

## Supporting Information

For

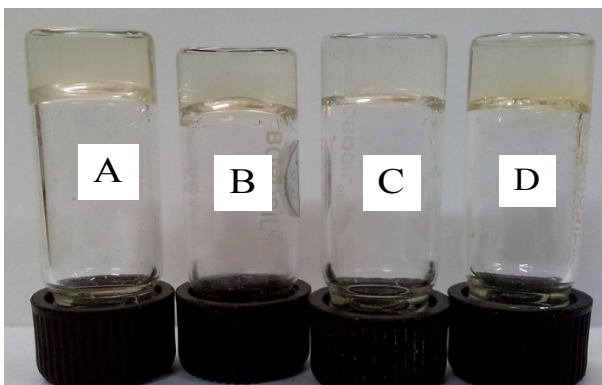
### Polyacryloyl Hydrazide Based Injectable & Stimuli Responsive Hydrogels with Tunable Properties

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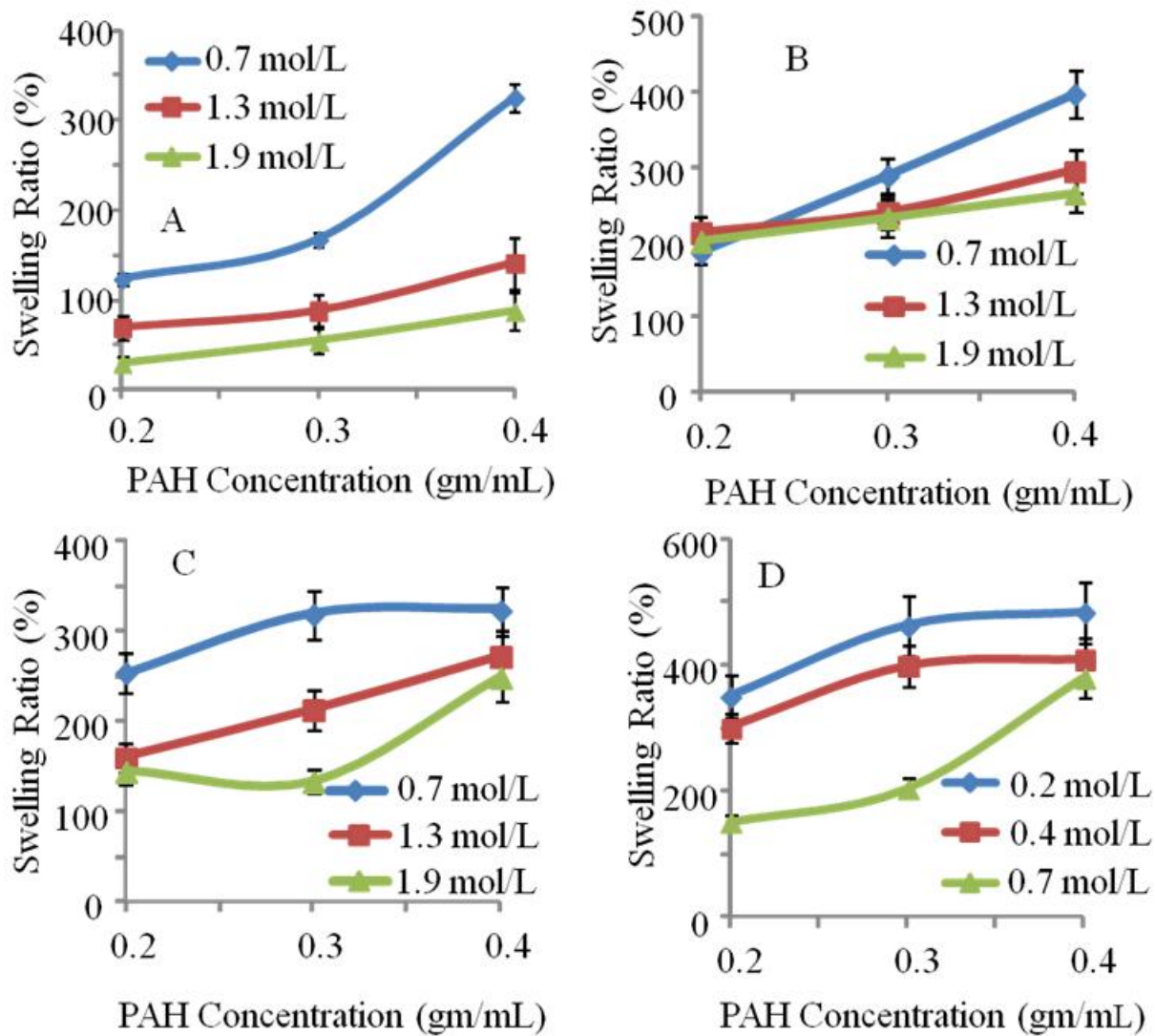
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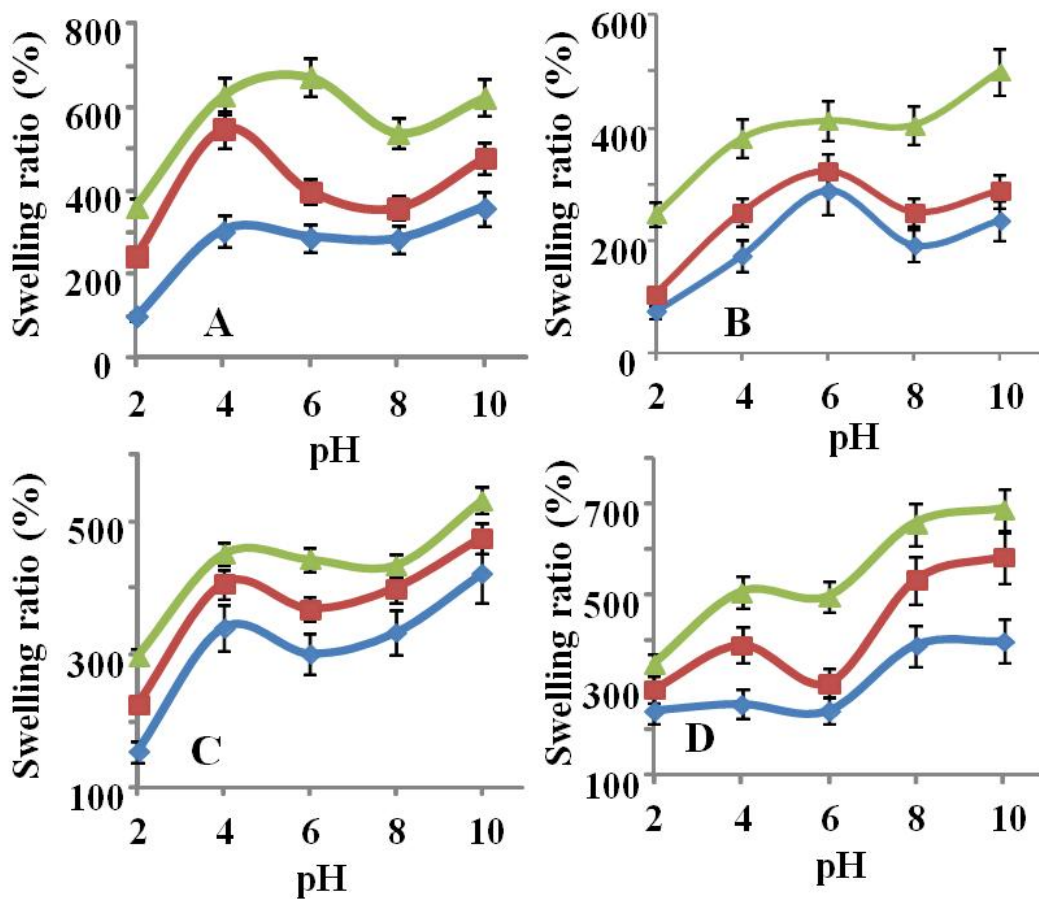
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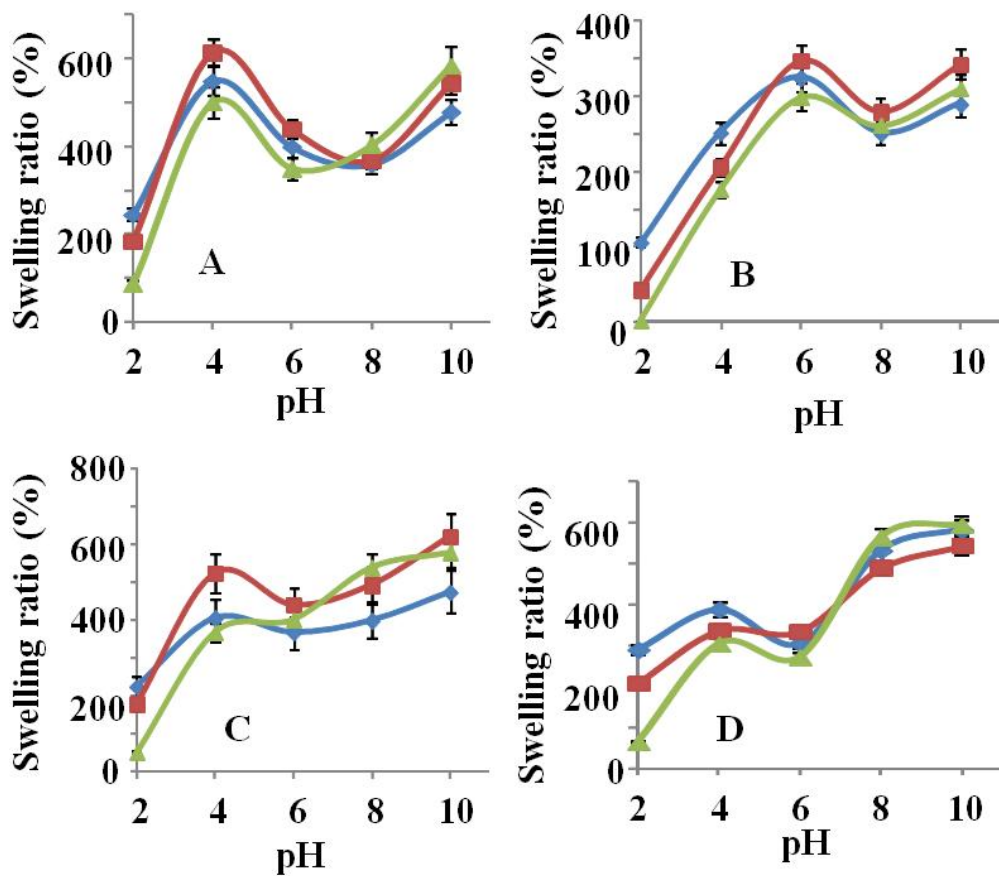
**Figure S1:** Photographs of (A) PAH-DTDA, (B) PAH-DEM, (C) PAH-AA and (D) PAH-PEGDA hydrogels.



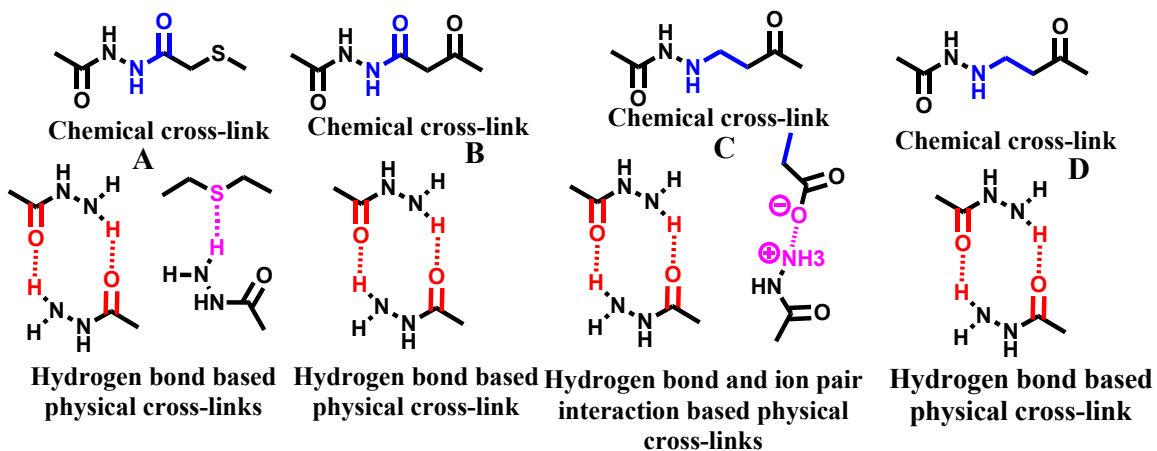
**Figure S2:** Swelling ratios at fixed temperature (~25 °C) and different (A) DTDA (B) DEM (C) AA or (D) PEGDA concentrations.



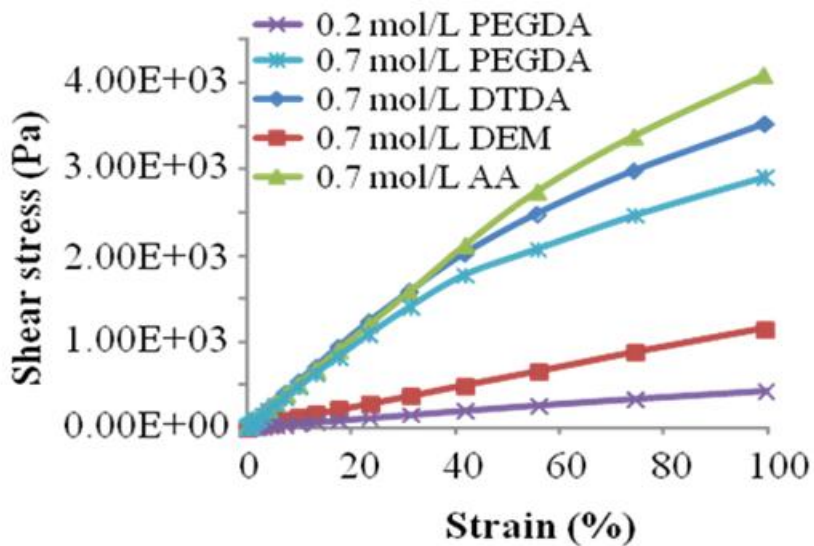
**Figure S3:** Swelling ratio of the hydrogels synthesized using 0.2 gm/mL of PAH (◆), 0.3 gm/mL of PAH (■) and 0.4 gm/mL of PAH (▲) and (A) 0.7 mol/L of DTDA (B) 0.7 mol/L of DEM (C) 0.7 mol/L of AA or (D) 0.7 mol/L of PEGDA measured at ~ 25 °C



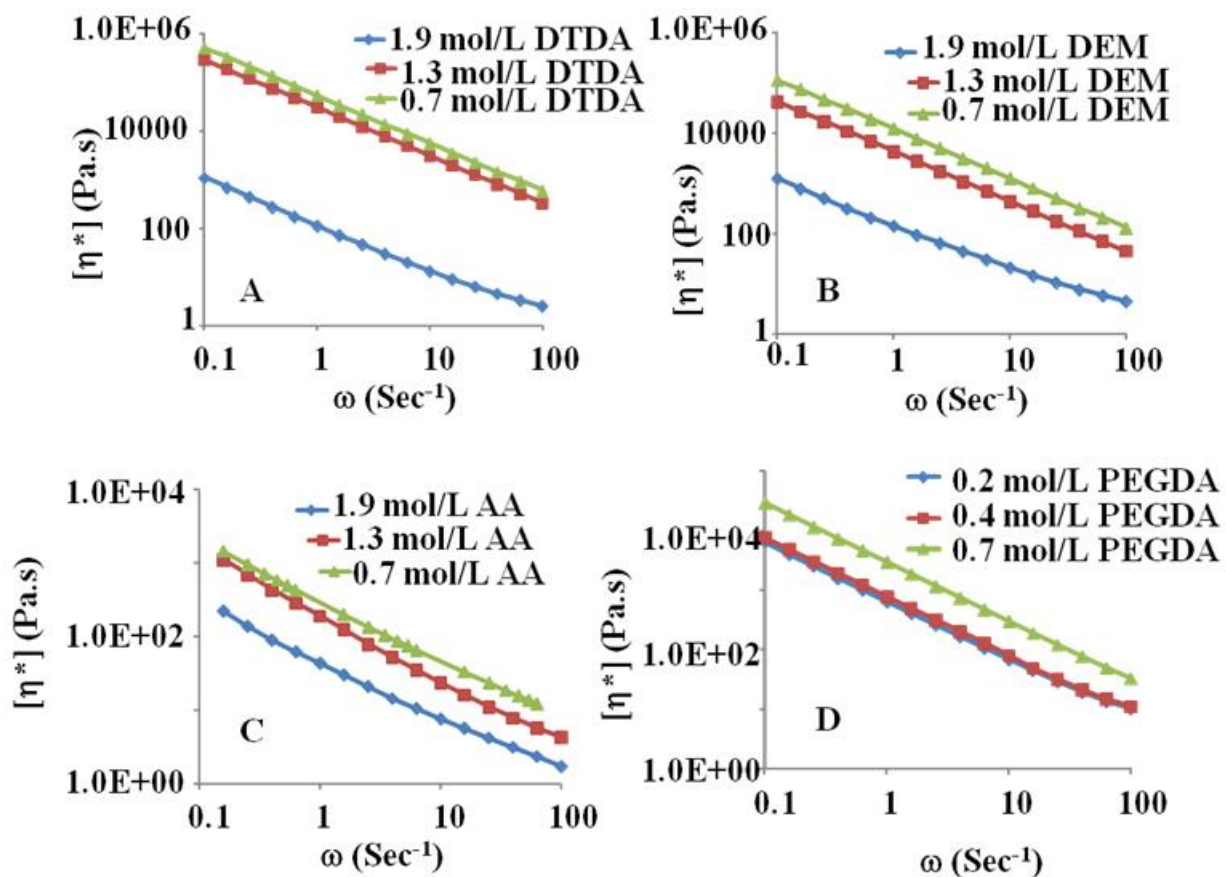
**Figure S4:** Swelling ratio of the hydrogels synthesized using 0.3 gm/mL of PAH and (A) 0.7 mol/L of DTDA, (B) 0.7 mol/L of DEM (C) 0.7 mol/L of AA or (D) 0.7 mol/L of PEGDA measured at ~ 25 (◆), 37 (■) and 65 (⊕) °C.



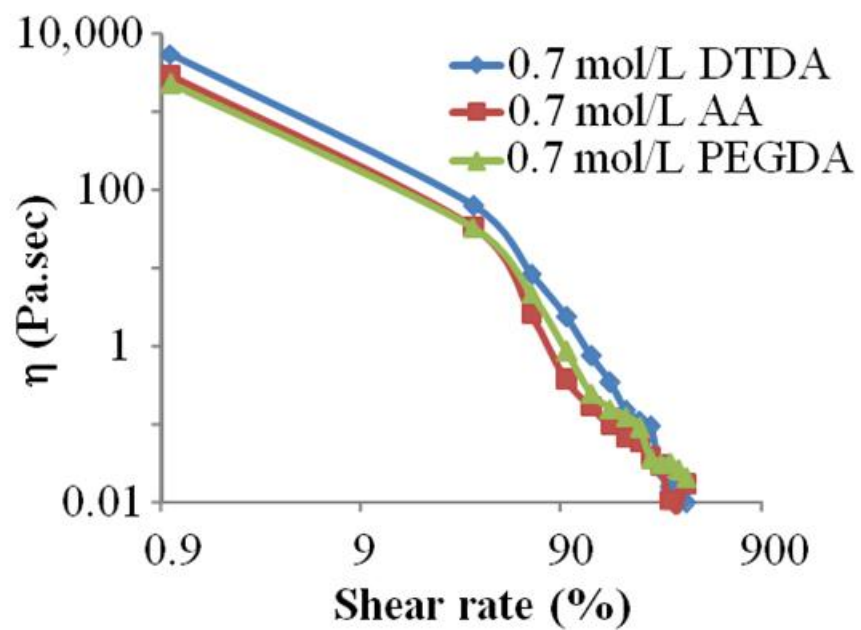
**Figure S5:** Schematics showing the type of physical and chemical crosslinking units present in the PAH and (A) DTDA, (B) DEM, (C) AA or (D) PEGDA based hydrogels.



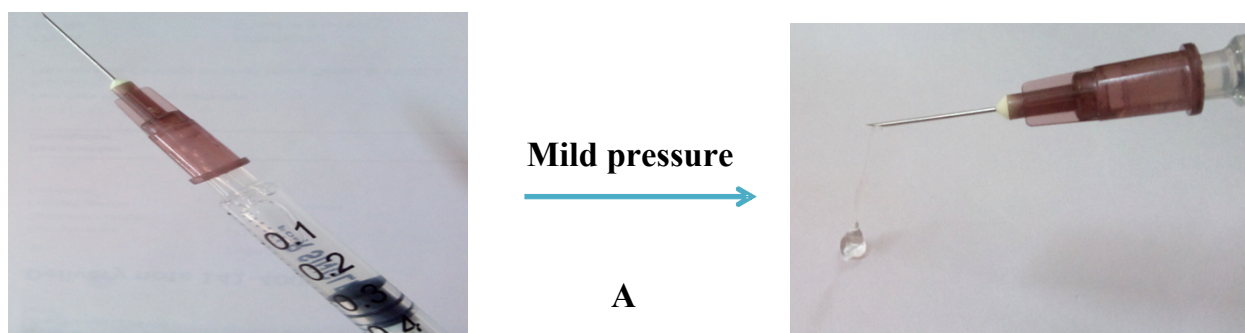
**Figure S6:** Shear stress versus strain plot of hydrogels recorded at 10 rad/sec angular frequency.

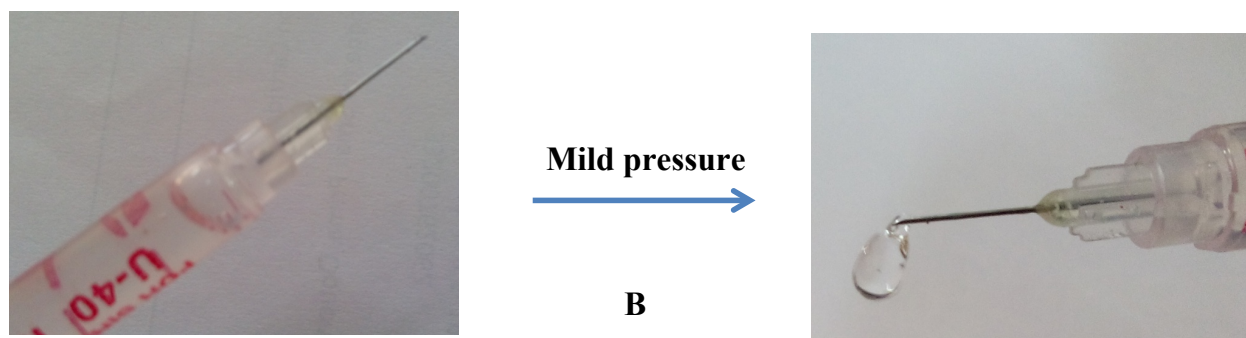


**Figure S7:** Frequency versus complex viscosity plot of PAH based hydrogels synthesized using 0.3 gm/mL PAH and (A) DTDA, (B) DEM, (C) AA or (D) PEGDA as cross-linker

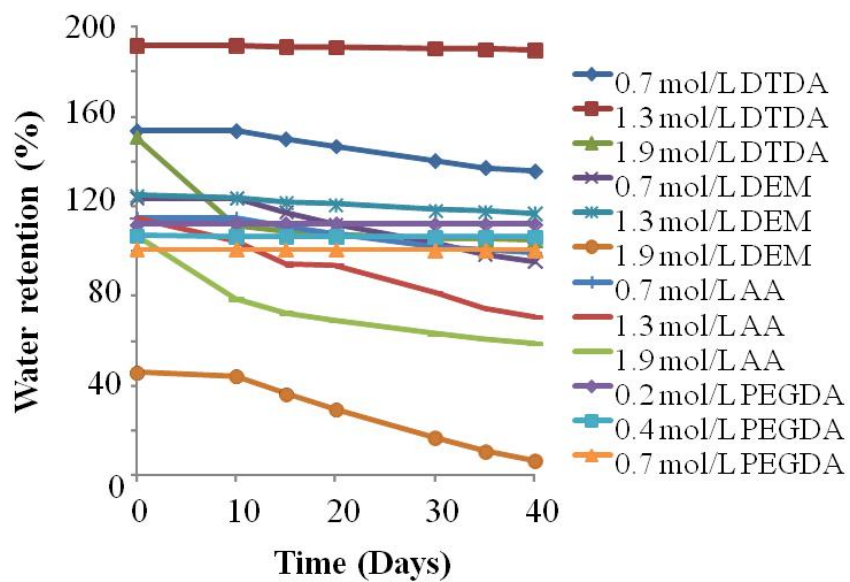


**Figure S8:** Viscosity versus shear rate plot of various hydrogels synthesized using 0.3 gm/mL PAH





**Figure S9:** Photographs depicting the injectability of the PAH (0.2 gm/mL)-AA (0.4 mol/L) hydrogel by (A) 26 and (B) 30 gauge size needle.

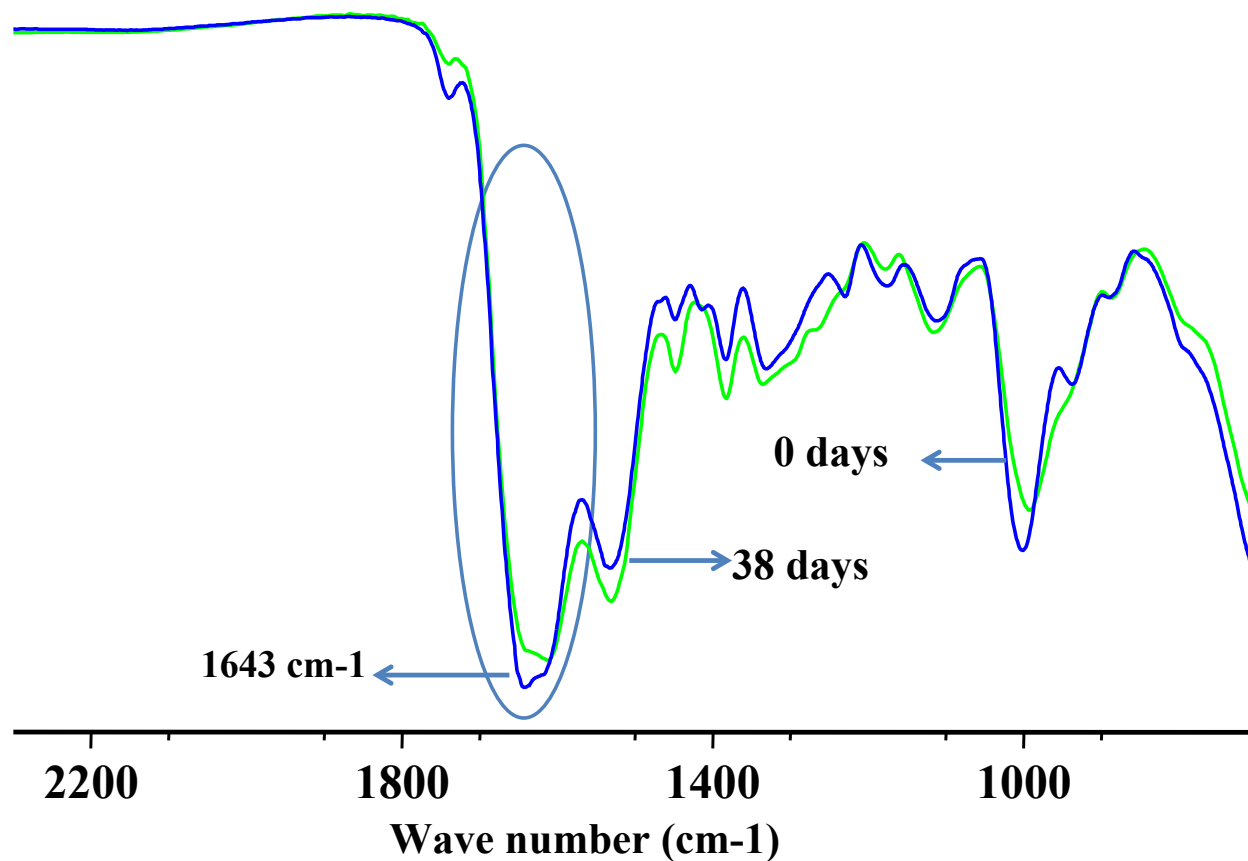


**Figure S10:** Water retention capacities of PAH based hydrogels prepared using various cross-linkers.

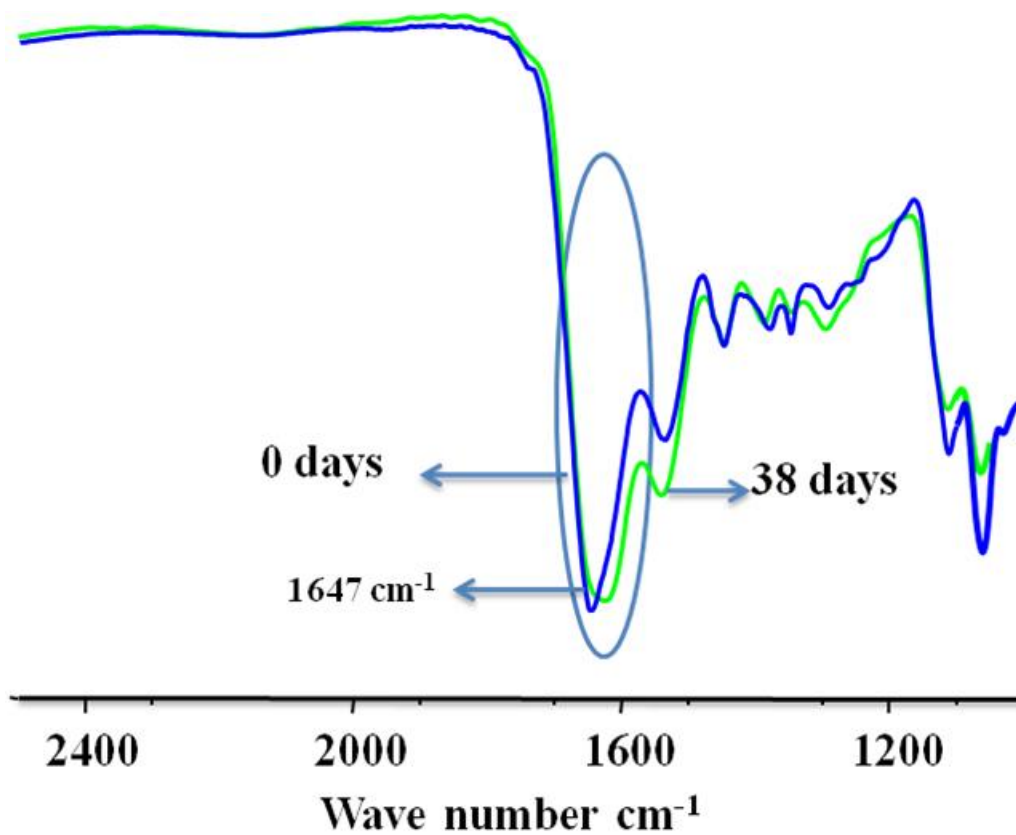


**Table S1:** In-situ percentage encapsulation of Rhodamine B in PAH based hydrogels synthesized using various cross-linkers.

Concentration of cross linker	PAH-DTDA (%)	PAH-DEM (%)	PAH-AA (%)	Concentration of cross linker	PAH-PEGDA (%)
1.9 mol/L	97.4	96.7	99.1	0.7 mol/L	96.6
1.3 mol/L	96.9	97.9	98.0	0.4 mol/L	96.7
0.7 mol/L	99.2	98.7	98.5	0.2 mol/L	98.6



**Figure S11:** ATR FT-IR spectra of the as synthesized (blue line) DTDA (0.7 mol/L) based hydrogel and the gel after 38 days (green line)



**Figure S12:** ATR FT-IR spectra of the as synthesized (blue line) PEGDA (0.7 mol/L) based hydrogel and the gel after 38 days (green line)