

Supplementary Information for

Fast-forming hydrogel with ultralow polymeric content as an artificial vitreous body

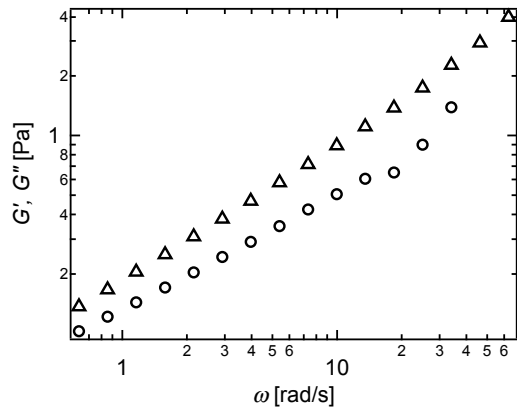
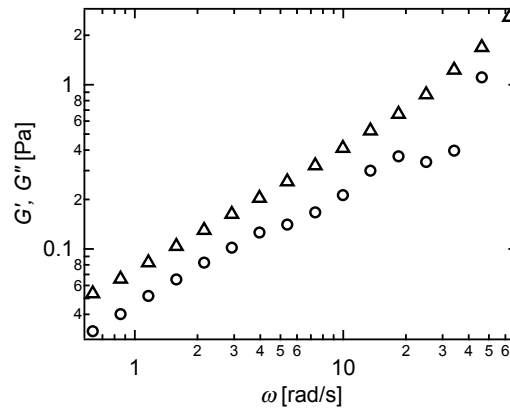
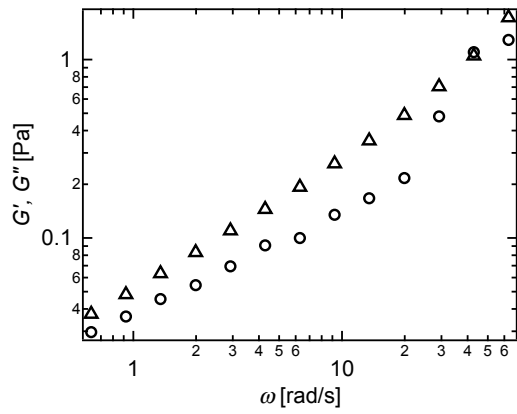
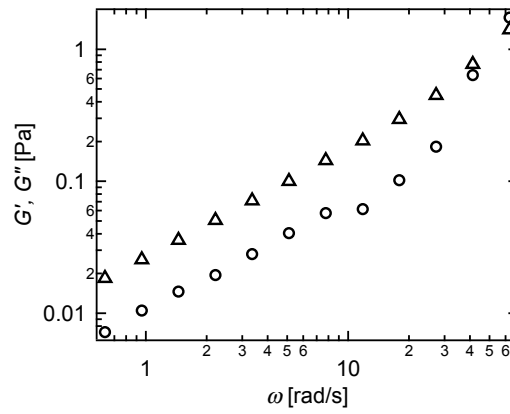
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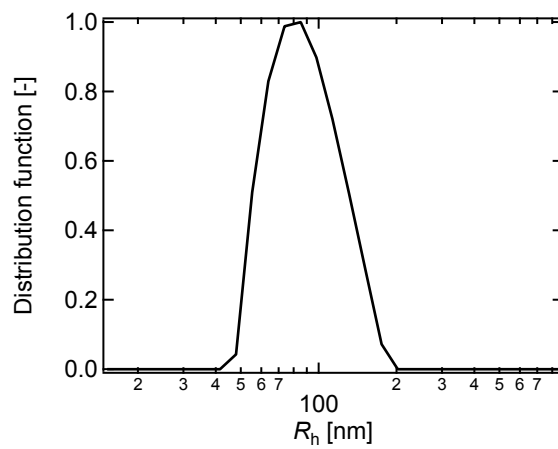
Supplementary Figures S1 to S4

Supplementary Movies S1 and S2

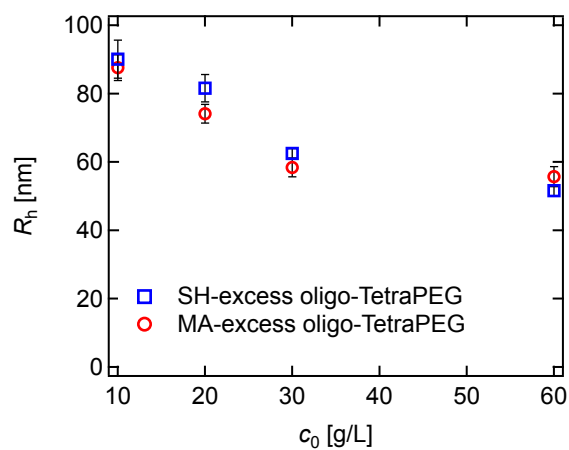
(a)**(b)****(c)****(d)**

Supplementary Figure1. The values of G' (circles) and G'' (triangles) as a function of ω at the gelation points for (a) $c = c^*$, (b) $c = c^*/2$, (c) $c = c^*/3$, and (d) $c = c^*/4$.

(a)

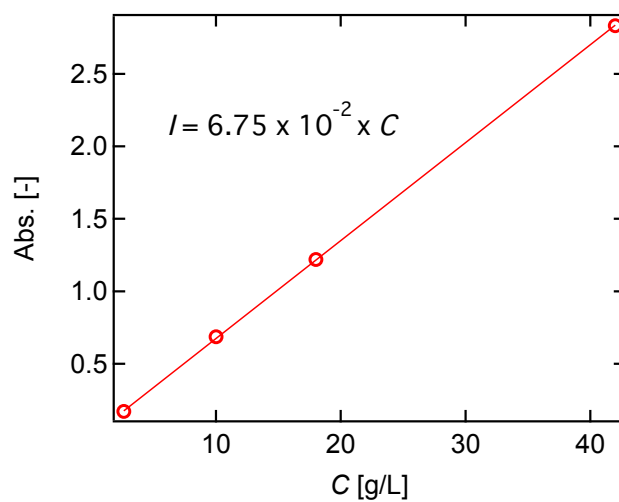


(b)

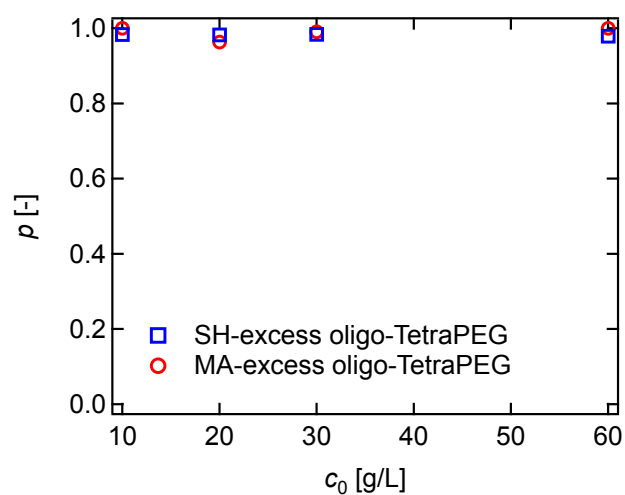


Supplementary Figure 2. (a) The distribution in hydrodynamic radius (R_h) of Oligo-TetraPEGs ($c_0 = 10$ g/L, $r = 0.37$). (b) Hydrodynamic radius of SH-excess (square) and MA-excess (circle) Oligo-TetraPEGs estimated using dynamic light scattering as a function of c_0 .

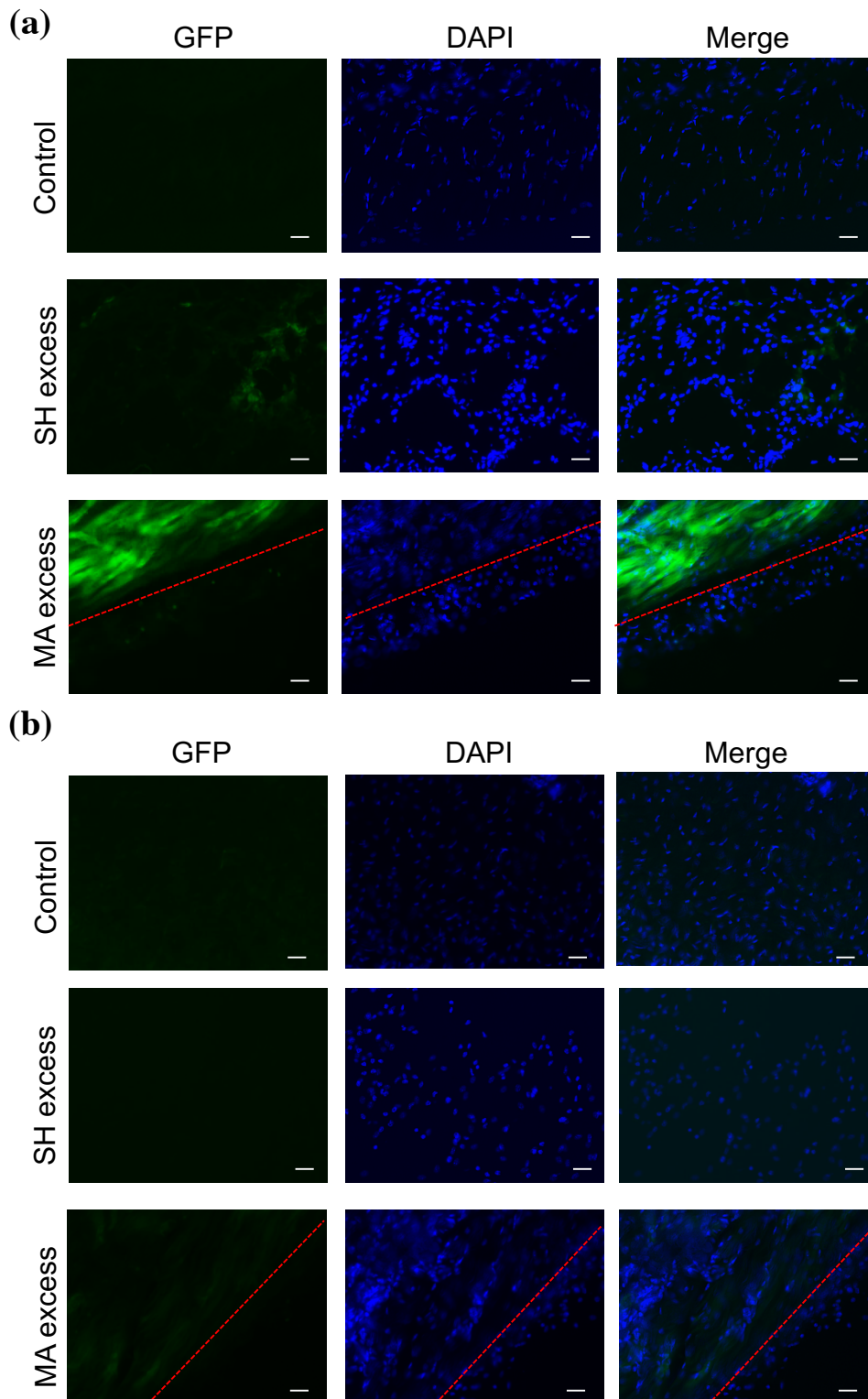
(a)



(b)



Supplementary Figure 3. (a) Effect of concentration on absorption intensity of tetraPEG-MA ($\lambda = 310$ nm). (b) Reaction rate of the minor species to excess species in Oligo-TetraPEGs estimated as a function of c_0 for SH-excess (squares) and MA-excess (circles) Oligo-TetraPEGs.



Supplementary Figure 4. Immunostaining for CD62L (L-selectin) in mice subcutaneously injected with MA-excess and SH-excess Oligo-TetraPEGs or PBS (control). Slight expression of CD62L (GFP signal), an adhesion molecule typically expressed in B lymphocytes, T lymphocytes, monocytes and granulocytes, was detected in critical clusters at day 3 after

injection (a); SH-excess Oligo-TetraPEG showed higher expression than MA-excess Oligo-TetraPEG. At 2 weeks after injection, the expression became very low or undetectable (b). Immunostaining was performed on frozen sections. Nuclei were stained with DAPI. Non-specific GFP signal in muscles is denoted with red dotted lines. Scale bars, 100 μm .

Supplementary Movie 1. The Oligo-TetraPEG hydrogels in a glass vial. Although the gel is very soft, the gel is not observed to flow.

Supplementary Movie 2. All procedures were carried out in left eyes with sterile techniques under a surgical microscope (Carl Zeiss Meditec, Inc., Oberkochen, Germany). The animals were anesthetized with intramuscular injection of ketamine hydrochloride (35 mg/kg) and xylazine (5 mg/kg). Topical anesthesia (0.4% oxybuprocaine hydrochloride drops) was applied to the eyes. Pupils were dilated with topical 0.5% phenylephrine hydrochloride, 0.5% tropicamide, and 1% atropine. A standard three-port, 25-gauge trocar-cannula vitrectomy system was used (Alcon Laboratories, Fort Worth, TX). An infusion cannula that delivered a balanced salt solution (BSS; Alcon Japan) was then inserted into the trocar cannula in the 2 o'clock position 1mm posterior to the limbus. The remaining two ports required for the insertion of a vitreous cutter and a light pipe in the 11 and 1 o'clock position, respectively, were created using the same method. The vitreous was detached from the retina by aspirating the cortical vitreous visualized with triamcinolone acetonide (Kenacort-A; Bristol-MyersSquibb, Tokyo, Japan). After removal of the vitreous with a vitrectomy cutter, air-fluid exchange was performed in the vitreous cavity. Following air-fluid exchange, the Oligo-TetraPEG hydrogel was injected into the vitreous cavity. All scleral ports were closed with 8-0 Vicryl[®] after the injection of endotamponade.