Title: Design, Synthesis and Applications of Polypeptides

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Abstract:

Synthetic polypeptides are very important biomimetic materials and have been extensively used as biomaterials in numerous application including drug delivery and tissue engineering. In this seminar, I will cover the research progress in my research group on the design and synthesis of polypeptides and their applications. Specifically, I will report our research on HMDS mediated controlled polymerization of amino acid N-carboxyanhydrides (NCAs), cooperative polymerization of NCAs, and open-air polymerization of NCAs via the SIMPLE (Segregation-Induced Monomer-Purification and initiator-Localization promoted rate-Enhancement) strategy. On the application side, I will report our design of charged, helical polypeptide as materials for efficient cell penetrating, gene and siRNA delivery and for antimicrobial applications. I will briefly report our other research areas in bionanomedicine such as ATTACK mediated cell labeling and cancer targeting, and polymeric and silica nanomedicine for drug delivery application. Key references of my seminar are: PNAS, 2019, 201901442; PNAS, 2018, 201712963; Nat. Chem. Bio, 2017, 13, 415; Nat. Chem., 2017, 9, 614; PNAS, 2017, 114, 12675; PNAS, 2016, 113, 4601; PNAS, 2015, 112, 13155; Nat. Commun., 2014, 5, 3218; PNAS, 2014, 111, 15344; Angew. Chem., 2013, 9182; Angew. Chem. 2013, 5757; Nat. Commun., 2011, 2, 206; JACS, 2007, 14114

Biosketch: Jianjun Cheng is the Hans Thurnauer Professor of Materials Science and Engineering, and Professor of Chemistry and Bioengineering at the University of Illinois at Urbana-Champaign (UIUC), and Director of UIUC-JITRI Institute on research translation. He obtained a B.S. degree in Chemistry at Nankai University, China, in 1993, a M.S. degree in Chemistry at Southern Illinois University at Carbondale in 1996 (with Prof. Jerry Smith), and a Ph.D. degree in Materials Science at the University of California, Santa Barbara in 2001 (with Prof. Tim Deming). He was a Senior Scientist at Insert Therapeutics, Inc. from 2001 to 2004, and was a Postdoctoral Scientist at MIT (with Prof. Robert Langer) from 2004 to 2005. He joined the faculty of UIUC as a Assistant Professor in 2005, and was promoted to Associate Professor in 2011 and Full Professor in 2015. Cheng is a co-inventor of 37 issued patents (22 of which being licensed) and 20+ other patent applications. He co-authored over 190 publications. Cheng’s research has made translational impact. Two nanomedicine systems he developed/co-developed have made to clinical trials. He received a Prostate Cancer Foundation Competitive Award in 2007, a National Science Foundation CAREER Award in 2008, a Xerox Award for Outstanding Research at UIUC in 2010, a NIH Director’s New Innovator Award in 2010, the Willett Faculty Scholar Award in 2013, and the UIUC Distinguished Promotion Award in 2015 (among 5 out of 80 faculty being promoted). He was appointed as an Associate of Center for Advanced Study at UIUC in 2014. He has also been on the list of Teacher Ranked As Excellent By Their Students five times at UIUC. Cheng is currently an Associate Editor of Biomaterials Science, Royal Society of Chemistry. He is a Fellow of the American Institute for Medical and Biological Engineering, American Chemical Society-Division of Polymer Chemistry, and the American Association for the Advancement of Science.