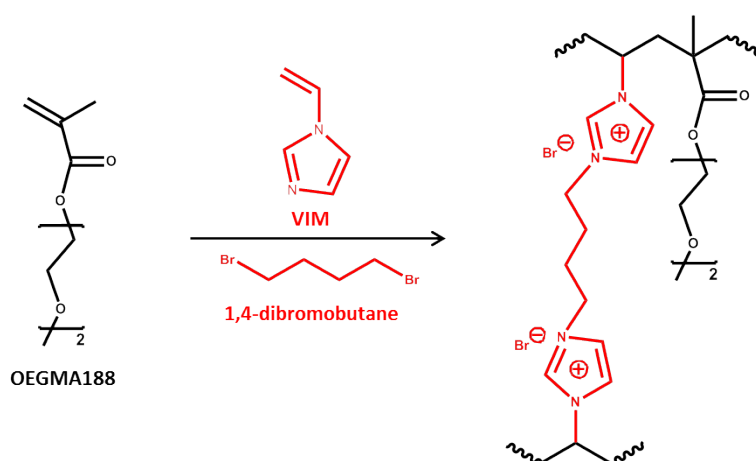


## Supporting Information for

# Volume phase transition mechanism of poly[oligo (ethylene glycol) methacrylate] based thermo-responsive microgels with poly(ionic liquid) cross-linkers

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Scheme S1. Chemical structure and synthesis of the POEGMA based microgels with hydrophilic PIL moieties on the cross-linking points.

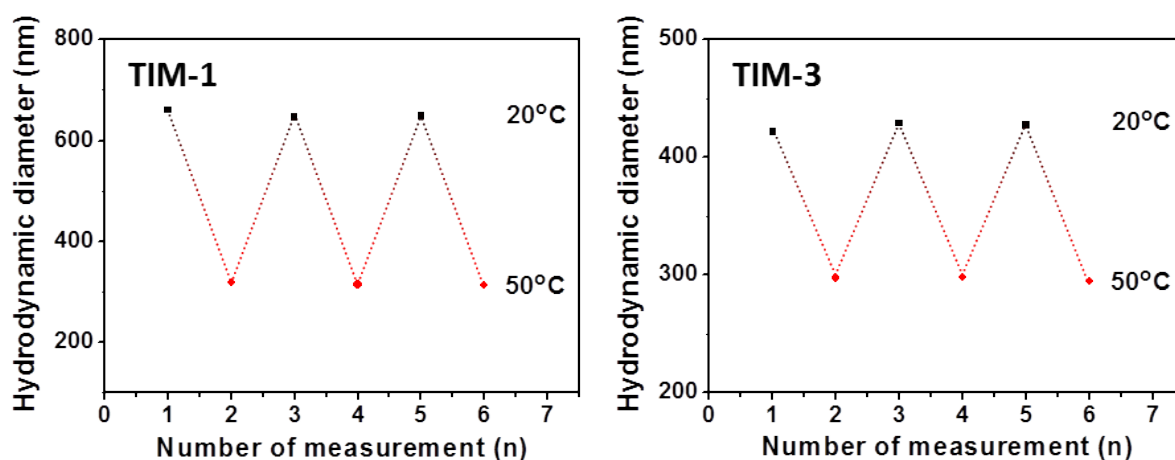


Fig. S1. Hydrodynamic diameters of TIM-1 and TIM-3 microgels during the heating and cooling cycle process between 20 and 50°C, respectively.

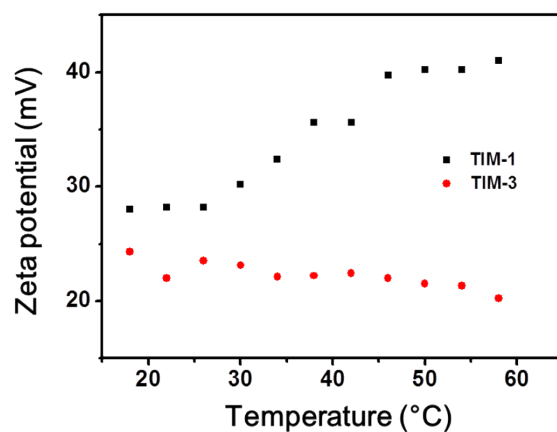


Fig. S2. Zeta potential of TIM-1 and TIM-3 microgel dispersions as a function of increasing temperature, measured by ELS measurement.

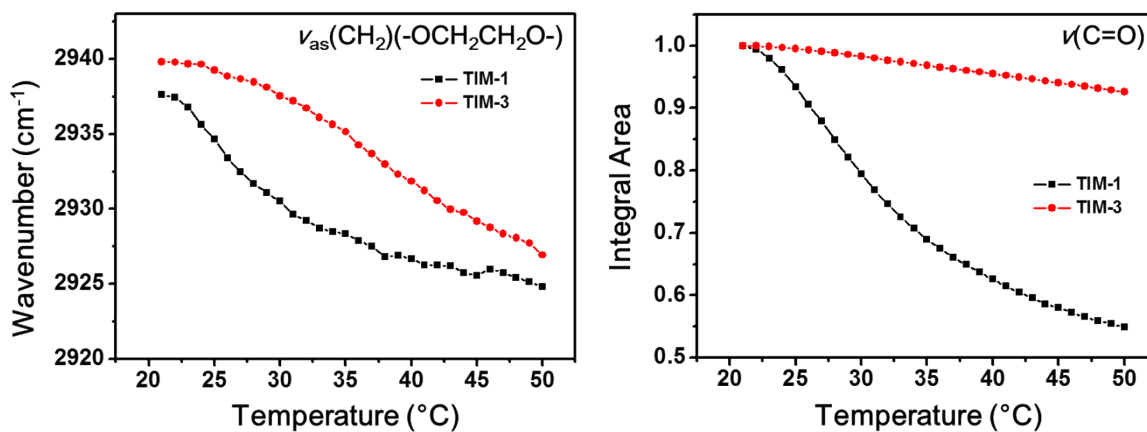


Fig. S3. Temperature-dependent frequency shifts of  $\nu_{as}(\text{CH}_2)(-\text{OCH}_2\text{CH}_2\text{O}-)$  and integral areas of  $\nu(\text{C}=\text{O})$  in TIM-1 and TIM-3 systems upon heating.

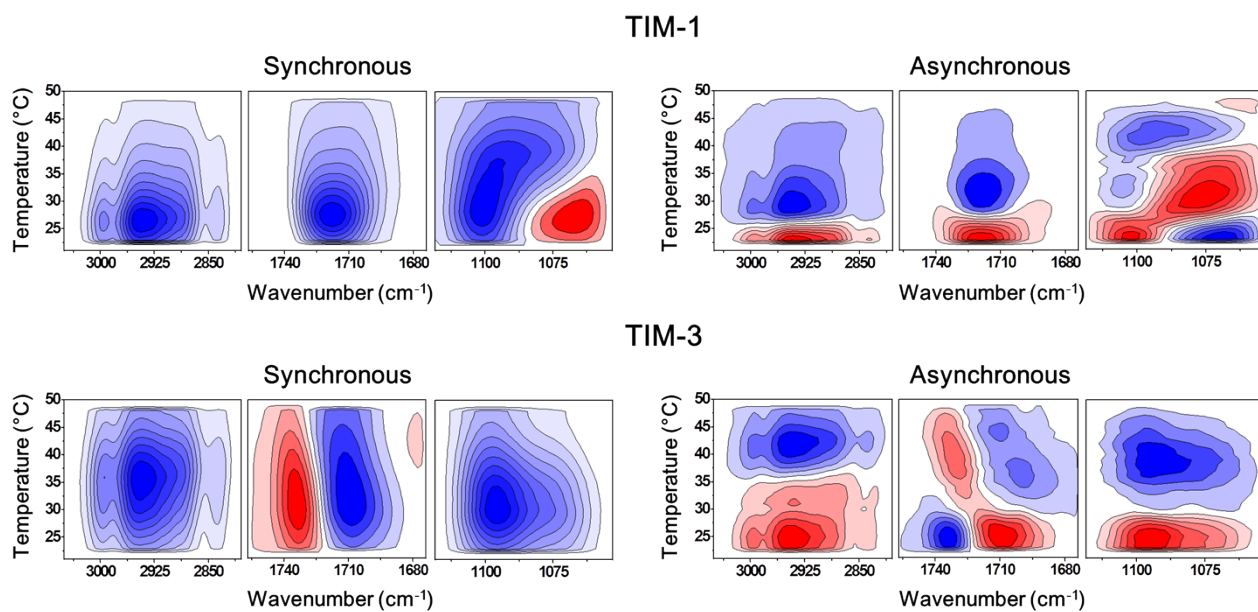


Fig. S4. PCMW synchronous and asynchronous spectra of TIM-1 and TIM-3 microgels during heating. Warm colors (red) denote positive intensities, while cool colors (blue) denote negative intensities.