高分子科学系列讲座

高分子物理与化学国家重点实验室 中国科学院长春应用化学研究所

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报 告 人	Gregory N. Tew	职　　称	Professor
从事专业	Polymer Science and Engineering		
建 议 人		主 持 人	李悦生研究员
报告时间	2012.06.06 上午 10:00	报告地点	主楼四楼学术报告厅（410 室）
单　　位	PSE, UMASS		
通讯地址/邮编	120 Governors Drive, Amherst, MA 01003		
电　　话	413-577-1612	电子邮箱	tew@mail.pse.umass.edu
出生年月	1973.08		

报告人背景

Education:

・ University of Pennsylvania, The Medical School 2000-2001	Post-doctoral Fellow, Research Advisor: Prof. William F. DeGrado
・ University of Illinois at Urbana-Champaign 1995-2000	Ph.D., Materials Chemistry, Research Advisor: Prof. Samuel I. Stupp
・ North Carolina State University 1989-1995	B.S., Chemistry, Magna Cum Laude, Research Advisor: Prof. David A. Shultz

Professional Positions:

・ University of Massachusetts-Amherst 2011-2012	Professor, Polymer Science & Engineering
・ University of Massachusetts-Amherst 2011-2012	Adjunct Professor, Molecular & Cellular Biology
・ University of Massachusetts-Amherst 2007	Associate Professor, Polymer Science and Engineering
・ University of Massachusetts-Amherst 2001-2007	Assistant Professor, Polymer Science and Engineering

报告题目

Chemically Rich Macromolecules: From Proteins Mimics to Advanced Materials

内容摘要

Our primary research aim is to create new materials using a combination of principles, many of which are inspired by biology. In addition, the design of simple molecules that mimic the complex structures and functions of biology is at the heart of our work. In this presentation, we will illustrate several examples of these principles including facially amphiphilic polymers which serve as novel antimicrobial peptide mimics, polymers designed to access the interior of cells, new hydrogels with robust mechanical properties, and unique metal-ligand containing polymers. For example, we present the first metal cation-based anion exchange membranes (AEMs), synthesized by copolymerization and cross-linking of a norbornene monomer functionalized with a water-soluble bis(terpyridine)ruthenium(II) complex and dicyclopentadiene. Each ruthenium complex has two associated counter anions, unlike most ammonium- and phosphonium-based membranes with single cation-anion pairs. In another example, we learn to program synthetic polymers and oligomers with the appropriate chemical information that adequately capture the biological activity of proteins. The synthetic approach easily allows doubling the density of guanidine functional groups, which increases the transduction efficiency of the sequences. Cellular uptake studies on three different cell lines (HEK 293T, CHO, and Jurkat T cells) confirm that these synthetic analogs are highly efficient novel protein transduction domain mimics (PTDMs), that are more effective than TAT_{49-57} and nonaarginine (R9) and also highlights the usefulness of polymer chemistry at the chemistry- biology interface.