

Special Issue: Biomedical Polymers

Biomedical polymers are currently one kind of the most fascinating but challenging functional polymers. With the benefits of tunable chemical structures, excellent physico-chemical performances, and remarkable biofunctionality, the facilely synthesized biomedical polymers could be widely used as bioactive agents and carriers or for controlled drug and gene delivery, tissue engineering, medical devices, and so forth.

To highlight the latest progress of biomedical polymers, we organized this special issue of "*Biomedical Polymers*". After efforts, the special issue published 13 research articles related to the controlled synthesis of biomedical polymers used in various biomedical fields, which provided some inspiring insights into the synthesis, biofunctionality, and application of biomedical polymers.

Controlled synthesis is the primary issue in developing functional polymers for biomedical applications. Chen, Pang and coworkers developed a dinuclear Salen-Cr(III) complex as a catalyst for the copolymerization of propylene oxide/carbon dioxide and lactide with higher efficiency than that of the mononuclear complex.

The biofunctionalities and bioactivities of polymers based on the enriched chemical structures and physical properties provide more and more valuable strategies to meet the increasing clinical medical requirements and the new disease challenges. Shi, Huang and colleagues fabricated a self-assembled nanochaperone based on mixed-shell polymeric micelle (MSPM) as a unique strategy for tau-targeted Alzheimer's disease therapy. Ding and coworkers developed a polymerization strategy to amplify the photoacoustic signal by enhancing near-infrared light-harvesting capacity and thermal-to-acoustic conversion. Ji and colleagues developed a reactive oxygen species (ROS)-responsive polypeptide-based macromolecular ethyl caffeate (EC) prodrug *via* phenylboronic esters to alleviate uveitis. Ma, Zhou and coworkers demonstrated that mesenchymal stem cells exhibited rapid proliferation and differentiation potential maintenance on microcarriers with intermediate rigidity of about 2.51 ± 0.65 MPa with the faster spreading rate of cells. Qiao, Lin and colleague designed a fused in sarcoma protein (FUS)-derived low complexity sequence to regulate liquid-liquid phase separation

via specific metal recognition. Lu, Dong and coworkers constructed the glucose-/catechol-functionalized ϵ -polylysine-based hydrogels, which presented excellent hemostasis and wound healing performance, and the hydroproline level within 14 days is comparable to that in normal skins.

Polymers are critical in improving the bioavailability and therapeutic index of drugs and genes as carrier matrices. Du and coworkers regulated the drug release rate from polymersomes by controlling the membrane phase separation. Wu and colleagues synthesized polyvaline (PVal) employing a one-step synthesis strategy, which was applied to prepare the PVal nanoparticle with a high drug-loading content (>20 wt%) of doxorubicin and improved antitumor efficacy. Shen and coworkers tuned the saline stabilities of polyplex nanovesicle carriers of oligonucleotides by modifying the polycation with zinc(II)-coordinative cationic chains. Shuai, Wang and colleagues constructed a PEGylated poly(aspartic acid) derivative-based vector labeled with superparamagnetic iron oxide (SPIO) for magnetic resonance (MR) visible siRNA delivery. Wu, Wang and colleagues fabricated **T-cRGD NPs** with superior ultrasound therapeutic efficacy and tumor enrichment ability *via* the self-assembly of DSPE-PEG-cRGD and TPP-PPh₃-4PEG for targeting sonodynamic therapy.

Biomedical polymers could also be used for the fabrication of medical devices. Zhang, Feng and coworkers developed a "gradient deposition" technique to coat a continuous and smooth layer of chitosan onto the surface of absorbable suture to relieve wound inflammation, stimulate collagen deposition, regenerate blood vessels, and assist tissue repairing, consequently leading to a significant enhancement of wound healing effect.

Undoubtedly, the studies above have shed light on the bright future of the research of biomedical polymers. We hope this special issue will be helpful for researchers working in this field and other related areas. Especially, we expect that more and more thoughts and ideas will be continuously stimulated, generated, and presented.

Finally, we would like to thank all the authors and reviewers for their valuable contributions and editors for their industrious editorial work for this special issue.



Prof. Xue-Si Chen
Guest Editor



Prof. Shi-Yong Liu
Associate Editor

September 2022