

Preparation and characteristics of screen-printing electrode of chitosan

S.J. Chang¹, C.S. Yen¹, C.J. Chen², J.T. Liu², S.M. Kuo¹, J.Z. Tsai² and M.W. Lee³

¹I-SHOU University, Taiwan; ²National Central University, Taiwan; ³School of Medical Laboratory and Biotechnology, Chung Shan Medical University

PDMS is often used in Bio-Micro-Electro-Mechanical Systems due to their optical transparency, light weight, tough, non toxic, relatively inert in biochemical reaction and heat resistance. However, the surface of PDMS is hydrophobic and poor adhesion with different kind of materials. Therefore, surface fabrications of PDMS with bioactive molecules have been markedly studies to tailor its properties to satisfy the requirements for particular application, especially in biological field. Nevertheless, being unable to degrade is still the major drawback in the development of tissue engineering. Therefore, this research employs a natural polysaccharide, chitosan as the base material. Chitosan, a biodegradable polymer with excellent biocompatibility, has great potential to be used as electrode substrate. In this study, we prepared a patterned circuit onto chitosan film by screen printing technique. This project began with the production of chitosan film with comparison between concentration and molecular weight, followed by a series of characterizations such as water content, swelling ratio, mechanical strength and degradation rate. In vitro cell culture was measured for biocompatibility and toxicity of chitosan with electrode. The preliminary results indicated that the chitosan films, prepared by 2% 300k kDa chitosan, had the smallest swelling ratio. The adhesion strength of the silver inks was better than carbon ink on the surface of chitosan. The cell test showed the biocompatibility of the chitosan films with electrode. Preliminary results showed that chitosan has great potential to be used as an electrode substrate to develop a cell culture system with electrical stimulation.

Biography

S.J. Chang is a professor of Biomedical Engineering in I-Shou University, Kaohsiung City, Taiwan. She received the PhD degree in biomedical engineering from Yang-Ming University, Taiwan. Her current research interests include biomaterials, tissue engineering, and biosensors.