Prof. Jui-Che Lin

林睿哲 教授

Ph.D.： Chemical Engineering, University of Wisconsin-Madison, USA

Email： jclin@mail.ncku.edu.tw

Phone： +886-6-2757575 ext 62665

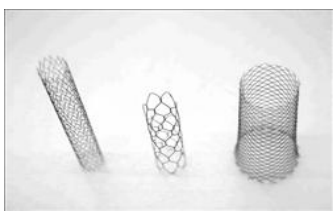
Office： Room No.93C16 (12F)

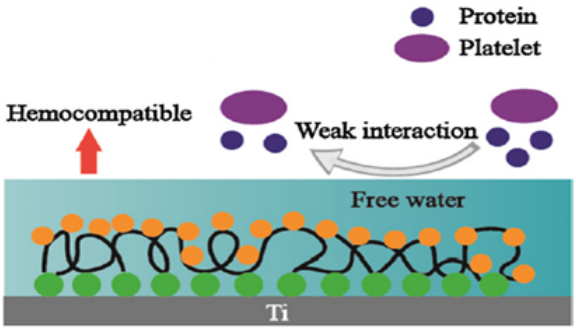
Research Interests

The research activities in **BIOMATERIALS LABORATORY** mainly focus in two areas: (1) study of the interactions between the biological environment and biomaterial surface with an aim to improve material's biocompatibility; (2) molecular design, synthesis and characterization of the new biocompatible materials, biodegradable polymers or matrix with various biomedical applications; such as cardiovascular materials, materials for hyperthermia in tumor/cancer therapy, materials for dental and orthopedic applications.

Representative Publications

1. Yen-Hsuan Chen , Chi-Hui Cheng, Wan-Ju Chang , Yi-Ching Lin, Feng-Huei Lin, **Jui-Che Lin**, "Studies of magnetic alginate-based electrospun matrices crosslinked with different methods for potential hyperthermia treatment", Materials Science and Engineering C, 62: 338–49 (2016).
2. Ching-Hsiung Shen, Yu-Jen Cho, Yi-Ching Lin, Li-Chin Chien, Tzer-Min Lee, Wen-Hsi Chuang, **Jui-Che Lin**, "Surface modification of titanium substrate with a novel covalently-bound copolymer thin film for improving its platelet compatibility", *Journal of Materials Science: Materials in Medicine*, 26(2): 79 (2015).
3. Shan-hui Hsu, Kun-Che Hung, Ying-Yi Lin, Chiu-Hun Su, Hsi-Yi Yeh, U-Ser Jeng, Chun-Yi Lu, Shenghong A. Dai, Wei-En Fu and **Jui-Che Lin**, "Water-based synthesis and processing of novel biodegradable elastomers for medical applications", *Journal of Materials Chemistry B*, 2(31): 5083-92 (2014).
4. Ta-Chun Lin, Feng-Huei Lin, **Jui-Che Lin**, "In vitro characterization of magnetic electrospun iminodiacetic acid grafted chitosan nanofiber composite for hyperthermic tumor cell treatment", *Journal of Biomaterials Science-Polymer Edition*, 24(9) 1152-63 (2013).
5. Yung-Show Chiang, Yuh-Ling Chen, Shu-Fen Chuang, Ching-Ming Wu, Pal-Jen Wei, Chang-Fu Han, **Jui-Che Lin**, Hsiao-Tzu Chang, "Riboflavinultraviolet-A-induced collagen cross-linking treatments in improving dentin bonding", *Dental Materials*, 29(6) 682-92 (2013).
6. Ching-Hsiung Shen, **Jui-Che Lin**, "Solvent and concentration effects on the surface characteristics and platelet compatibility of zwitterionic sulfobetaine-terminated self-assembled monolayers", *Colloids and Surfaces B: Biointerfaces*, 101: 376-83 (2013).

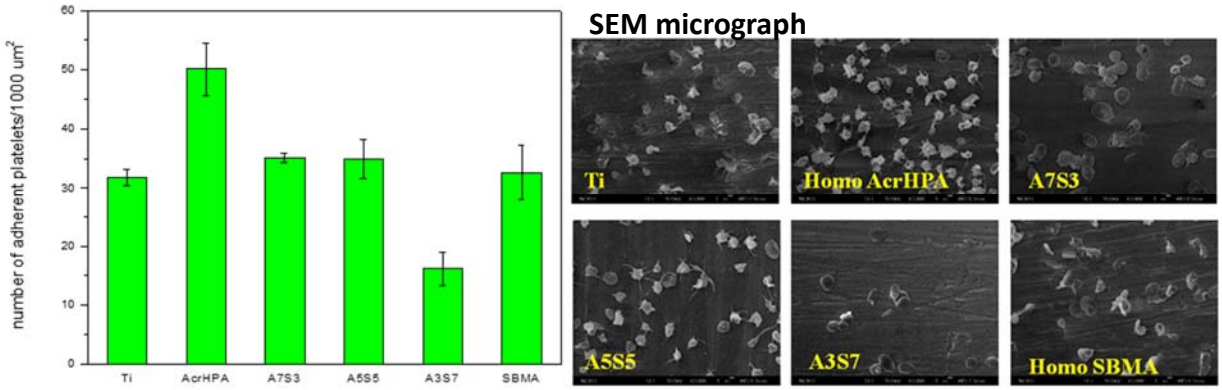




Improving blood compatibility and anti-biofouling characteristics of titanium-based biomaterials by covalently bounded novel copolymers

Study of the interactions between the biomaterial surface and platelets:

In order to elucidate the relationships between the biological responses and surface properties of biomaterials, our lab has synthesized a series of novel 6-acryloyloxy hexyl phosphonic acid (AcrHPA) and sulfobetaine methacrylate (SBMA). The phosphonic acid group in these copolymers can impart covalent binding to the titanium substrate while the zwitterionic sulfobetaine functionality is considered being able to reduce the platelet adhesion and activation on the modified titanium substrate. Various surface analysis techniques, such as ESCA, AFM and contact angle measurement are utilized to characterize the covalent-bound AcrHPA-SBMA copolymers on titanium substrate.



The most platelet compatible surface was noted on the one modified by the highest amount of SBMA added (i.e. 70 mole %, A3S7) in copolymerization. The surface modification scheme presented here would be of potential as well as manufacturing process applicable for future development in blood-contacting titanium-based biomedical devices.

Hyperthermia in tumor/cancer therapy:

Hyperthermia has been reported as one of the effective cancer treatment modalities since the tumor cells are more temperature sensitive than their normal counterparts. Due to the fact that the ambient temperature can be increased by placing the magnetic nanoparticles under an alternating magnetic field, it would become of interest to incorporate these magnetic nanoparticles into the biodegradable nanofibers for endoscopic hyperthermia treatment of malignant tumors. Alginate (SA) was utilized in this investigation as the main material for electrospinning because of being biodegradable and water-soluble. We have preliminary demonstrated these magnetic nanoparticles-incorporated biodegradable electrospun nanofiber matrix can increase the medium temperature and enhance the death of Caco-2 (human colon adenocarcinoma) cells *in vitro*.