Electronic Supplementary Material (ESI) for Soft Matter.

The multi-stimuli-responsiveness of a novel polydiacetylene-based supramolecular gel

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The co-gelaor IMSA was synthesized as the following method: 1.0 g octadecanoic acid was dissolved in 40 ml CH_2Cl_2, then 0.48 g NHS and 0.8 g EDC were added into the solution. After agitation at 30 ℃ overnight, the solvent was evaporated and the activated residue was extracted in ether and saturated NaCl aqueous solution (volume ratio, 1:1), producing a white solid, which was next dissolved in 40 ml DMF. Then 0.74 g histamine dihydrochloride and 1 ml triethylamine were added, and the solution was also agitated at 30 ℃ overnight before poured into 400 ml water. Through filtration, a crude product appeared, which was recrystallized in ethanol to yield a pure white solid. Fig. S1 shows the ^{1}H-NMR spectrum of IMSA, and the chemical shift for imi-NH is at about 11.68, although it's not shown in the spectrum.

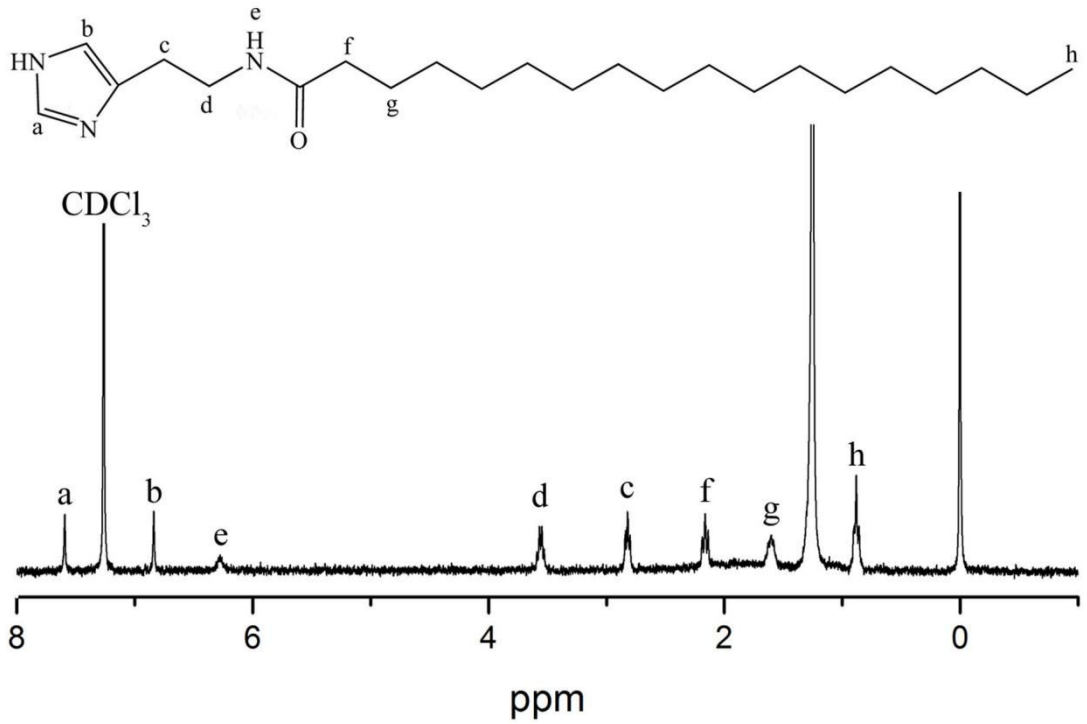

Fig. S1. ^{1}H-NMR spectrum of the co-gelator IMSA in $CDCl_3$.

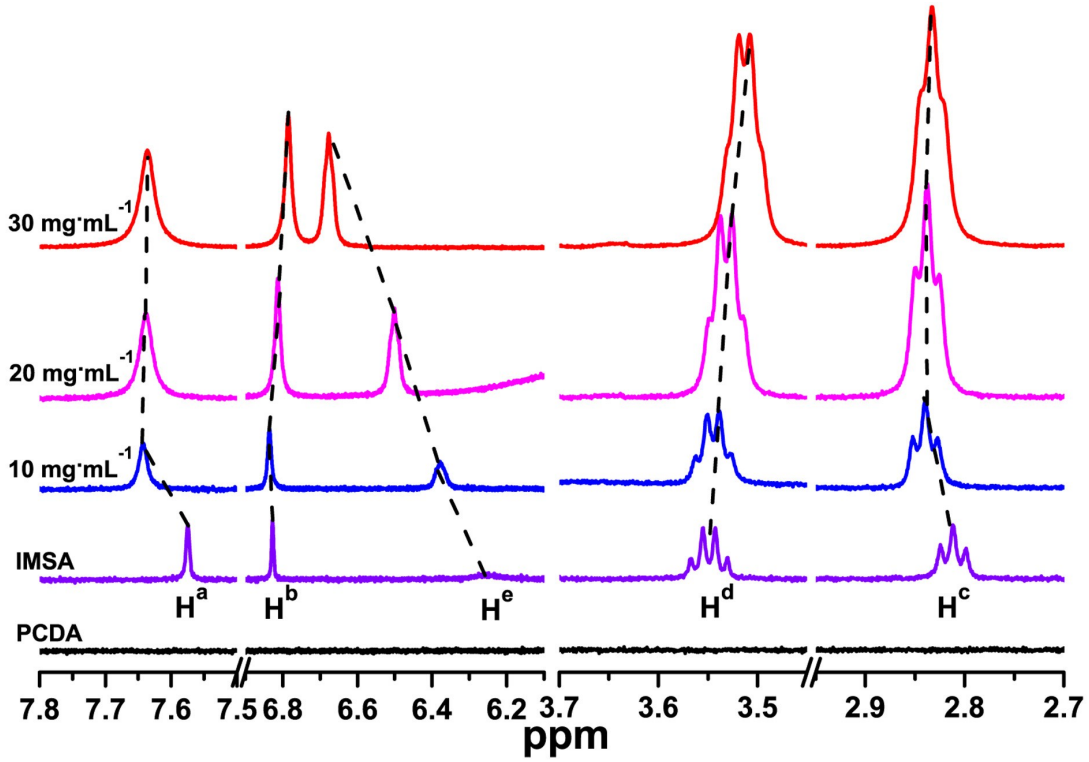

Fig. S2. Partial ^{1}H-NMR spectra of pure PCDA, pure IMSA and the equivalent PCDA/IMSA co-assembly in $CDCl_3$ at various concentrations: 10 mg·mL^{-1}, 20 mg·mL^{-1}, 30 mg·mL^{-1}, respectively.

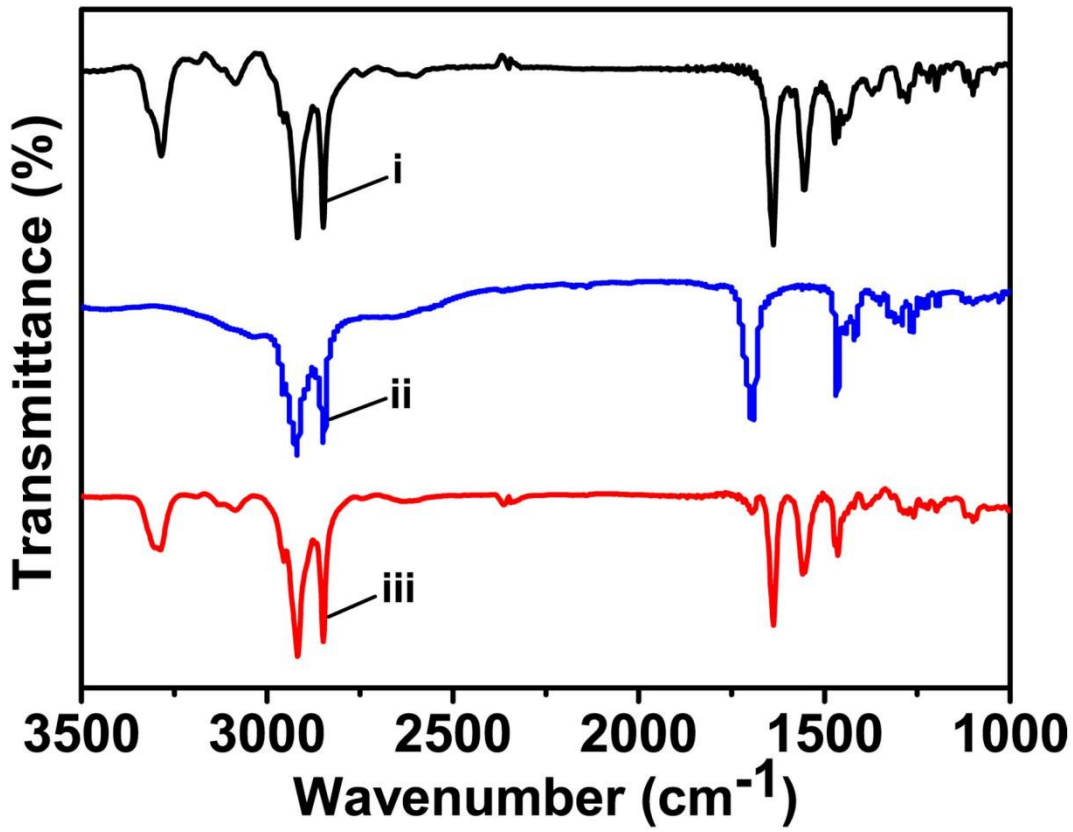

Fig. S3. FT-IR spectra of (i) IMSA, (ii) PCDA and (iii) their co-assembly organogel.

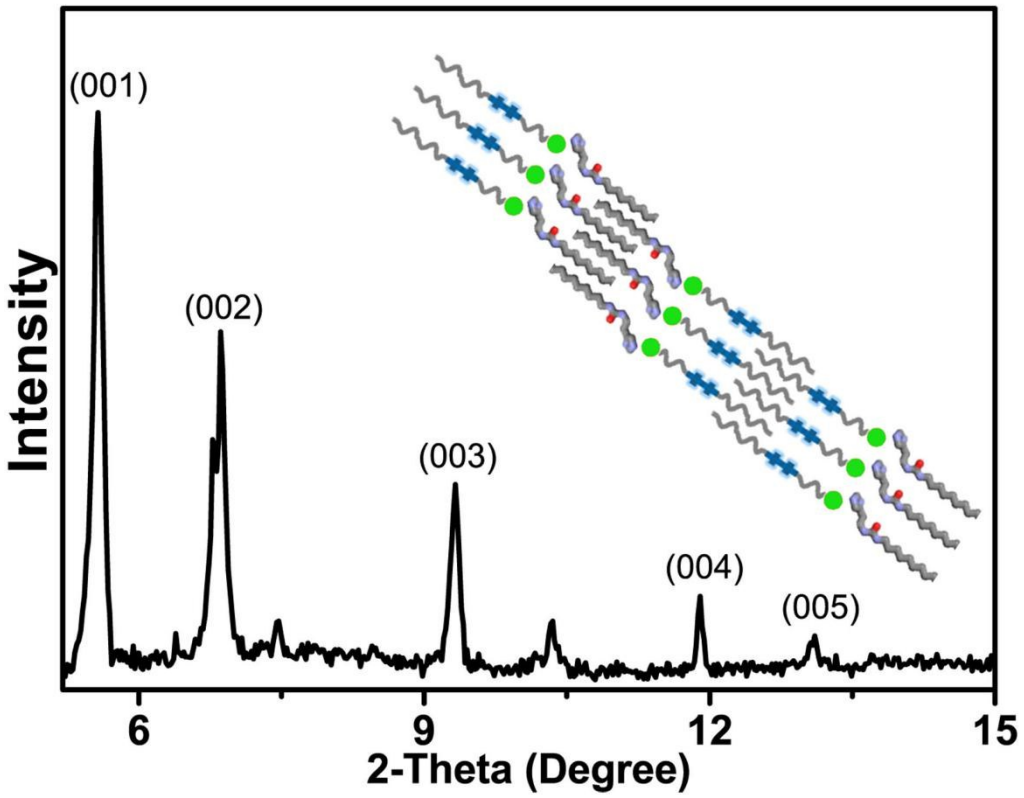

Fig. S4. Small angle X-ray diffraction profile of PCDA/IMSA supramolecular gel on silicon (100) wafer. The inset depicts the schematic representation of the periodic structure of the organogel composed of small building blocks.

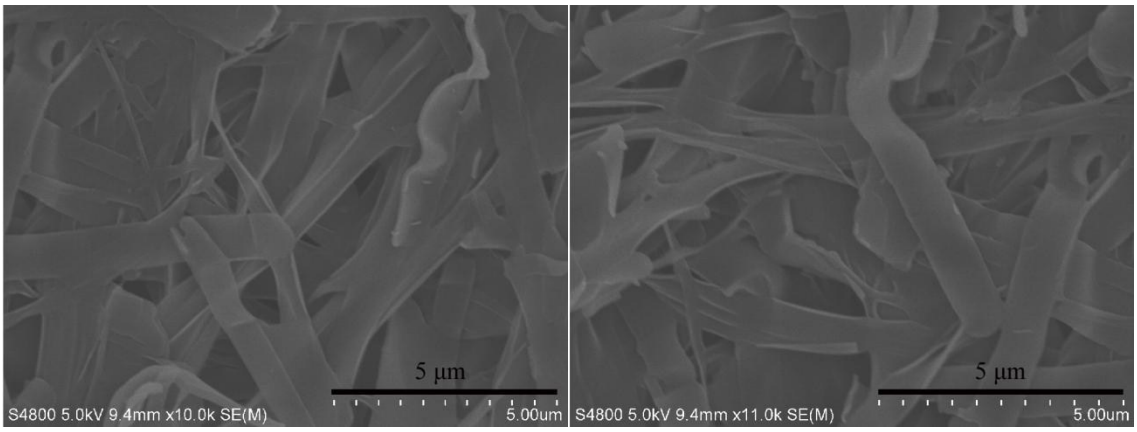

Fig. S5. SEM images of the supramolecular gels in different batches.

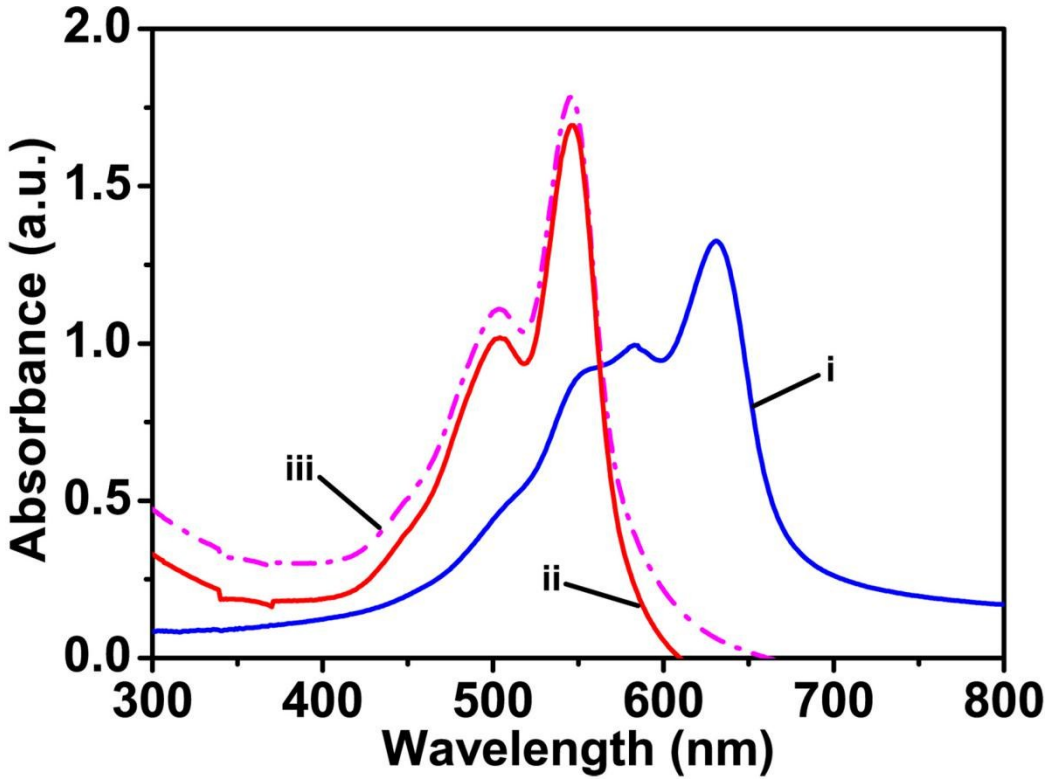

Fig. S6. UV-Vis spectra of the PDA supramolecular gel: (i) at 25 ℃, (ii) heated to 85 ℃, and (iii) cooled back to 25 ℃.

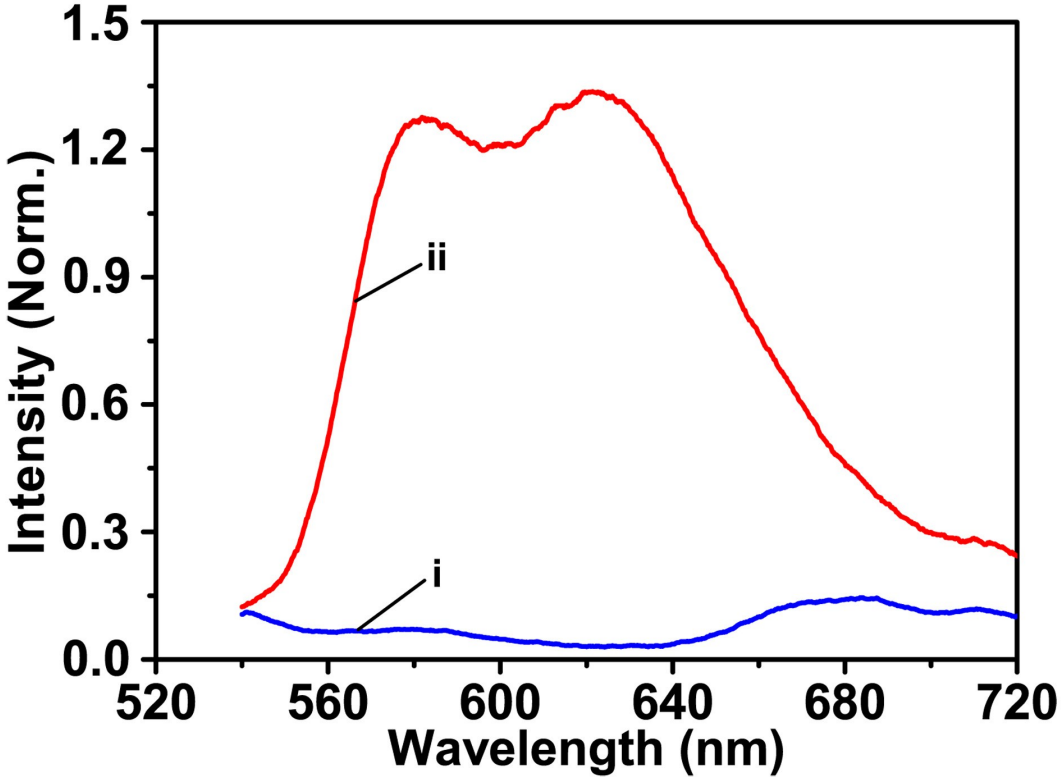

Fig. S7. Fluorescence spectra of the PDA supramolecular gel (i) before and (ii) after heated to the red phase, respectively.

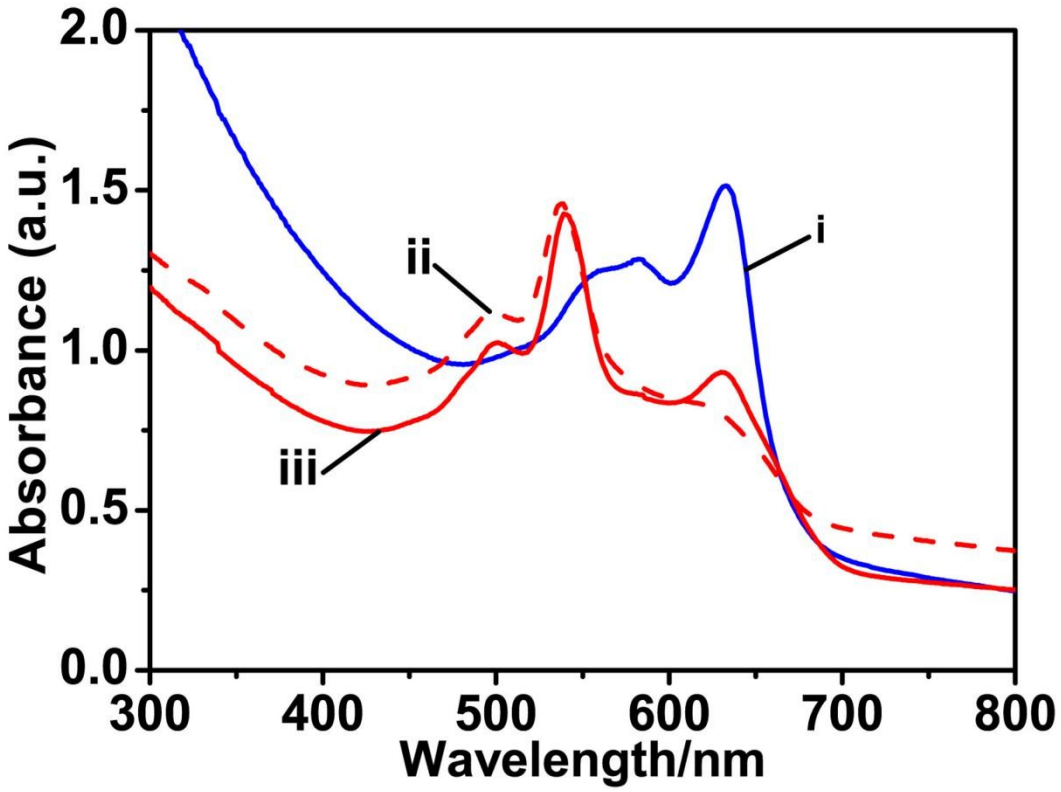

Fig. S8. UV-Vis spectra of the PDA supramolecular gels: (i) as prepared, after exposure to (ii) HCl gas or (iii) NH_3 gas atmosphere for 2 hours, respectively.

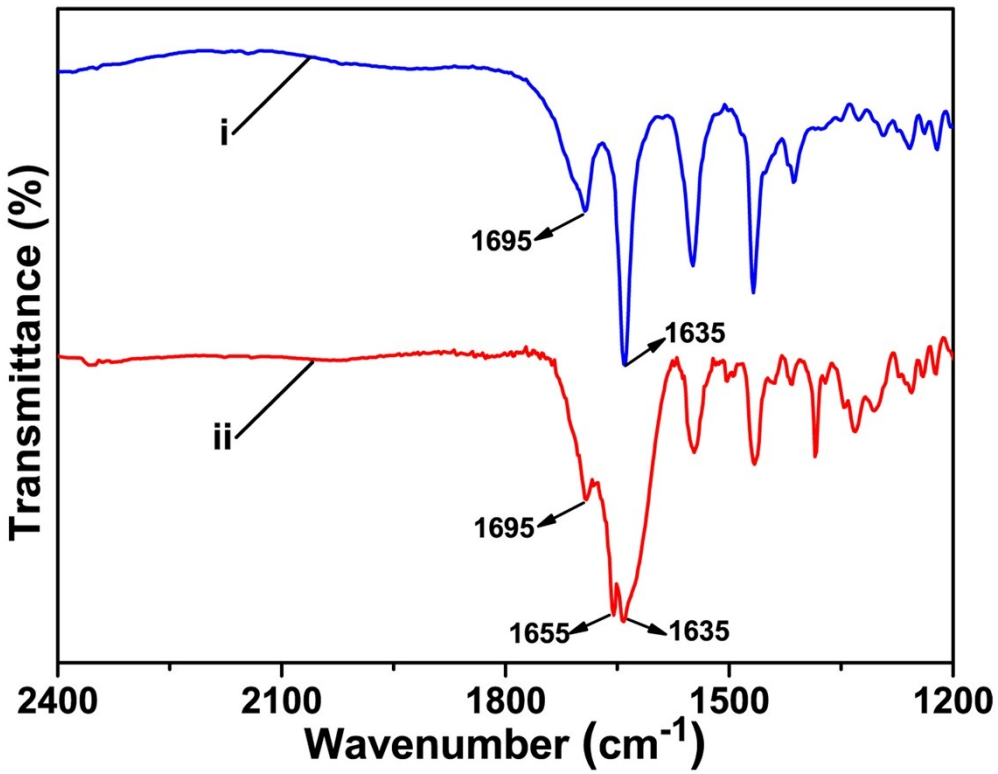

Fig. S9. The FT-IR spectra of the PDA-based supramolecular gel (i) before and (ii) after immersion in the Cr^{3+} aqueous solution, respectively.