International Webinar on Gels and Networks

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Improved network formation in polyelectrolyte complex hydrogels via suppression of micellization

ABSTRACT: Physical hydrogels are consisted of three-dimensional polymer networks formed by dynamic crosslinking. However, the inherently low mechanical properties due to the weak bond strength of the non-covalent bond limit their applicability. Recently, increasing attention has been paid to the preparation of physical hydrogels with polyelectrolyte complex (PEC). PEC hydrogels, composed of oppositely charged polyelectrolytes, are an important class of polymer materials that are widely used in many applications, such as membranes, medical prosthetic, antistatic coatings, environmental signals to the sensors, drug delivery systems, and protein separation. Although PEC hydrogels can exhibit unique functions like sol-gel transition and self-healing, they generally exhibit insufficient mechanical strength or low water holding capacity due to the weak intermolecular bonds. In general, PEC hydrogels can be easily obtained using ABA triblock copolymers, where A block is a charged block and B block is a hydrophilic neutral block. At critical gelation concentrations, ABA triblock copolymers form three-dimensional polymer networks through the formation of self-assembled micelles, especially flower-type micelles. In this case, the loop-shaped polymers do not contribute to the network connection at all, which reduces the efficiency of gel formation. Here, we propose a novel BABAB pentablock copolymer that shows direct network formation rather than loop formation through inhibition of micellization. The mechanism of the directly formed polymer network as well as the rheological properties of our hydrogels will be discussed.

GOALS:

- Understand the influence of block copolymer architecture on the hydrogelation ability
- Learn about the structure of the hydrogels through SEM images and SAXS profiles
- Learn about the mechanical property of the hydrogels through rheological results

ABOUT THE WEBINAR:

Due to the ongoing global crisis involving COVID-19, there is little chance for the soft matter community to meet to learn about gels and networks. We propose this seminar as a way for members of the European and Asian communities to share our research and learn from each other, even when social distancing is necessary. The tone of this webinar is informal, and questions can be freely asked at any time. We welcome open discussion, and hope that all who attend will learn a lot!

Webinar website: http://www.fp.a.u-tokyo.ac.jp/lab/sozai/seminar.html

Registration: https://zoom.us/meeting/register/tJcpcuqurj8rG9HEcLHZtf79IfADCDR4Ki-w
Date: Friday, March 26th, 2021
Time: 17:00-18:30 JST, 9:00-10:30 CET
Cost: Free

Organizers:
Daniel King (Hokkaido University)
Koichi Mayumi (University of Tokyo)
Tetsuo Yamaguchi (University of Tokyo)
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