



学术报告

Tuning Intermolecular Interactions in Functional Materials and Engineering Systems

时间: 2017年8月29日 (周二) 9:30-10:30

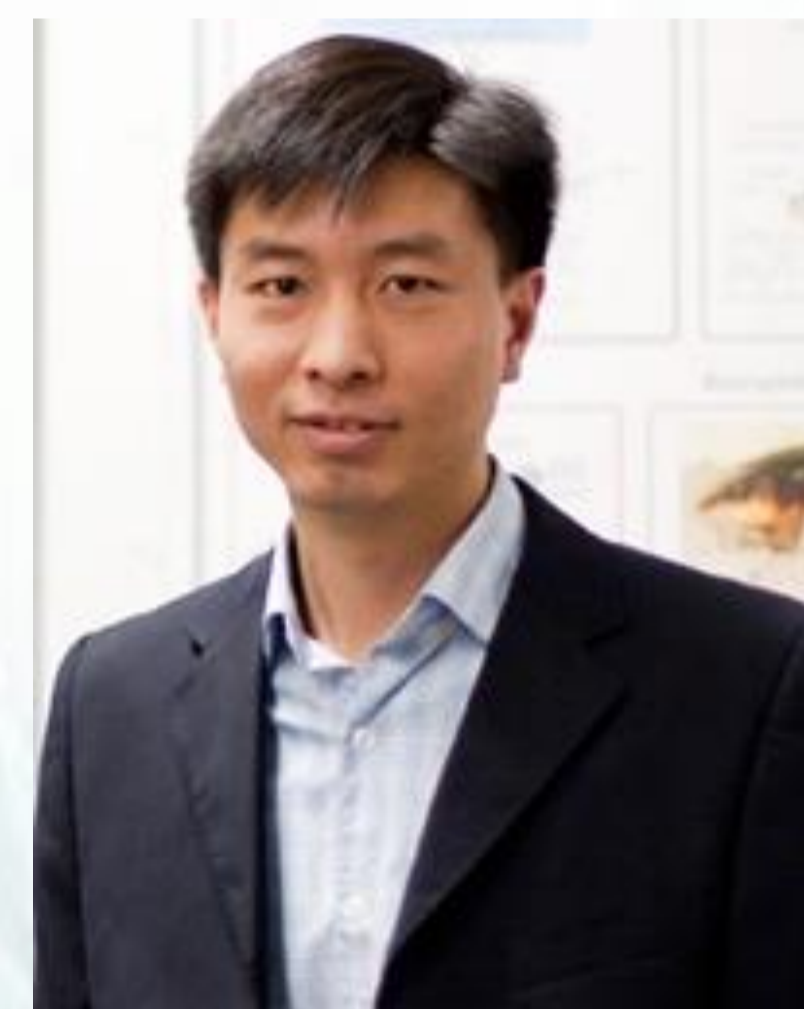
地点: 化新楼211会议室

报告简介:

The intermolecular interactions and surface characteristics of materials mostly determine their physicochemical properties and functionalities. Characterization of the intermolecular and surface interaction mechanisms (e.g. adhesion mechanism) of soft materials (e.g. surfactants, polymers, biopolymers) and engineering systems (e.g. stabilization/destabilization of water-in-oil or oil-in-water emulsions, bubble flotation, adsorption of pollutants in waste water treatment) has attracted much research interest. In this talk, the basics of intermolecular and surface forces and the commonly used nanomechanical techniques, such as surfaces forces apparatus (SFA) and atomic force microscope (AFM) coupled with drop/bubble probe, will be briefly introduced. The recent progress on how we applied these advanced nanomechanical techniques for quantifying intermolecular and surface interactions of polymer materials, biological and engineering systems will be presented. The fundamental interaction mechanisms elucidated have been further applied for the development of advanced functional materials with important engineering, bioengineering and environmental applications. Two examples will be given: mussel wet adhesion mechanism and development of bio-inspired adhesives and self-healing materials, and hydrophobic interaction mechanisms at solid/water and oil/water interfaces.

报告人简介:

曾宏波，加拿大阿尔伯塔大学化学工程和材料工程系终身教授，加拿大国家讲席教授，加拿大分子力和界面科学领域首席专家。分别于2001年和2003年获清华大学工学学士和硕士学位，2007年获加州大学圣芭芭拉分校博士学位，于2009年受聘为加拿大阿尔伯塔大学化学工程和材料工程系助理教授，2015年被批准破格晋升终身正教授。已在PNAS, Advanced Materials, ACS Nano, Nature Materials, ACS Nano, Nature Communications, Angewandte Chemie International Edition, Advanced Functional Materials等高水平SCI专业期刊发表学术论文160多篇，撰写和主编专著“Polymer Adhesion, Friction and Lubrication” (Wiley)。研究方向主要包括胶体与界面科学、分子和纳米力学、高分子材料、纳米材料和生物智能材料、以及各种工程过程中的界面现象等。其实验室能对复杂流体和材料体系中各种分子间和界面间作用力进行直接测量和分析，部分仪器和实验方法为独立开发。



代表作:

- [1] Long-Range Hydrophilic Attraction between Water and Polyelectrolyte Surfaces in Oil. *Angew. Chem. Int. Ed.*, 2016, 55, 15017.
- [2] Novel mussel-inspired injectable self-healing hydrogel with anti-biofouling property. *Adv. Mater.*, 2015, 27, 1294.
- [2] In Vivo Residue-Specific Dopa-Incorporated Engineered Mussel Bioglue with Enhanced Adhesion and Water Resistance. *Angew. Chem. Int. Ed.*, 2014, 126, 13578.
- [3] Nanomechanics of Cation- π Interactions in Aqueous Solution. *Angew. Chem. Int. Ed.*, 2013, 52, 3944.
- [4] Strong Reversible Fe³⁺-mediated Bridging between Dopa-Containing Protein Films in Water. *Proc. Natl. Acad. Sci. U.S.A.*, 2010, 107, 12850.

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北京化工大学材料科学与工程学院
石峰教授课题组