

EDITORIAL

Special Issue: Biorelated Polymers and Materials

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Science and engineering of biorelated polymers and materials are becoming increasingly important for development of artificial organs, drug delivery systems, regenerative medicine, diagnostics and biomimetics. It is essential for these materials to adequately design new polymers with on-demand shape, structures, properties and functionality, and to fully understand and control the interactions of the materials with biological molecules, which include protein adsorption, blood coagulation, immune reactions, tissue regeneration, biodegradability and biomineralization. Such effort clearly realizes excellent diagnostic and therapeutic values of the materials due to valuable biocompatibility. The key ambition of this field is to widely focus and investigate the interface between artificial materials and biological systems.

Recently, *Polymer Journal* started to frequently publish special issues on attractive topics of polymer science and engineering. Among them, two special issues such as 'Self-Assembled Materials'¹ in 2012 and 'Peptide Materials'² in 2013 have already featured biorelated polymers and materials. Fortunately, those special issues were widely noticed by the readers of *Polymer Journal*. However, due to the increasing importance and remarkable development of this field, it can be expected to newly collect other biorelated topics from different scientific and technological viewpoints.

The special issue on 'Biorelated Polymers and Materials' of *Polymer Journal* presents a variety of attractive reviews and original articles that cover biological and biomedical polymers for materials science and engineering. Although it was hard to cover all subjects in this emerging field due to limited pages, we made an effort to collect the distinctive topics on synthetic polymers, bio-based polymers and polymer-inorganic hybrids. All of the polymers and materials have unique and regular nanostructures with excellent biocompatibility, biofunctionality and bioactivities. The guest editor believes firmly that this special issue stimulates not only proper polymer scientists but also chemical, physical and even biological scientists in other fields.

In brief, Chang and colleagues address fundamental development of non-fouling zwitterionic poly(sulfobetaine methacrylate) coated on a wide variety of material surfaces. Fong and colleagues explore recent development of genetically engineered elastomeric biopolymers like elastin. Caruso and colleagues summarize dopamine- and tannic acid-based film engineering techniques as new platforms for template-mediated capsule preparation. Niikura and colleagues focus on recent

advances in surface engineering of nanoparticles toward therapeutic applications. Osada outlines polyplex micelles fabricated by polyion complexation between plasmid DNA and polyethylene glycol-based diblock copolymers for polymer-based DNA delivery systems. Ma and colleagues give a comprehensive overview of the developments, applications and future prospects of gene-activated matrix as substitutes for tissue repair and regeneration. Matsumoto and colleagues highlight emerging directions of the phenylboronic acid-based research toward versatile diagnostic and therapeutic targets. The aforementioned contributions are presented as Focus Review.

Furthermore, Aoyagi and colleagues prepare near-infrared light-responsive shape memory films through polymerization of poly(ϵ -caprolactone) macromonomers in the presence of gold nanorods. Kato and colleagues utilize thermo-responsive poly(*N*-isopropylacrylamide) brushes for the formation of patterned polymer/strontium carbonate hybrid thin films. Tachaboonyakiat and colleagues perform antibacterial activities of naturally occurring chitin chemically modified with positively charged groups. The guest editor's group constructs hybrid hydrogels composed of liquid crystalline filamentous M13 phages and regularly assembled gold nanoparticles. These contributions are given as Original Article or Note.

The guest editor sincerely hopes that this special collection contributes to the progress in science and engineering of biorelated polymers and materials. Finally, the editor appreciates all authors and referees for their grateful contribution to this special issue, and Dr Toshiki Sawada (Tokyo Institute of Technology), one of authors of this issue, for the preparation of the comprehensive cover art, which schematically represents representative polymeric materials introduced in this issue.

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1 Kato, T., Aoshima, S. & Kikuchi, H. Special Issue: Self-Assembled Materials. *Polym. J.* 44, 451 (2012).

2 Venanzi, M. & Kimura, S. Special Issue: Peptide Materials. *Polym. J.* 45, 467 (2013).