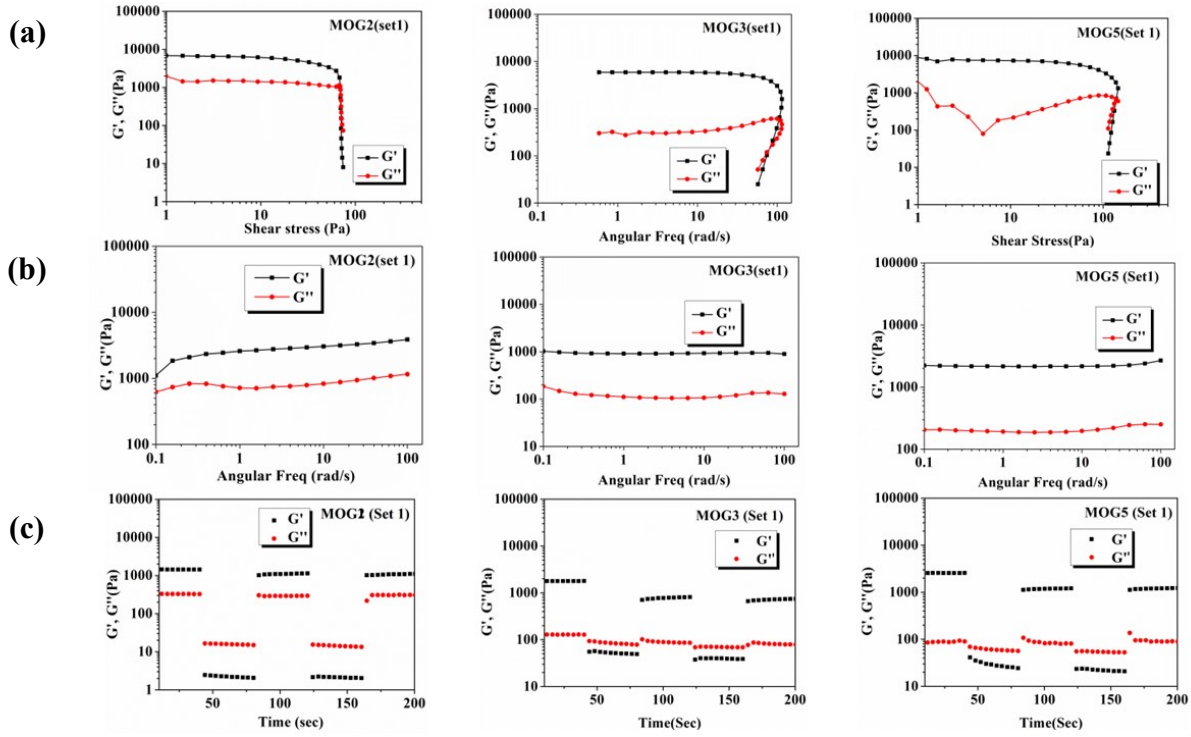

Fig. S9 Rheological analysis for **MOG2**, **MOG3** and **MOG5** before irradiation: variation of storage modulus (G') and loss modulus (G") with: (a) shear stress (b) frequency and (c) step-strain hysteresis loop.

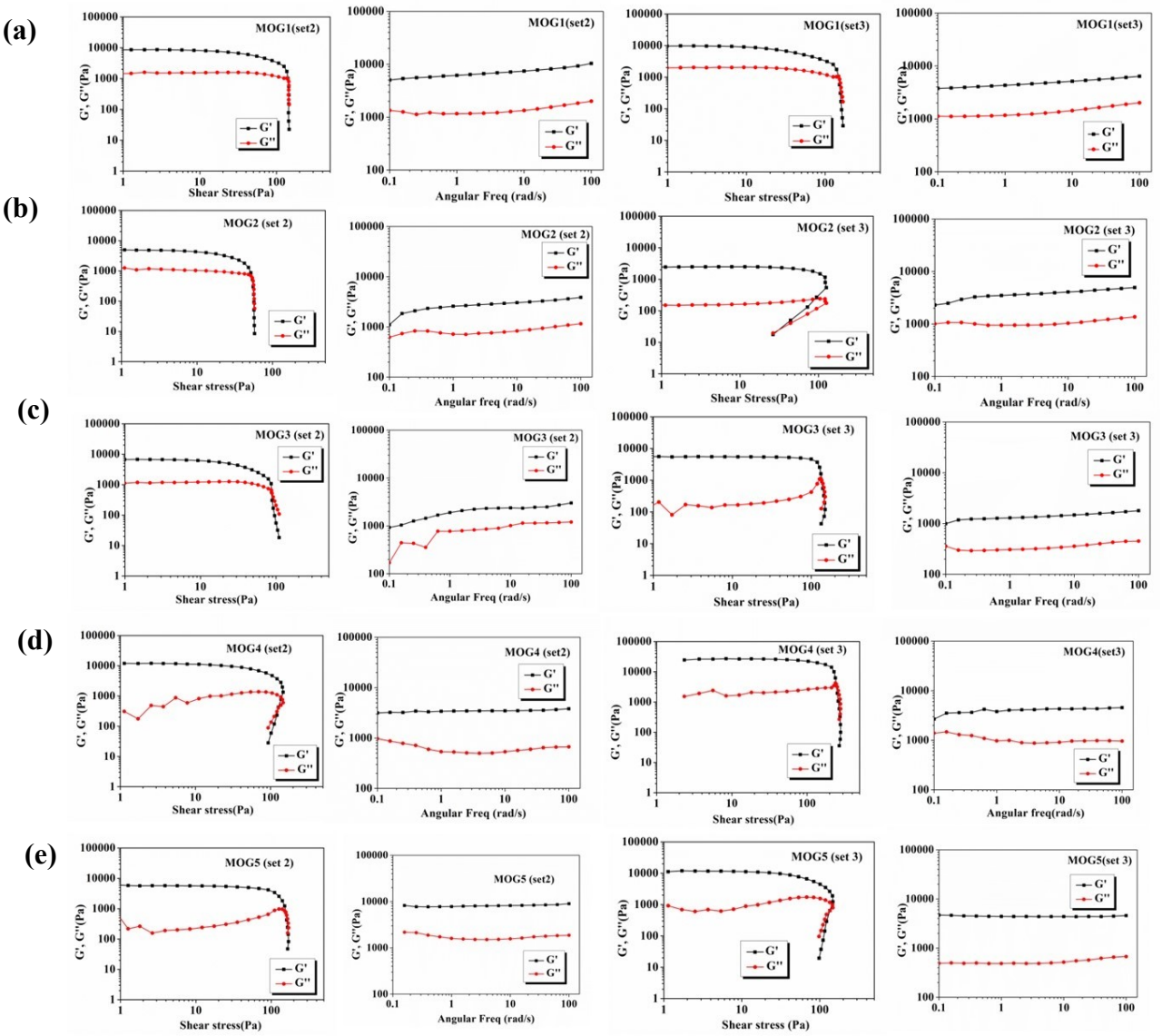

Fig. S10 Rheological data reproducibility for **MOG1-5** before irradiation: variation of storage modulus (G') and loss modulus (G") with: shear stress and frequency for (a) **MOG1**, (b) **MOG2**, (c) **MOG3**, (d) **MOG4** and (e) **MOG5** (set 2 and set 3 denotes data for two different batches of sample).

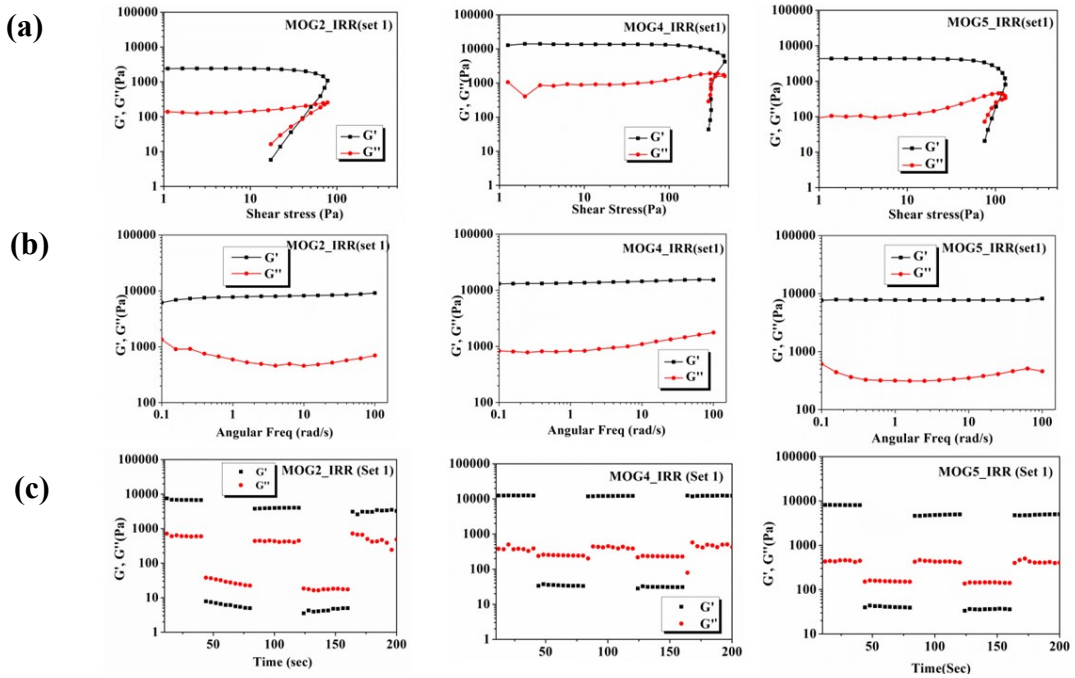

Fig. S11 Rheological analysis for **MOG2**, **MOG4**, & **MOG5** after 24 hrs of UVA irradiation: variation of storage modulus (G') and loss modulus (G") with: (a) shear stress (b) frequency and (c) step-strain hysteresis loop.

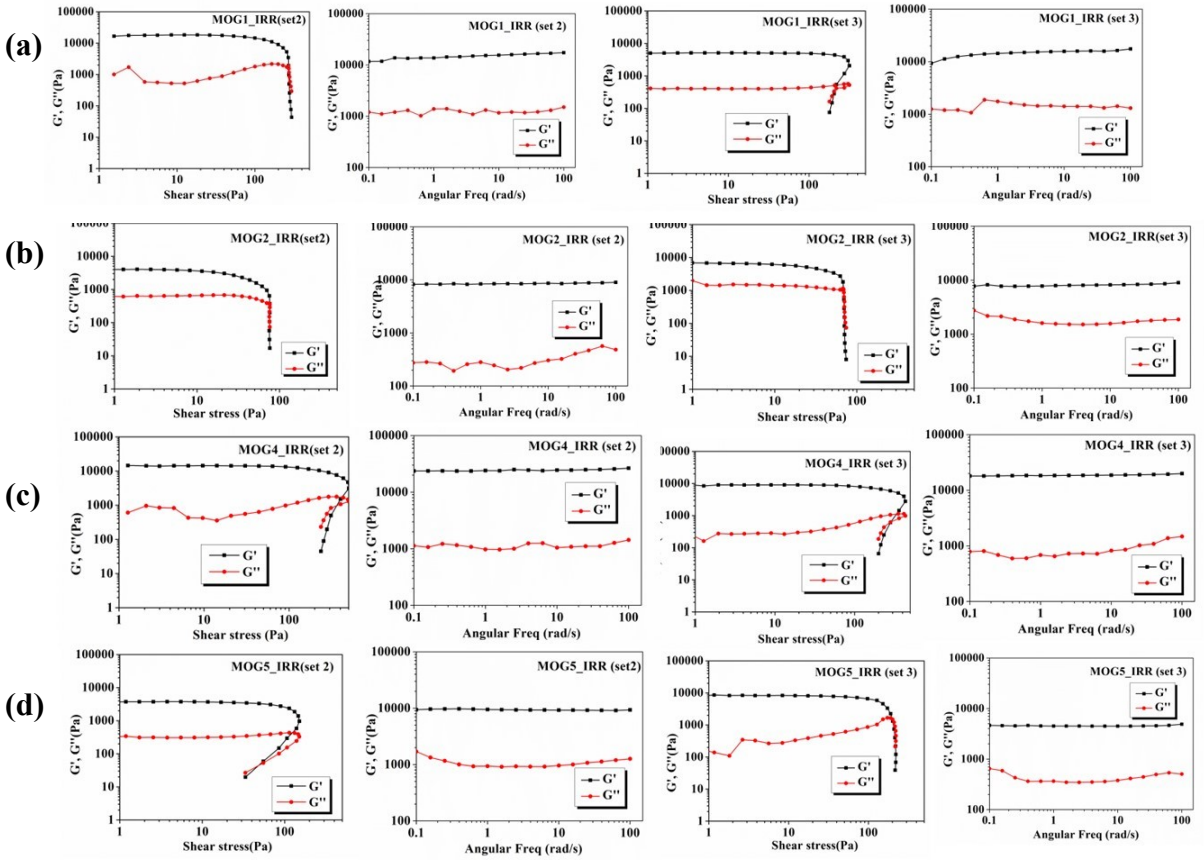

Fig. S12 Rheological data reproducibility for **MOG1-5** after irradiation: variation of storage modulus (G') and loss modulus (G") with: shear stress and frequency for (a) **MOG1**, (b) **MOG2**, (c) **MOG3** and (d) **MOG4** (set 2 and set 3 denotes data for two different batches of sample).

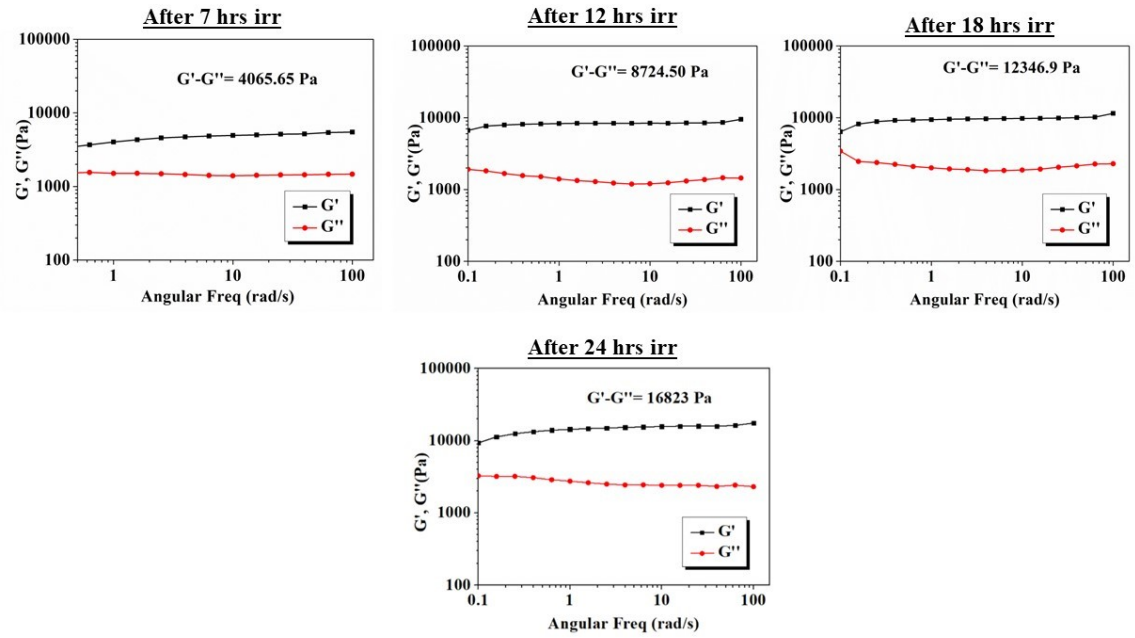

Fig. S13 Rheological analysis for **MOG1** at different course of photoreaction: variation of storage modulus (G') and loss modulus (G'') with frequency showing gradual increase in mechanical strength.

MOG5

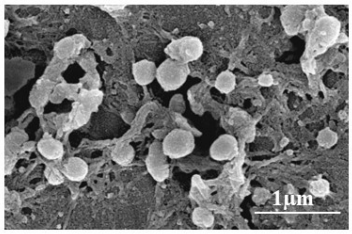

Fig. S14 Illustration of FESEM analysis of **MOG5**.

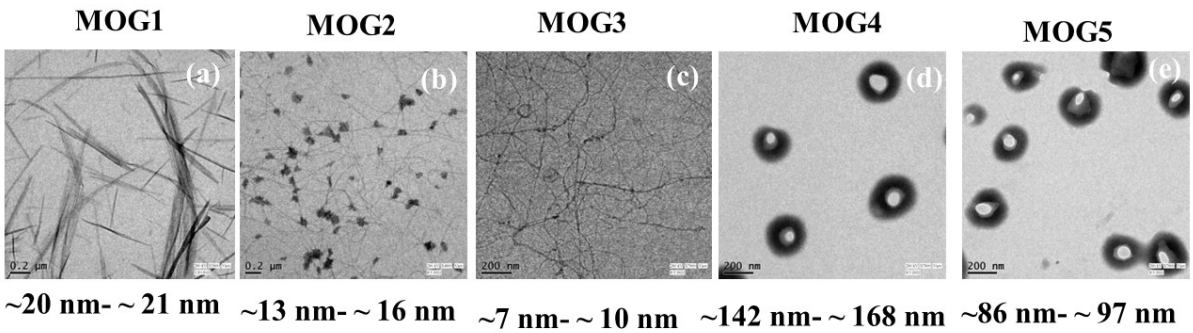

Fig. S15 (a-e) Illustration of TEM analysis of **MOG1-5**, fibril/ ring length/diameter are written at the end of the images.

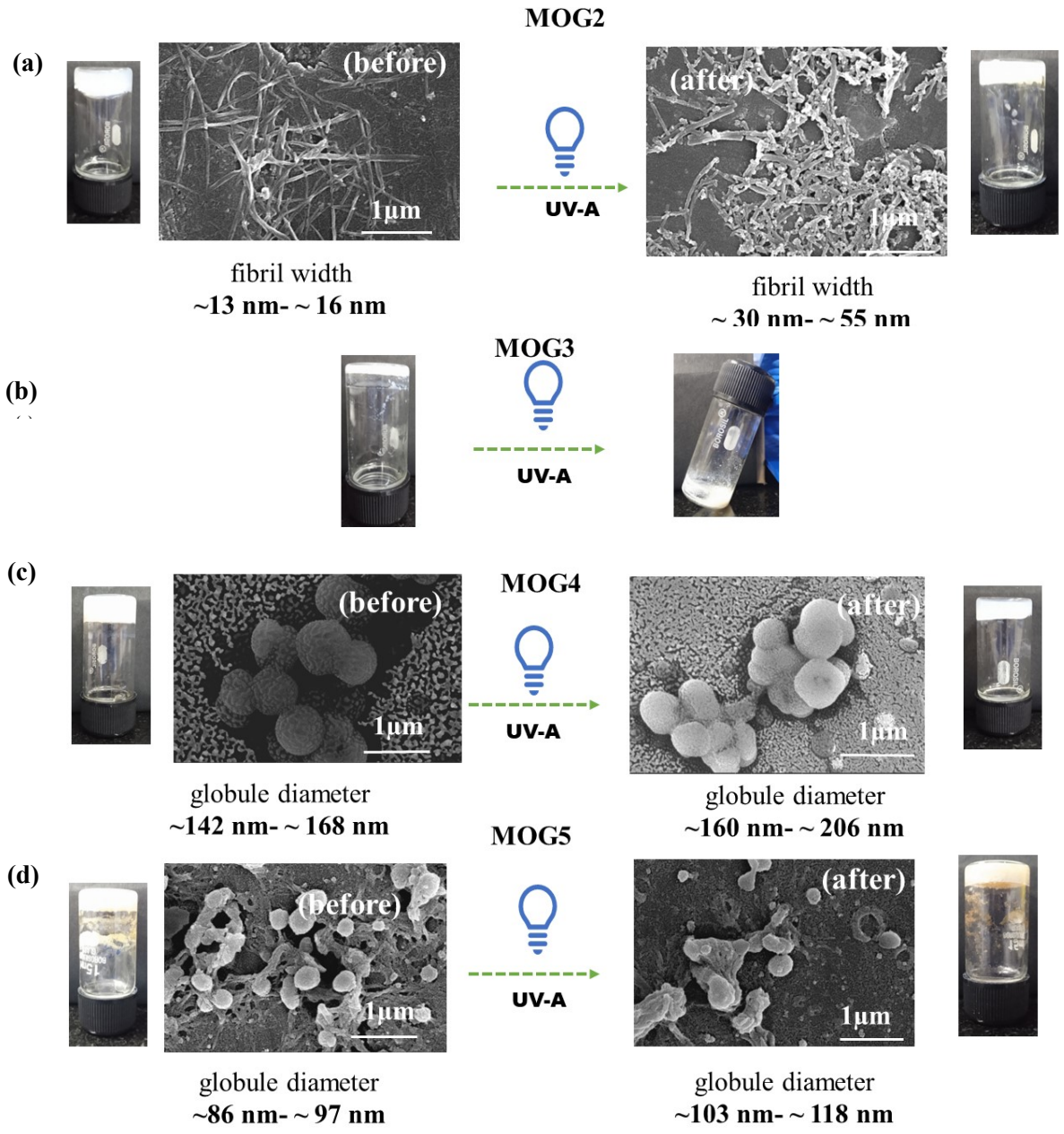

Fig. S16 Photographs showing gels in upturned vials, and FESEM showing fibre width and spheres diameter before irradiation and after 24 hours of irradiation for (a) **MOG2,** (b) **MOG3**, (c) **MOG4** and (d) **MOG5**.

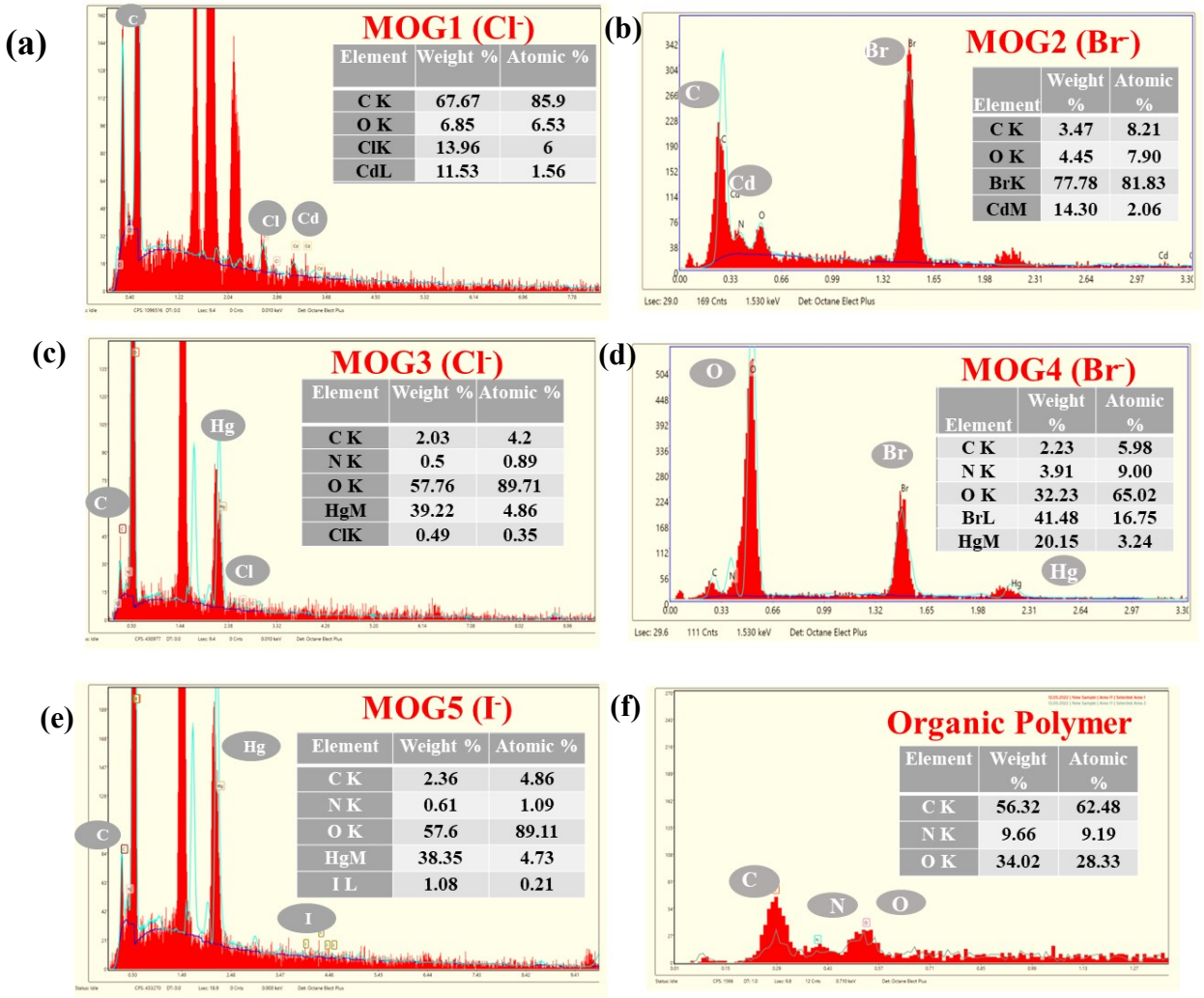

Fig. S17 EDX- elemental analysis for: (a-e) **MOG1-5**, (f) organic polymer extracted from **MOG1**

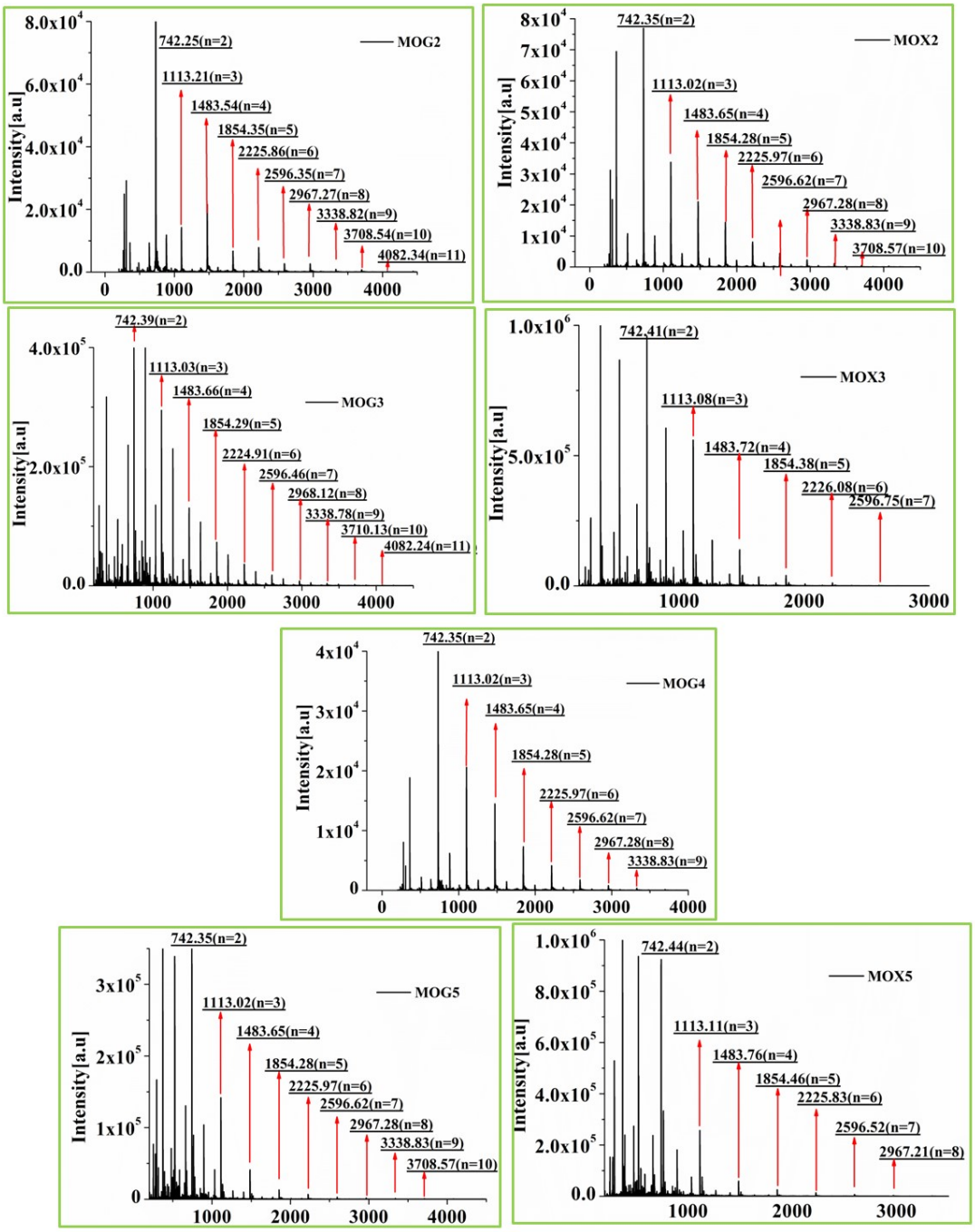

Fig. S18 MALDI-TOF analysis for **MOG1-5** and xerogel of **MOG1-3** and **MOG5**.

Table S2 Degree of polymerization in gel and xerogel states for **MOG1-5**.

	No of photopolymerized gelator molecules	
	Gel	Xerogel
MOG1	11	10
MOG2	11	10
MOG3	11	7
MOG4	10	0
MOG5	10	8

Table S3 Overall changes in rheological moduli after 24h UV irradiation for **MOG1-5**

Gels	Yield Stress σ_y (Pa)				G'-G'' (Pa)			
	Before		After		Before		After	
		avr		avr		avr		avr
MOG1	132.32 140.13 148.58	140.34	228.06 269.08 217.10	238.08	4,104.14 3,925.55 4,134.77	4054.82	16,823.95 16,022.03 17,314.74	16,720.24
MOG2	53 53.90 69.30	58.73	69 81.60 76.81	75.80	3,896.15 4,115.94 4,263.75	4091.94	7,183.92 7,126.71 7,908.43	7,406.35
MOG3	105.22 87.11 107.34	99.89	… 		802.7 988.12 1088.83	959.88	…. 	

MOG4	**145.25**		**358.91**		**4,271.73**		**20,285.25**	
	119.65	**136.01**	**417.35**	**370.64**	**4,150.92**	**3983.26**	**22,281.48**	**20,900.43**
	143.15.		**335.66**		**3,527.14**		**20,134.56**	
MOG5	**110.80**		**118**		**3,915.76**		**7,169.69**	
	198.09	**154.89**	**140.43**	**127.30**	**3,860.40**	**3,996.08**	**7,701.32**	**7,615.13**
	155.78		**123.48**		**4,212.09**		**7,974.39**	

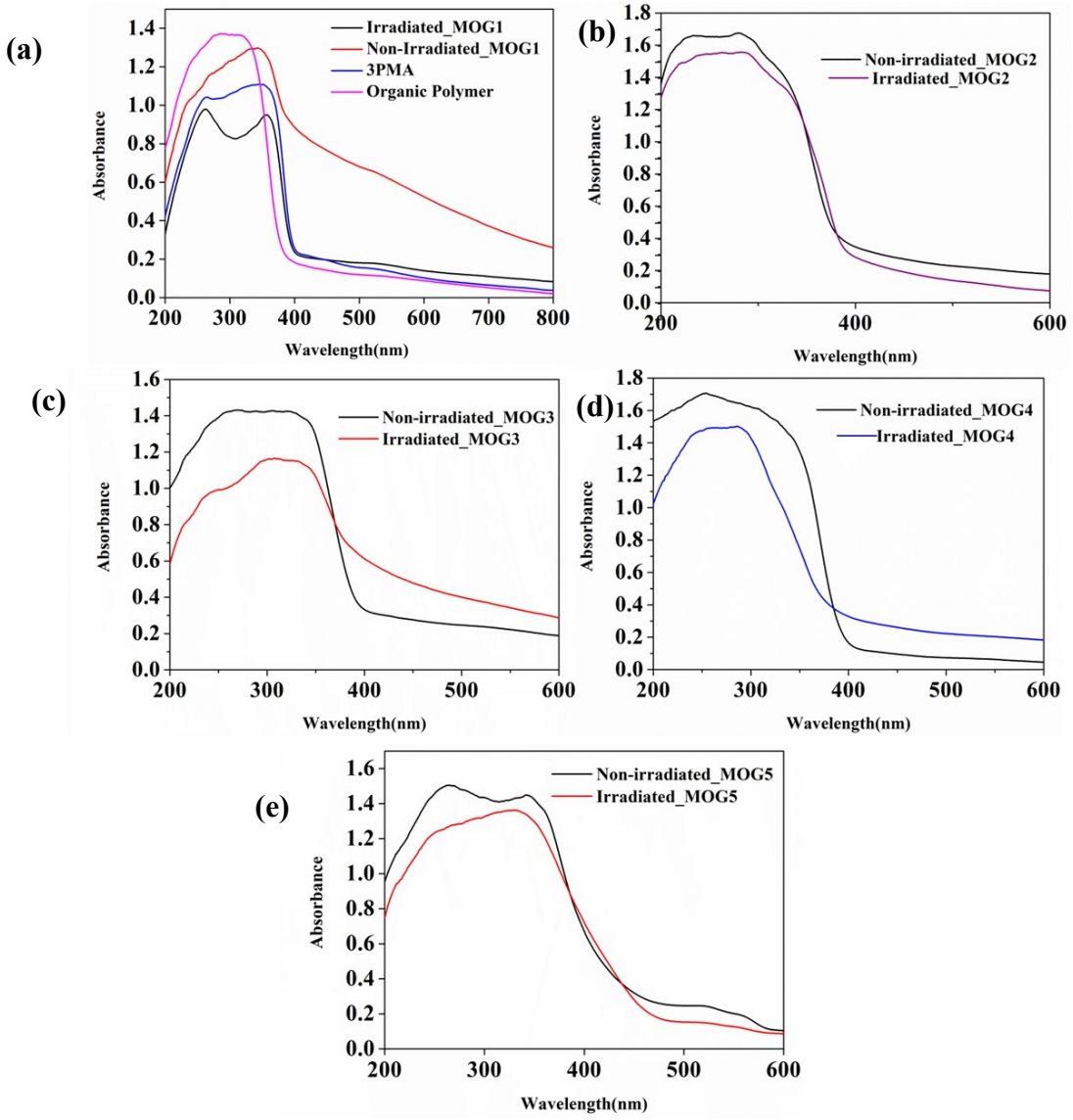

Fig. S19 Absorption spectra in solid state of (a) **3PMA, MOG1** and irradiated **MOG1**; (b) **MOG2** and irradiated **MOG2**; (c) **MOG3** and irradiated **MOG3**; (d) **MOG4** and irradiated **MOG4**; (e) **MOG5** and irradiated **MOG5**.

References:

[1]. Mandal, R.; Biradha. *K. Dalton Trans.* **2020**, *49*, 13744-13752.

[2]. Myshakina, N. S.; Ahmed, Z.; Asher, S. A. *J Phys Chem B*. **2008**, *112*, 11873-11877.