New Functional Biodegradable Pseudo-Protein Biomaterial Technology, New Strategy and Biomedical Applications

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Date	**:**	**18 January 2019 (Friday)**
Time	**:**	**10:00 - 11:30am**
Venue	**:**	**ST602 (4D Theatre), The Hong Kong Polytechnic University**

Abstract

A new family of functional biodegradable pseudo-protein biomaterials has been designed to advance the design, functionality and biological property of absorbable biomaterials beyond the current commercially popular absorbable polyesters like polyglycolide, polylactide and their copolymers. These new pseudo-protein biomaterials are amino acid-based poly(ester amide)s (AA-PEAs) and their distance relatives, poly(ester urea urethane, or AA-PEUU). AA-PEAs are designed from 3 building blocks (amino acids, diacids and dialcohols), while AA-PEUU are designed from 4 building blocks (amino acids, dialcohols, aliphatic or aromatic diisocyanate, and glycerol a-monoallyl ether). The backbone chemical structures of AA-PEAs and AA-PEUUS have both peptide and non-peptide bonds, and hence exhibit both proteins and non-protein properties, named as "pseudo-proteins". AA-PEAs and AA-PEUUs can also be coupled with polysaccharides or synthetic polymers to design and fabricate hybrids for achieving even broader range of property and applications [1,2]. These pseudo-protein biomaterials can be engineered into electrospun nanofibrous membranes, melt-spun fibers, micro and nanospheres, 3D microporous hydrogels, micelles, films and 3D printing. Figure 1 shows the images of some these physical forms engineered. The most unique biological property of these pseudo-protein biomaterials are their support of cell adhesion and proliferation, induce muted inflammatory response and blood biocompatible. Pseudo-proteins have been evaluated for some unique biomedical applications ranging from stent and suture coating, vascular

patches, biodegradable nanoparticles for drug delivery, 3D tissue printing, 3D microporous hydrogel scaffolds for stem cells tissue engineering, burn wound treatment, non-viral gene vectors to synthetic vaccines.

About the speaker

Prof. Chih-Chang (C.C.) Chu received his PhD in chemistry from the Florida State University, Tallahassee, Fla, USA. He is the first recipient of the Rebecca Q. Morgan ′60 endowed chair professor at Cornell University, Ithaca, New York, USA. Chu is the recipient of the State University of New York Chancellor's Award for Excellence in Scholarship and Creative Activities in May, 2009. Chu was very recently inducted into the College of Fellow of the American Institute of Medical and Biological Engineering in Washington, DC on March 24, 2014. Chu is just elected as the Fellow of the American National Academy of Inventors in Nov. 2018. Chu received the Golden Eagle award from his alma mater, Tamkang University in Taipei, Taiwan in Nov. 2018. Chu is also the distinguished guest professor of Chang-Chun Institute of Applied Chemistry, Chinese Academy of Science in Chang-Chun, Ji-Lin, and the Xi'An Jiao-Tong University, Xi'An, China. Chu also served on the Biology/Medicine Panel of the Hong Kong Research Grant Council from 2010 - 2013, and was a member of the Hong Kong Research Grant Council Collaborative Research Fund Committee. Prof. Chu is in the editorial board of 7 journals like The Open Biomaterial Journal, The Open Material Science Journal, the J. of Bioengineering and Biomedical Sci. and J. Fiber Bioengineering and Informatics. He has published 214 referred research papers (h-index:59; citation: 11,411), a recipient of 79 US and international patents and 30 pending, and an editor and author of the published book "Wound Closure Biomaterials and Devices" by CRC Press, and two-volume books "Biodegradable Polymers: New Developments and Challenging" by Nova Science.

Prof. Chu has focused on the multidisciplinary study of new novel biodegradable polymers/fibers/fibrous membranes invented in his tribe for human body repair. His efforts in the last 15 years have largely focused on the design, synthesis and evaluation of a new novel family of biologic active biodegradable polymers (Pseudo-protein biomaterials) that are would have very unique biological properties like muted inflammatory response, promoting cell growth, facilitating wound healing and would be nontoxic. This new family of biodegradable polymers has also been engineered into a wide range of physical forms/shapes ranging from melt-spun fibers, electrospun fibrous membranes, 3D microporous hydrogels, micelle, micro- and nanospheres; and they have been evaluated for surgical repair of injured or diseased tissues, tissue regeneration like vascular grafts, drug-eluting stents, burn treatment, wound closure and drug control/release purposes. Chu also developed a new course "Biomaterials and Medical Devices for Human Body Repair" for biomedical engineering senior/graduate students.

~ALL ARE WELCOME~