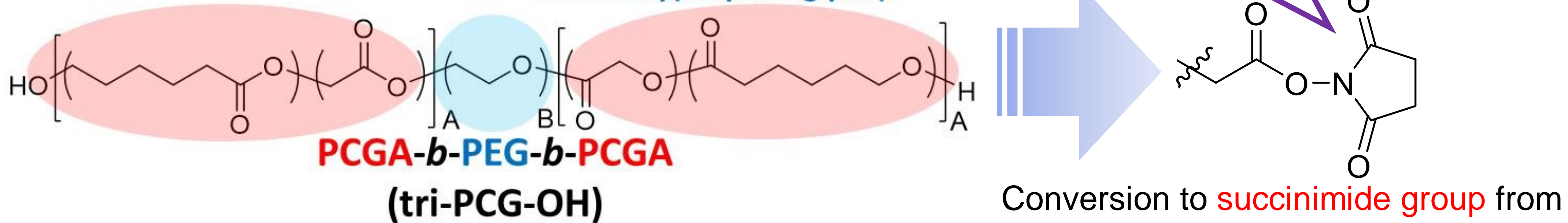


<Introduction>

< Temperature responsive injectable polymer (IP) >

- Polymers that form hydrogels in response to body temperature (37°C)

PCGA : Poly(caprolactone-co-glycolic acid)
PEG : Poly(ethylene glycol)



Application: Antiadhesive material, Hemostatic agent, Cell delivery, Drug delivery system, Cellular scaffold material

- Y. Ohya, *Polym. J.*, 2019, 51, 997-1005.
- Y. Yoshida, Y. Ohya et al., *ACS Biomater. Sci. Eng.*, 2017, 3, 56-67.

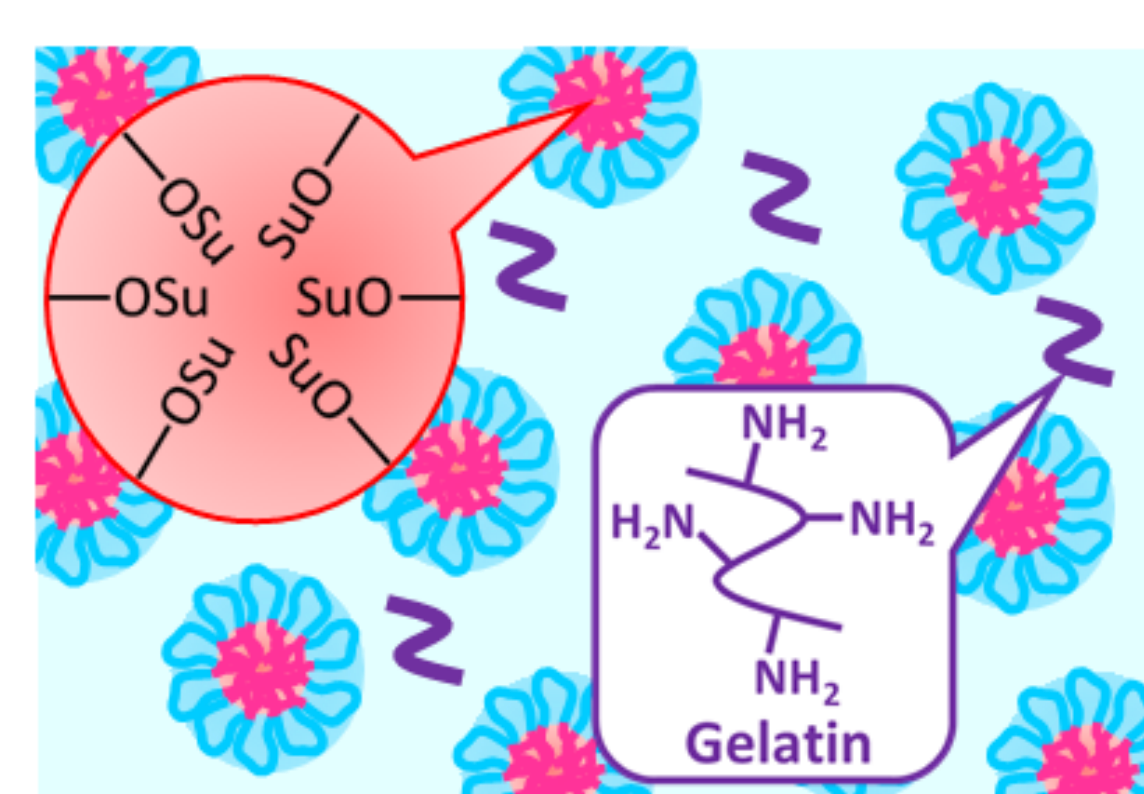
< Purpose of this study >

- Extension of the duration of gel state
- Improvement of the cytocompatibility of IP systems

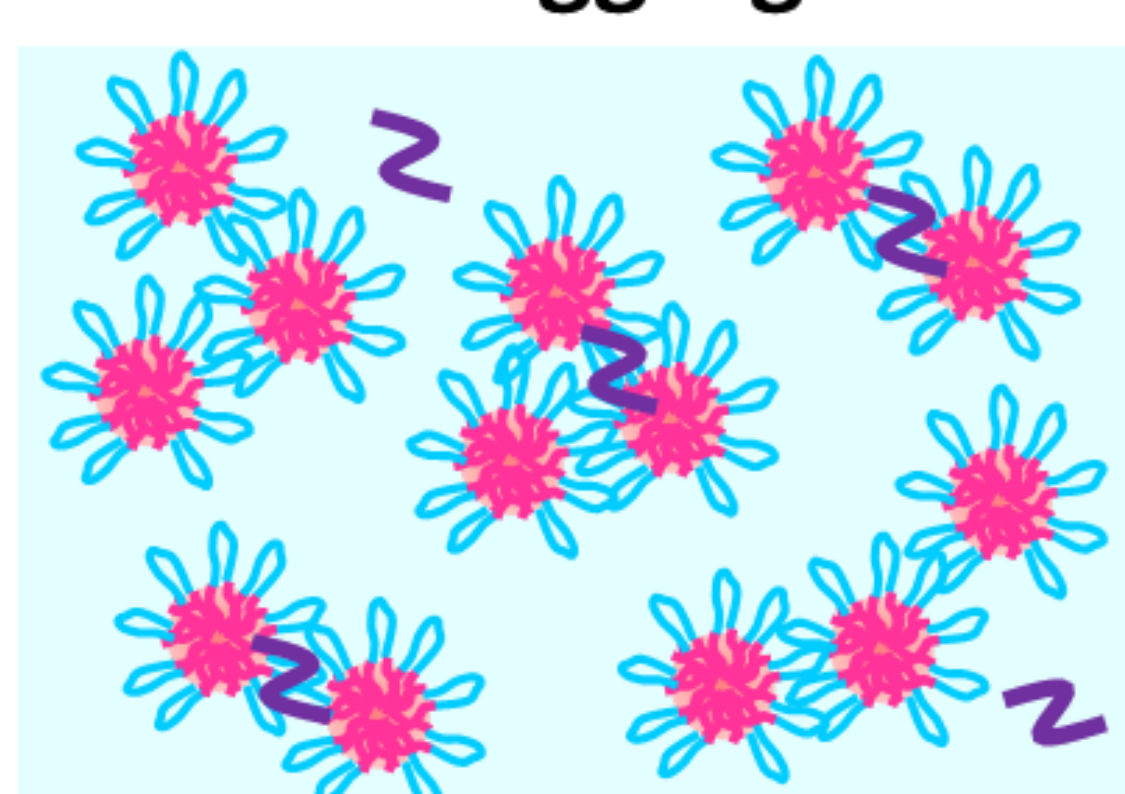
Room temperature (25°C)

Body temperature (37°C)

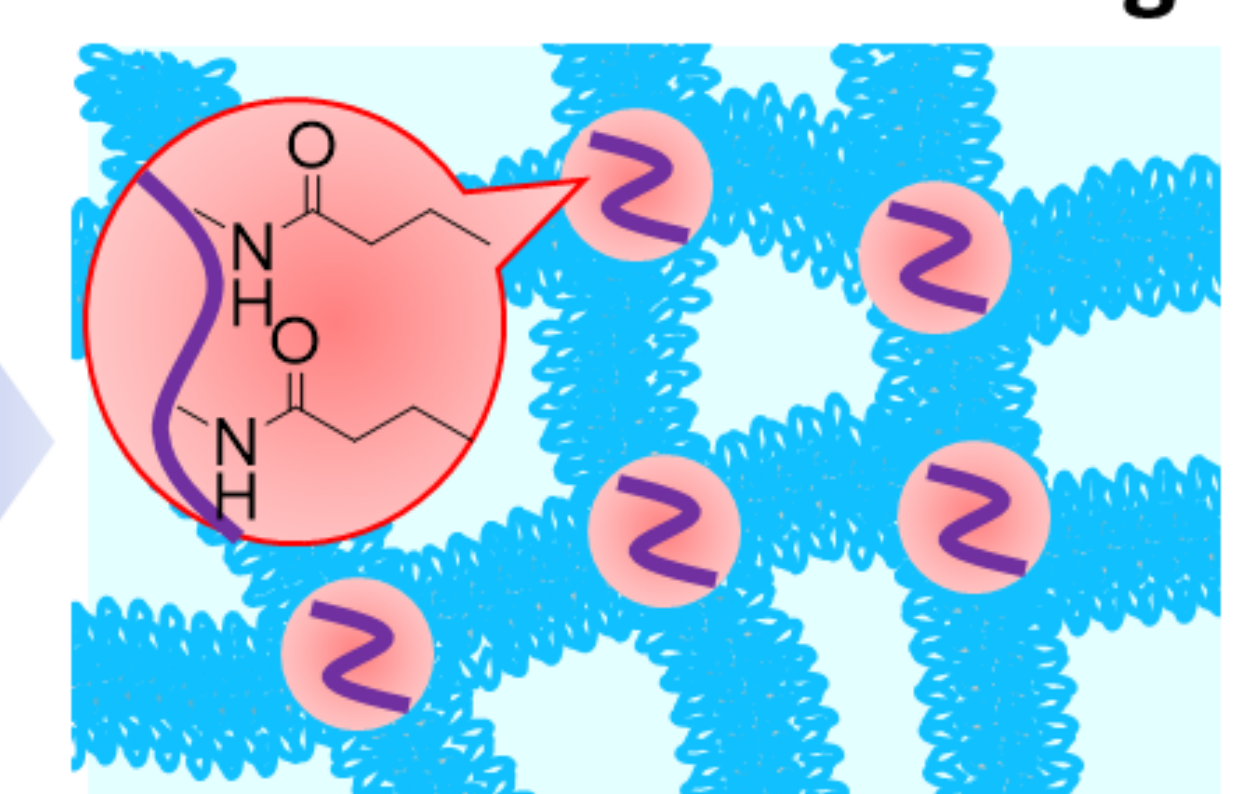
< Micelle formation >



< Micelle aggregation >



< Gelation · Crosslinking >



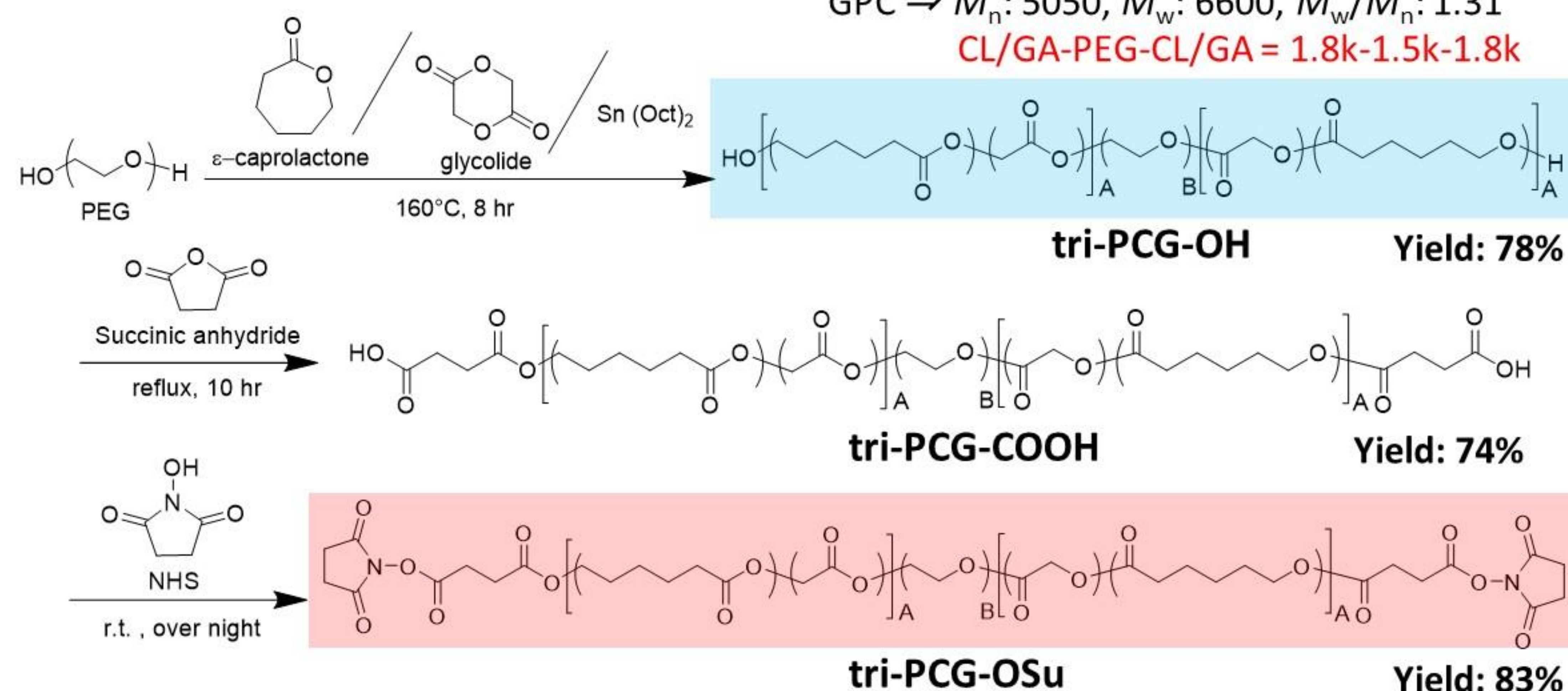
Low cytocompatibility of IP crosslinked by polylysine

Preparation of temperature-responsive IP formulation using gelatin with high cytocompatibility as a crosslinker

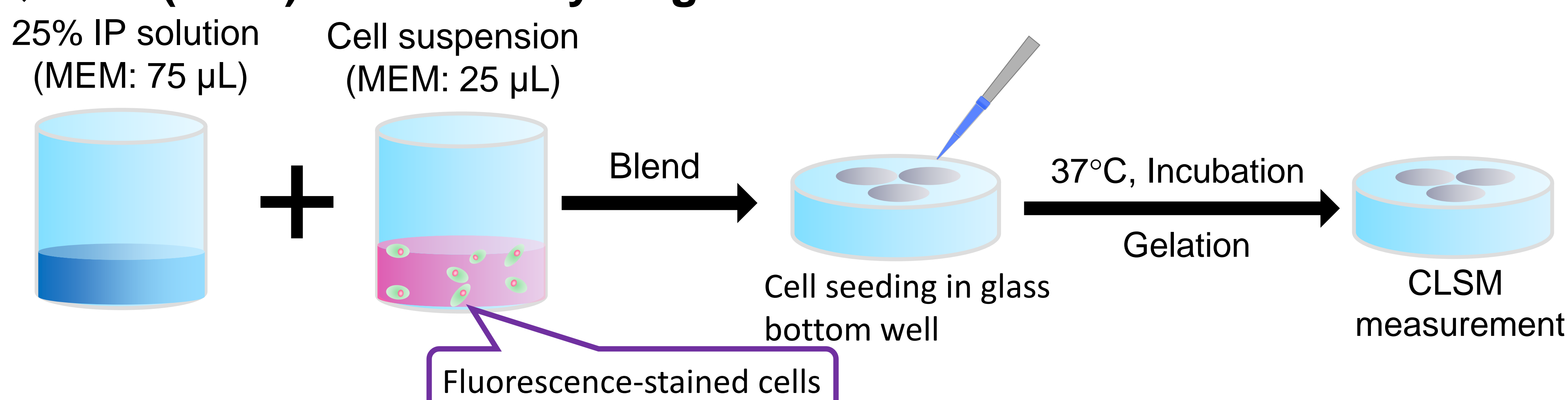
<Experiment>

◇ Synthesis of tri-PCG-OH and tri-PCG-OSu

NMR ⇒ CL/GA = 3.1/1.0
GPC ⇒ M_n : 5050, M_w : 6600, M_w/M_n : 1.31
CL/GA-PEG-CL/GA = 1.8k-1.5k-1.8k



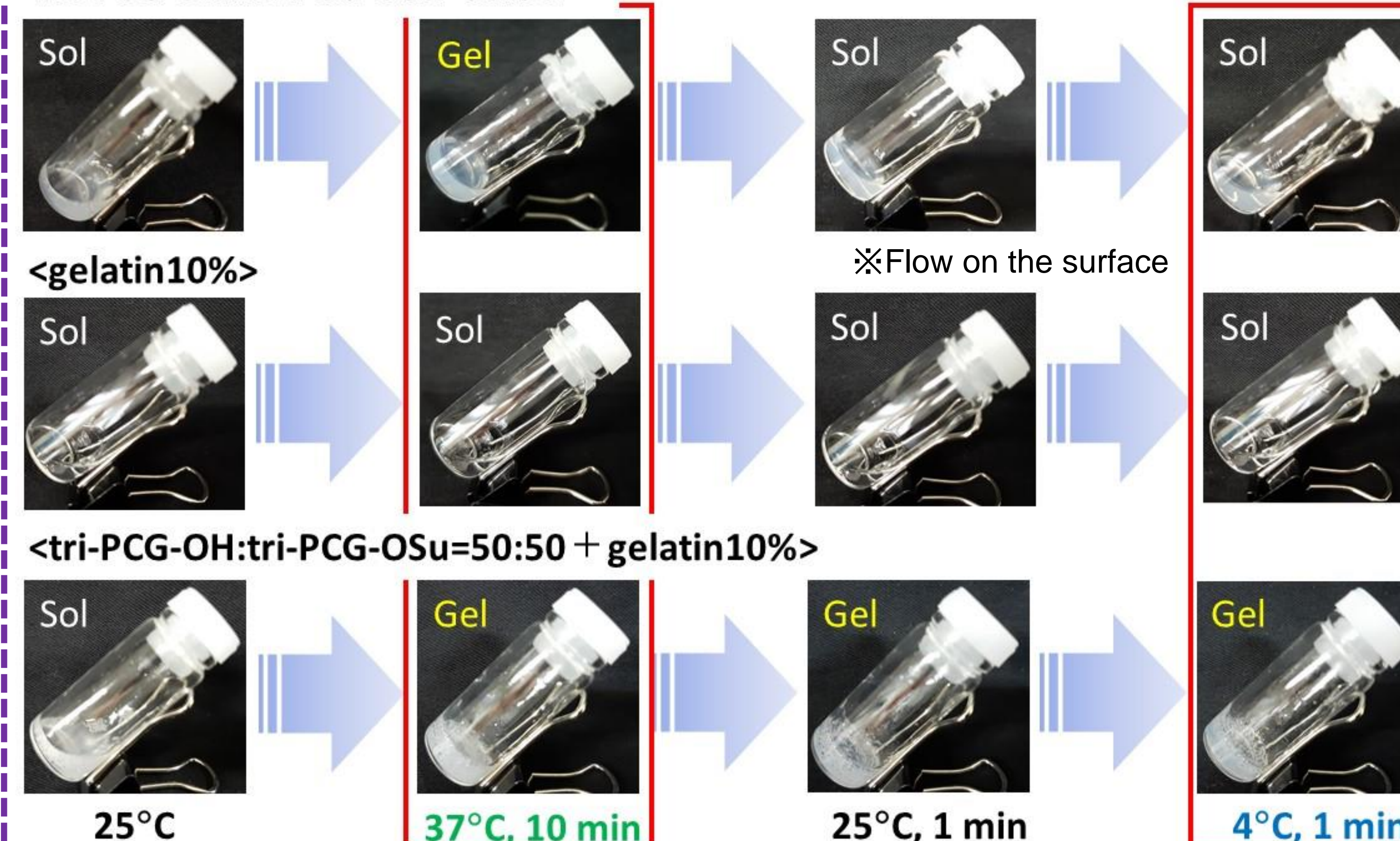
◇ Cell (L929) culture in hydrogel and CLSM measurement



<Results and discussion>

◇ Evaluation of sol-gel transition by test tube inverting method

<tri-PCG-OH:tri-PCG-OSu=50:50>

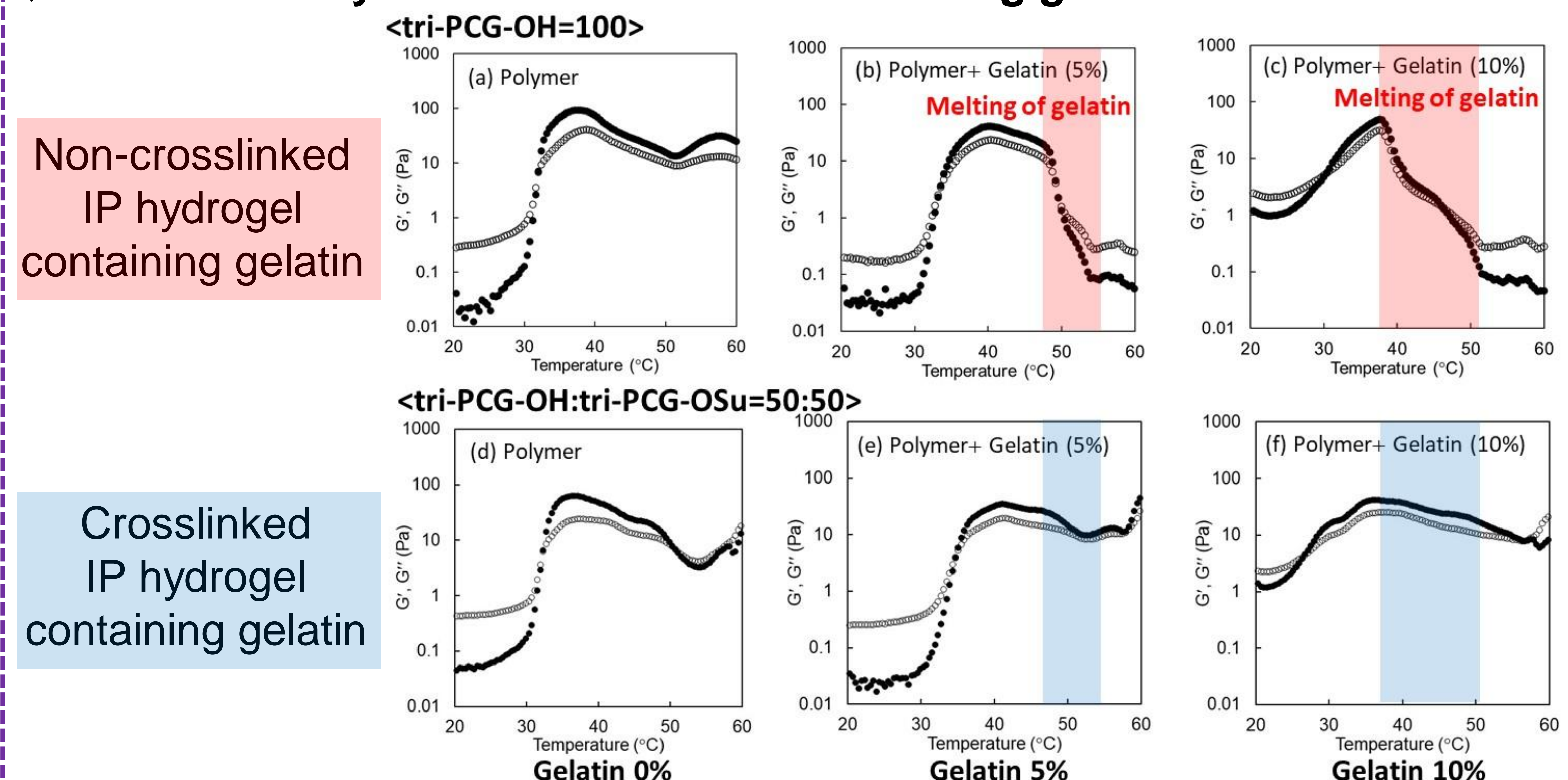


< Experimental conditions >

Solvent: PBS
IP solution volume: 300 μL
Polymer concentration: 25%

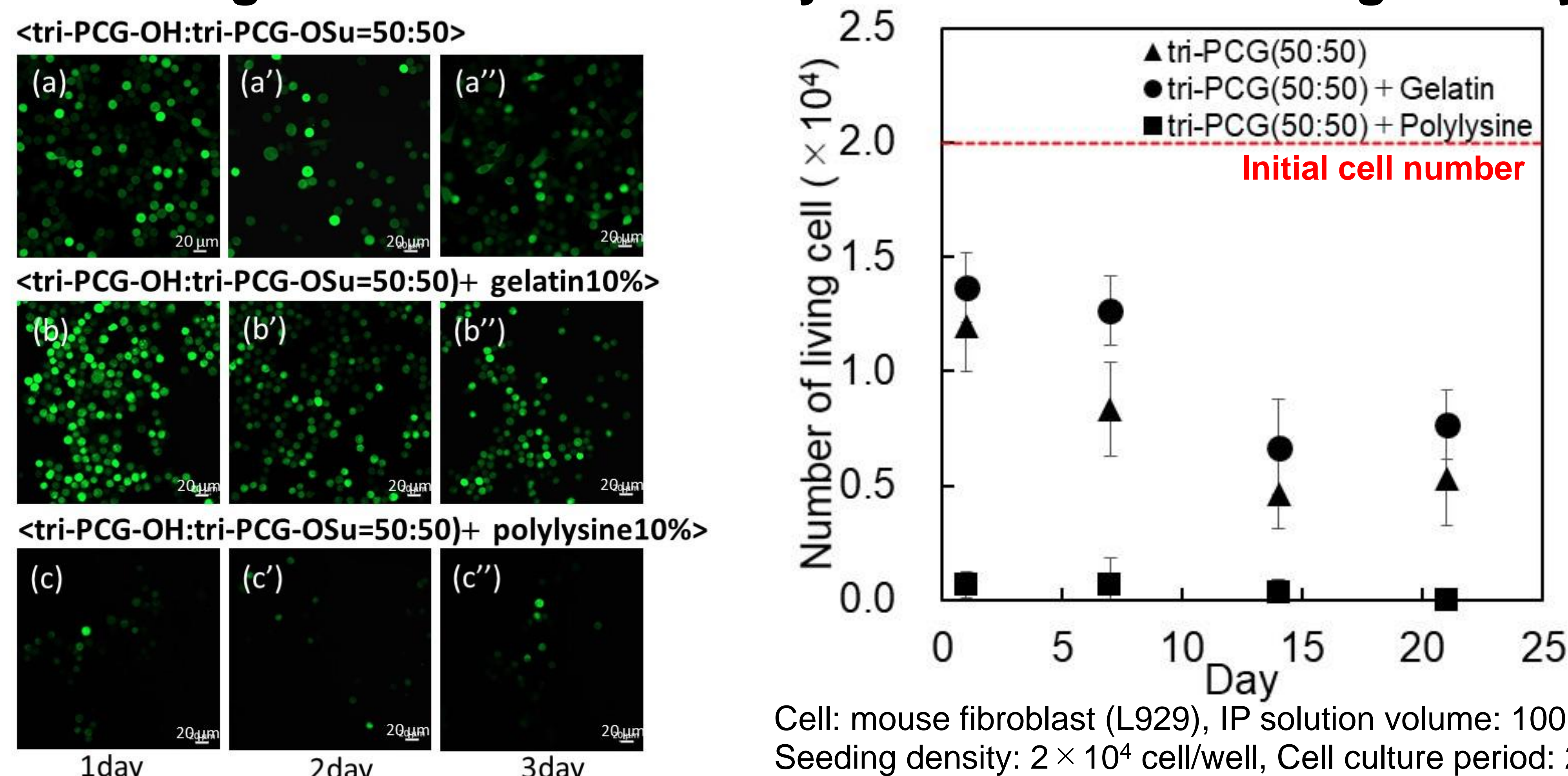
- IP formulation using gelatin as a crosslinker maintained the gel state even after cooling (4°C). → Effect of gelatin crosslinking

◇ Viscoelasticity measurement of IP containing gelatin as a crosslinker



- The decrease of elastic modulus of gelatin-crosslinked IP was suppressed. → Effect of gelatin crosslinking

◇ CLSM images and live-dead assay of cells after culturing in IP hydrogel



- A certain amount of cells were alive in the IP hydrogel crosslinked by gelatin over 3 weeks.
- Cell viability was dramatically improved by IP containing gelatin as a crosslinker compared with that containing polylysine.

<Conclusion>

- We succeeded in improving the duration and cytocompatibility of hydrogel using the IP system containing gelatin as a crosslinker.