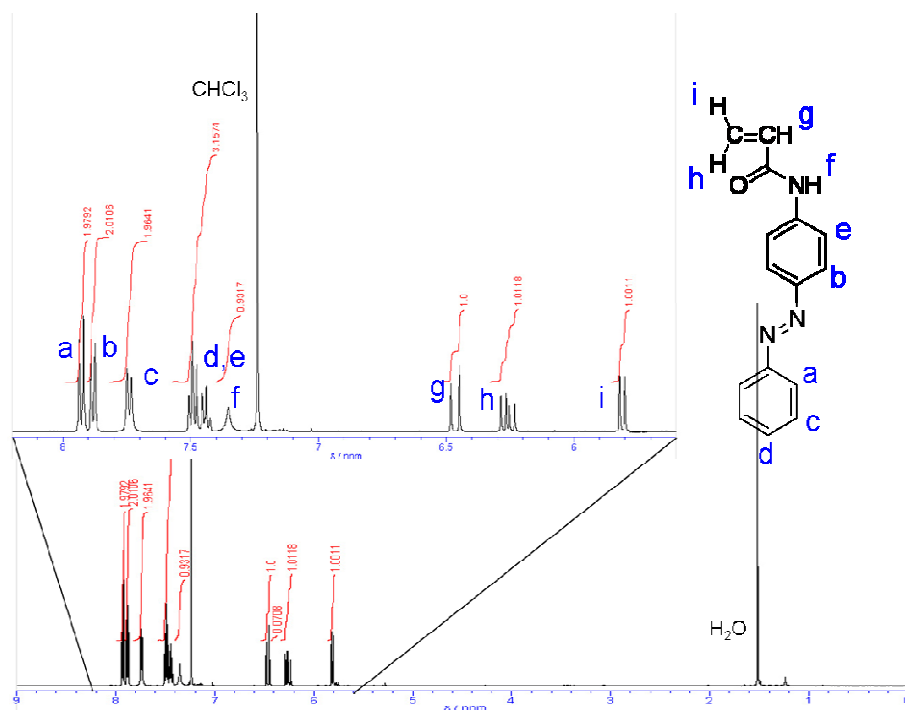
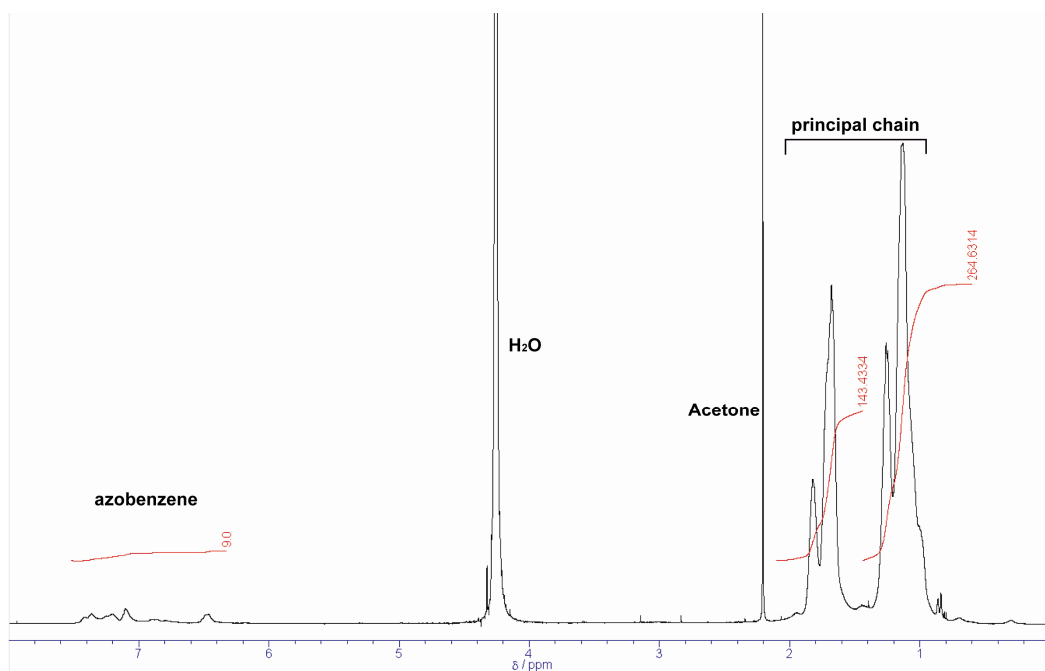


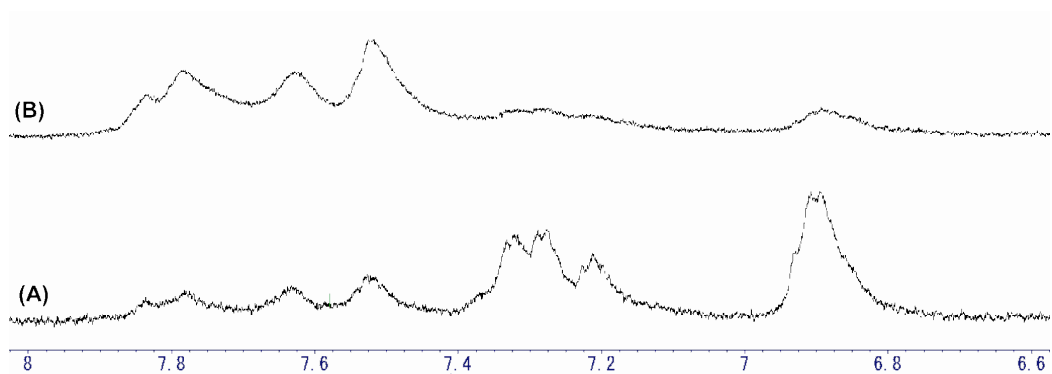
## Supplementary Information



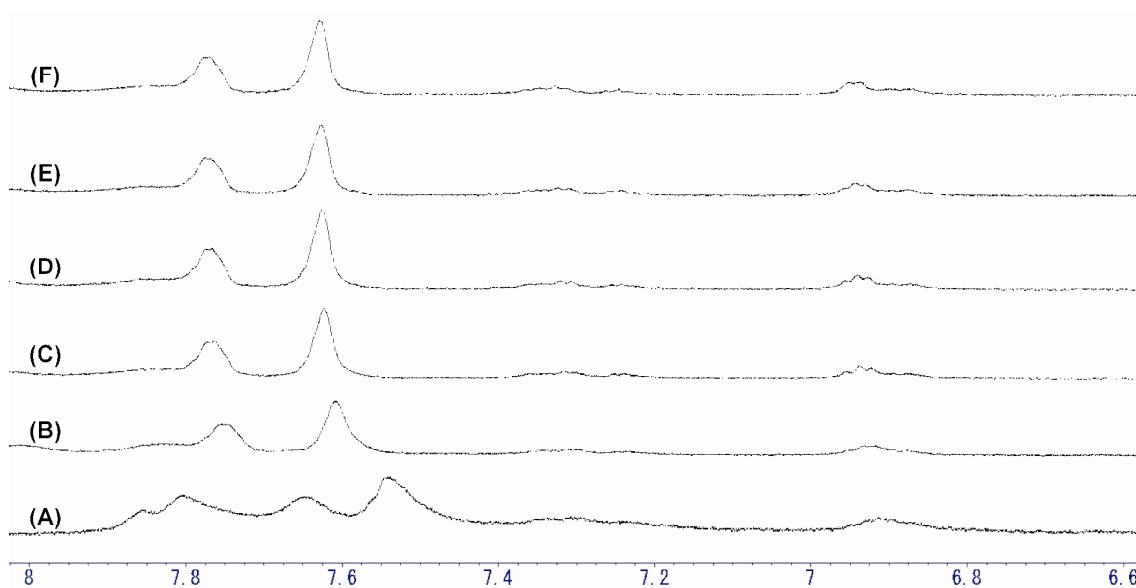
**Supplementary Figure S11 Characterization of Azo-acrylamide monomer.**  $^1\text{H}$  NMR spectrum of Azo-acrylamide in  $\text{CDCl}_3$  at  $30^\circ\text{C}$ .



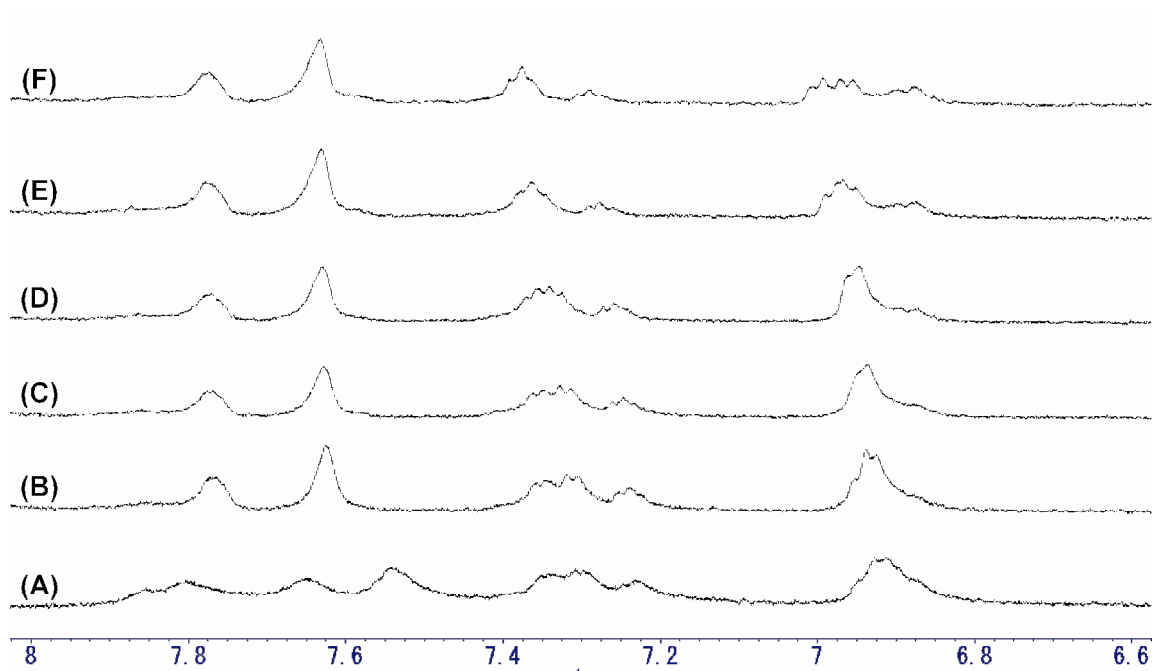
**Supplementary Figure S2| Characterization of Azo-polymer.**  $^1\text{H}$  NMR spectrum of Azo-polymer in  $\text{D}_2\text{O}$  at  $30\text{ }^\circ\text{C}$ .



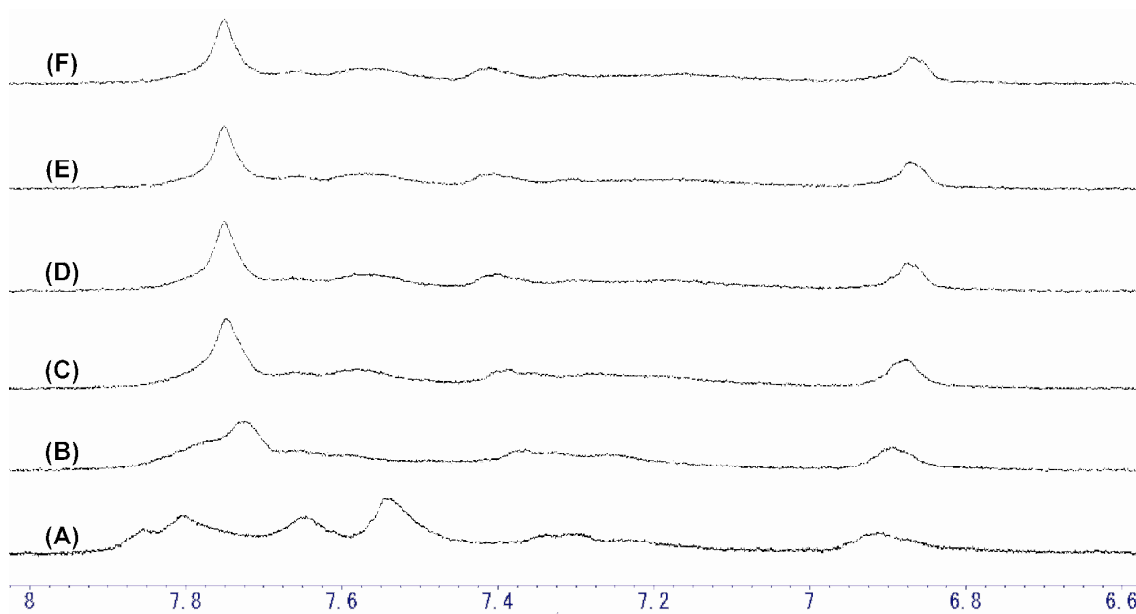
**Supplementary Figure S3| Photoisomerization of Azo in Azo-polymer.** <sup>1</sup>H NMR spectra of Azo-polymer after irradiation of ultraviolet light (A) and visible light (B) in D<sub>2</sub>O.



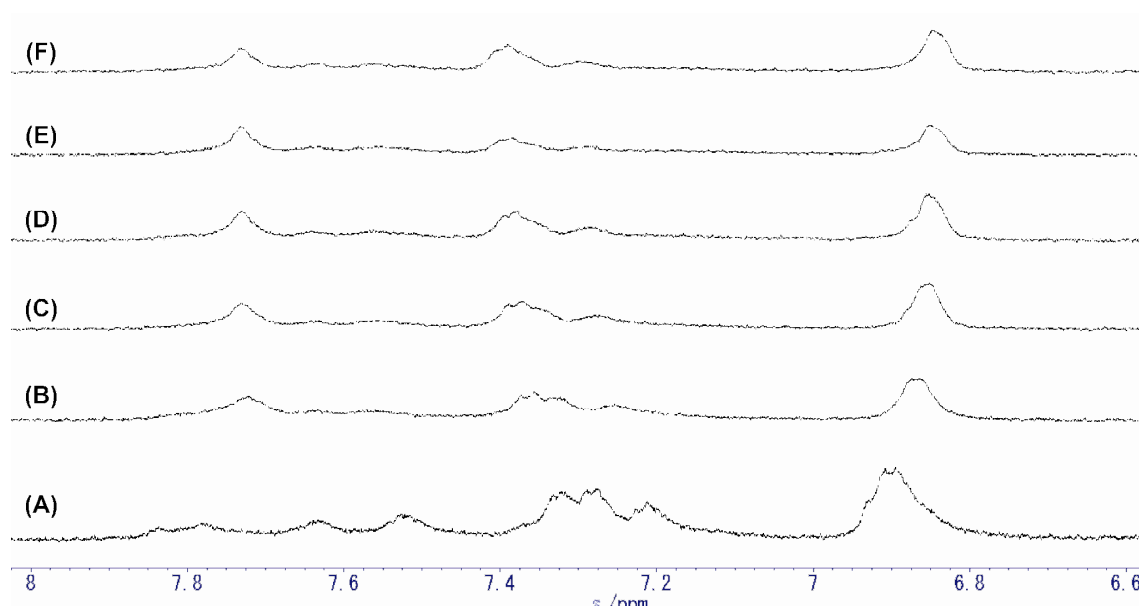
**Supplementary Figure S4| Complex formation of *trans*-Azo in Azo-polymer with  $\alpha$ -CD.** <sup>1</sup>H NMR spectral changes of *trans*-Azo moiety (1 mM in guest unit) in Azo-polymer (A) by the addition of  $\alpha$ -CD. [ $\alpha$ -CD] = 5 mM, (B), 10 mM (C), 20 mM (D), 40 mM (E), and 60 mM (F) in D<sub>2</sub>O.



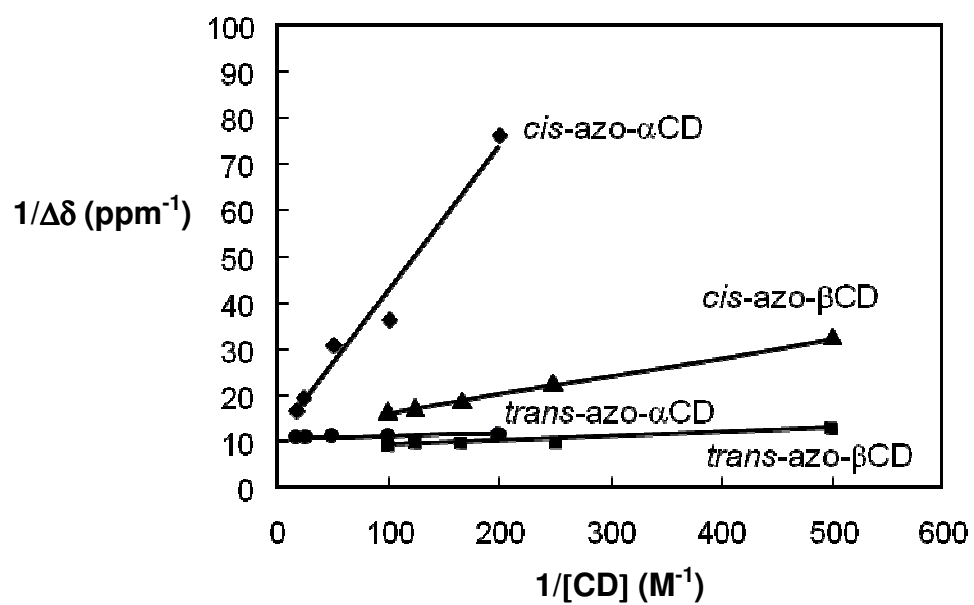
**Supplementary Figure S5| Interaction between *cis*-Azo in Azo-polymer and α-CD.** <sup>1</sup>H NMR spectra of *cis*-Azo moiety in Azo-polymer in the absence of α-CD (A) and in the presence of α-CD. [α-CD] = 5 mM (B), 10 mM (C), 20 mM (D), 40 mM (E), and 60 mM (F) in D<sub>2</sub>O.



**Supplementary Figure S6l Interaction between *trans*-Azo in Azo-polymer and β-CD.** <sup>1</sup>H NMR spectral changes of *trans*-Azo (1 mM in guest unit) in Azo-polymer (A) by adding β-CD. [β-CD] = 2 mM, (B), 4 mM (C), 6 mM (D), 8 mM (E), and 10 mM (F) in D<sub>2</sub>O.



**Supplementary Figure S7| Complex formation of *cis*-Azo in Azo-polymer with β-CD.** <sup>1</sup>H NMR spectral changes of *cis*-Azo moiety (1 mM) in Azo-polymer (A) by adding β-CD. [β-CD] = 2 mM (B), 4 mM (C), 6 mM (D), 8 mM (E), and 10 mM (F) in D<sub>2</sub>O.



Supplementary Figure S8| Benesi-Hildebrand plots.