The 10th Dvořák Lecture

by Professor **Shaoyi Jiang**
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Molecular Understanding, Design and Development of Ultra-Low Fouling Zwitterionic Materials

June 13th, 2018 at 15:00

Institute of Physics of the Czech Academy of Sciences, *Na Slovance 2, 182 21 Praha 8, Czech Republic*

The lecture and the discussion will be in English only, the translation to Czech will not be provided.
The admission to the lecture is free, however it is necessary to reserve a seat using the registration form at: rezervace.fzu.cz

Annotation

An important challenge in many applications, ranging from biosensors to drug delivery, is the prevention of nonspecific protein adsorption on surfaces. To address this challenge, our goals are twofold. First, we strive to provide a fundamental understanding of nonfouling mechanisms at the molecular level using an integrated experimental and simulation approach. Second, we aim to develop biocompatible and environmentally benign ultra-low fouling materials based on the molecular principles we have learned. Over the last several years, we have demonstrated that zwitterionic and mixed charge materials and surfaces are highly resistant to nonspecific protein adsorption, cell adhesion and bacteria adhesion/biofilm formation from complex media. Both simulation and experimental results show that the strong hydration of zwitterionic materials is responsible for their excellent nonfouling properties. Recent results show that zwitterionic materials induce no capsule formation upon implantation and no immunological response in blood circulation and are able to preserve protein and cell bioactivity. At present, zwitterionic materials, as alternatives to poly(ethylene glycol) (PEG)-based materials, have been applied to a number of applications, including implantable medical devices, early cancer diagnostics, drug/gene delivery, antimicrobial coatings, and marine coatings.

Shaoyi Jiang

Professor Jiang received his Ph.D. degree in chemical engineering from Cornell University in 1993 under Profs. Keith Gubbins and John Zollweg. He was a postdoctoral fellow at the University of California, Berkeley between 1993 and 1994 with Prof. Kenneth S. Pitzer and a research fellow at California Institute of Technology between 1994 and 1996 with Prof. William A. Goddard, III both in chemistry. He is currently the Boeing-Roundhill Professor of Engineering in the Department of Chemical Engineering and an adjunct professor of Bioengineering at the University of Washington, Seattle. He was a visiting professor in the Department of Chemical Engineering at Massachusetts Institute of Technology (MIT) with Prof. Robert Langer in 2007. He is a senior editor for Langmuir, a fellow of the American Institute of Chemical Engineers (AIChE), a fellow of the American Institute for Medical and Biological Engineering (AIMBE) and a member of Washington Academy of Sciences. He received the Braskem Award for Excellence in Materials Engineering and Science, AIChE (2017). His research focuses on the molecular understanding, design and development of zwitterionic-based functional materials for biomedical and engineering applications.

Vladimír Dvořák

(1934–2007)

Vladimír Dvořák was a solid state physicist and the most prominent Czech scientist in the theory of ferroelectricity and structural phase transitions. He was affiliated with Institute of Physics of the Czech Academy of Sciences in Prague for the whole productive life. He served as its director in 1993–2001 and was the main protagonist of the revolutionary reforms in the Institute after 1989. He was a member of the Learned Society of the Czech Republic since 1995. His personality has strongly influenced the scientific program and development in the Department of Dielectrics of the Institute since the late sixties up to the present. He was a brilliant lecturer and is considered as one of the most respected directors of the Institute.

To commemorate his work and personality, Institute Physics of the Czech Academy of Sciences decided to organize an annual festive Dvořák lecture, given by prominent internationally renowned scientists in the field related to the research pursued at the Institute..

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