

## Supplementary Information

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### **One-pot synthesis and gelation by borax of glycopolymers in water**

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#### **Example of preparation of mixtures for rheology and phase diagram**

Mixture prepared with  $x = y = 0.4$ , B/G=0.3: an aqueous stock solutions of PAH (10 w/w%, 2.77g PAH in 25g H<sub>2</sub>O taking into account the 10% residual water in PAH) was prepared by stirring overnight. Borax stock solution (5 w/w%) was first heated for 15 min at 70 °C for dissolution and then allowed to cool down to room temperature for one hour. The final solution was obtained by mixing 2g of PAH stock solution, 0.86 g NaOH solution (1 mol L<sup>-1</sup>), 0.15 g of  $\delta$ -Glu in solid form. After stirring for 15 min, 0.49 g of borax solution was added. At this step, a precipitate formed which dissolved after stirring (~ 8 hours). After complete dissolution, the pH of the homogeneous solution was 4. It was set to the value of 8 upon addition of NaOH solution (1 mol L<sup>-1</sup>). The final mass of the mixture was adjusted to 4g by adding deionized water, leading to polymer concentration of 5 w/w%. The final mixture was equilibrated for 2 hours before running the first rheology measurement.

Series of  $^1\text{H-NMR}$  spectra as a function of  $y = \text{NaOD/AH}$ .  $x$  is set at 0.68. Solvent  $\text{D}_2\text{O}$





