Functional Polylactide-based Anticancer Therapeutic Delivery Systems

State Key Laboratory of Chemical Resource Engineering

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个人简介：

Dr. Chong Cheng is an Associate Professor in Department of Chemical and Biological Engineering at University at Buffalo (UB), The State University of New York. He obtained his Bachelor's degree in Polymer Materials from Hefei University of Technology in 1993, and earned his Master's degree in Polymer Materials from Beijing University of Chemical Technology in 1996. In 2003, he received his PhD in Chemistry from City University at New York, in which he learned significantly from Prof. George Odian, the author of Principles of Polymerization. From 2003 to 2007, he worked as a postdoctoral associate in Professor Karen L. Wooley's laboratory at Washington University in Saint Louis. Dr. Cheng started his independent academic career as a tenure-tracked Assistant Professor at UB in 2007, and was promoted to an Associate Professor at UB in 2013. He has published over 60 peer-reviewed research articles. His current research focuses on the development of novel functional polymers and polymeric nanostructures for biomedical and other applications.

报告摘要：

As an important class of biodegradable polymers, polylactides (PLAs) have been approved by FDA for clinical applications. However, conventional PLAs are lack of functionalities, and this significantly limits their applications. Therefore, in recent years we have made significant efforts in developing functional PLAs and investigating their applications in therapeutic delivery. Because cancer is a leading cause of death of human beings, the functional PLA-based delivery systems in our work are designed specifically for the treatment of cancers. A series of research accomplishments have been made. First, the approaches for the synthesis of a series of functional PLAs with alkene, alkyne, aldehyde, amine, zwitterionic and other side groups have been developed. Second, several types of functional PLA-based drug delivery systems, including brush-like polymer-drug conjugates (PDCs), PDC-based nanoparticles and zwitterionic PDCs, have been prepared, and results of in vitro studies suggest that they may potentially serve as potent nano-therapeutics for cancer treatment. Third, novel cationic PLAs (CPLAs) and pegylated CPLAs (i.e. PEG-b-CPLAs) have been synthesized, and their application as transfection agent in the delivery of anticancer small interfering RNA (siRNA) has been demonstrated through in vitro and in vivo studies. Fourth, unique CPLA-based nanocapsules enabling drug delivery, gene delivery, and drug-gene co-delivery have also been achieved. These nanocapsules can effectively evade multi-drug resistance of cancer cells. Synergistic treatment effects are observed in the drug-gene co-delivery via the nanocapsules. Overall, a broad variety of functional PLA-based systems for the delivery of anticancer therapeutics have been successfully prepared, and the preliminary biomedical results obtained from these systems encourage further biomedical studies to explore their significant potentials for cancer treatment.

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