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Editorial Note on Functional Polymers

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Abstract

Researchers may now easily create polymers with customized composition, architecture, and functionality because to advances in synthetic polymer chemistry. This has substantially increased the use of polymers in a variety of fields. Functional polymers, in particular, have been increasingly involved in many biomedical applications as soft and biocompatible materials. Significant progress in the biomedical sector has been made thanks to beautifully engineered functional polymers, including the creation of stimuli-responsive polymer materials, novel drug delivery methods, and improved theranostics.

***Keywords:** Polymers; Thiolene reaction; Polyesters; Polycarbonates; Adjuvants*

Introduction

Chemical design and polymer synthesis are unquestionably crucial in achieving these results. Polymers, on the other hand, must fulfill a number of conditions in order to be used in biomedical applications. Biocompatibility and biodegradability of polymers are two of the most important characteristics. Polyesters, polycarbonates, and poly amino acids are examples of synthetic methods that lead to biocompatible and biodegradable polymers. The potential of stimuli-responsive polymeric materials to respond to specific physical, chemical, or biological triggers has piqued attention. This property is very helpful for delivering targeted drugs and imaging pathological changes in sick tissue. The inclusion of a single cinnamaldehyde acetal unit in the polymer chain renders the polymer pH responsive in the production of Polyethylene Glycol (PEG) with a single cinnamaldehyde acetal unit in the polymer chain. The acetal bond would be dissolved in an acidic environment, and the polymer would be broken into PEG fragments, releasing cinnamaldehyde, a bioactive chemical.

The thiolene reaction was utilized to make a complete PEG based hydrogel out of this polymer. Under low pH conditions, the hydrogel can be fully destroyed, indicating that it might be used as a smart drug delivery method for therapeutic purposes. Intracellular administration improves medication distribution and therapeutic efficacy, yet it is a difficult and time-consuming technique. A variety of efficient intracellular delivery methods have been discovered by combining functional polymers with polymer-associated nanoparticles. The development and application of pH-responsive amphiphilic carboxylate polymers as an innovative drug delivery system for transporting therapeutic payloads across cell membranes and releasing them in endosomes provides mechanistic insights into the effect of different carboxylate polymers on their endosomal escape properties, as well as the challenges and future opportunities for this type of polymer for delivering therapeutic payloads across cell membranes.

Polyesters and polycarbonates are two types of biocompatible and biodegradable polymers that may be used in a wide range of biomedical applications. Synthetic methods that can efficiently and environmentally manufacture these polymers from widely accessible chemical building blocks are desperately needed. The advancements in the catalysts used in Ring-Opening Copolymerization (ROCOP) of epoxides with carbon dioxide and cyclic anhydrides to prepare polyesters and polycarbonates, such as organometallic complexes and metal-free Lewis pairs systems, are highlighted in recent developments in ROCOP of epoxides with carbon dioxide and cyclic anhydrides to prepare polyesters and polycarbonates. the advancement of employing a post-polymerization modification method to make polyesters and polycarbonates with functional groups like hydroxyl and alkene that may be utilized as chemical handles for further functionalization Poly amino acids, in addition to polyesters and polycarbonates, are another significant family of biocompatible and biodegradable polymers with a wide variety of biomedical uses. The development

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of epsilon-poly-L-lysinZ and L-lysine based dendrimers as effective antimicrobial and antiviral agents, functional adjuvants, and innovative drug delivery system. The assorted applications of the lysine-based polymers are as effective antimicrobial and antiviral agents, functional adjuvants, and innovative drug delivery system. Ring Opening Polymerization (ROP) of cyclic monomers of N-thio-carboxyanhydrides N(T)CA is an efficient method for producing poly amino acids. A comprehensive understanding of the reaction mechanism and dynamics in ROP of N(T)CA remains difficult due to a lack of efficient experimental techniques. This can be accomplished with the help of sophisticated computational chemistry.