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Electrospinning of biodegradable drug-eluting nanofibers for medical applications

Shih-Jung Liu
Chang Gung University, Taiwan

Biodegradable nanomaterials are currently designed to transport therapeutic or diagnostic agents through biological barriers. The material properties of biodegradable nanofibers are extremely advantageous for drug delivery, and the use of drug-loaded nanofibers has greatly increased over the past decade. Local delivery of pharmaceuticals by using nanofibers allows site-specificity and requires a lower overall drug dosage with lower adverse side effects. Self-assembly, phase separation, and electrospinning can all be used to successfully fabricate nanofibers with sizes perfectly within the same range of the fibers present in the native extracellular matrix (ECM) (50–500 nm). Nevertheless, electrospinning has received the most attentions mainly due to that this procedure is inexpensive, simple, and versatile, thus being effective for the production of a broad range of scaffold structures and materials. Different drugs have been loaded onto various nanofibers, including those that are natural, synthetic, and copolymer, for various medical applications. Pharmaceuticals can also be singly or coaxially loaded onto nanofibers to enhance clinical applications. In particular, biodegradable drug-eluting nanofibers provide additional benefits to preventing wound adhesion and scar formation because of their high surface area-to-volume ratios, high porosities, and three-dimensional open porous structures. This presentation gives current research and breakthrough discoveries on the innovative application of biodegradable drug-loaded nanofibers that will alter the clinical therapy of various diseases.

Biography

Shih-Jung Liu is currently Professor in the Department of Mechanical Engineering at the Chang Gung University of Taiwan. He received the Bachelor degree from Mechanical Engineering of National Taiwan University in 1986, and earned his Master and PhD degrees from Cornell University and the University of Wisconsin at Madison in 1989 and 1992 respectively. He had been working as a Post-doctoral research fellow at McMaster University of Canada, and also as a visiting Professor to the Tokyo Institute of Technology in Japan and Aachen University of Applied Science in Germany. He has been involved in pioneering work on the concepts of various polymer processing techniques. His research work deals with theoretical and experimental processing of various polymeric materials including engineering plastics and biomedical materials. He is the author of more than 250 scientific publications including 140 referred journal papers, editor and co-editor of 6 books and the author of 15 patents. He is also serving as the Associate Editors of *Journal of Polymer Engineering and Asia Pacific Journal of Chemical Engineering*.

shihjung@mail.cgu.edu.tw

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