Chinese Academy of Sciences

Key Lab for Biomedical Effects of Nanomaterials and Nanosafety

中科院纳米生物效应与安全性重点实验室

Nanosafety Lab. CAS

学术报告通知

CAS NS Forum (NO. 276)

演讲者： Prof. Cynthia J. Burrows

美国国家科学院院士，美国艺术与科学学院 院士

犹他大学化学系主任， Acc. Chem. Res. 主编

题　　目：Using Nanopores to Interrogate DNA: How Oxidation of Guanine Leads to Structural and Functional Changes in the Genome

时　　间：2016年10月24日 (Monday)　17:30pm-19:30pm

地　　点：国家纳米科学中心，南楼二层多功能厅

主持人： 赵宇亮

Prof. Cynthia J. Burrows is Distinguished Professor of Chemistry at the University of Utah and presently Chair of the Department of Chemistry. She received her Ph.D. from Cornell University in 1982. From 1983-1995, she held the positions of Assistant through Full Professor of Chemistry at the State University of New York at Stony Brook, before returning to the West to take a position at the University of Utah in Salt Lake City in 1995.

Prof. Burrows's main research interest is nucleic acid chemistry with focus on chemical modifications to DNA and RNA bases, which is help to understand how to modify nucleic acids to alter the function of DNA or RNA in the cell. A lot of progress has been made by her group in the following studies: biochemistry of DNA processing enzymes with damaged DNA, Photochemistry of redox-active DNA and RNA bases, nanopore sequencing of DNA damage, etc.

Prof. Burrows has published over 300 research manuscripts with citations exceeding 8,600 and a h-index of 49. She received numerous awards and honors for her research and teaching, including a University Distinguished Teaching Award and the ACS Cope Scholar Award. She served as Editor-in-Chief of Accounts of Chemical Research. She was inducted into the American Academy of Arts and Sciences in 2009, and in 2013 she was appointed the inaugural holder of the Thatcher Presidential Endowed Chair of Biological Chemistry. In 2014, was elected to the National Academy of Sciences.

Contact information: Tel: 010-8254-5570 or 010-8254-5526

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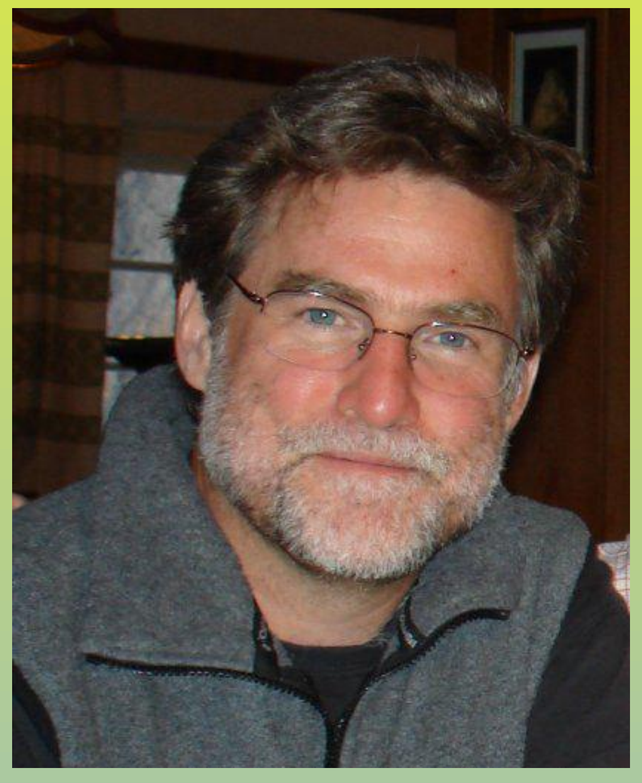

演讲者： **Prof. Scott L. Anderson**
美国科学促进会会士，美国物理学会会士
犹他大学分析化学杰出教授

题　　目： **Research on nanoparticle surface chemistry and application**

时　　间： 2016年10月24日 (Monday)　17:30pm-19:30pm

地　　点： 国家纳米科学中心，南楼二层多功能厅

主持人： 赵宇亮

Prof. Scott L. Anderson is Distinguished Professor of Physical & Analytical Chemistry at the University of Utah and Associate Director for Surface Analysis and Nano-imaging, Utah Univ. He received his Ph.D. from University of California at Berkeley in 1981, followed by postdoctoral fellowship in the Stanford University (1981-1983), and then worked in the department of chemistry, University of Utah.

The theme of Prof. Anderson's research is nanoparticle surface chemistry, with activities in four main areas: 1. size-selected cluster deposition and size-effects on catalysis; 2.effects of site size on electrocatalysis; 3.single nanoparticle trapping mass spectrometry to study surface chemistry and optical properties with ppm size resolution; 4.use of surface chemistry to control size and reactivity properties of high energy density nanoparticles for fuel/propellant applications.

Prof. Anderson has published over 230 research manuscripts with citations nearly 6,000 and a h-index of 20. He received many awards and honors, including Robert W. Parry Teaching Award, U of Utah Distinguished and Creative Research Award, NSF Creativity Award, *etc*.. He is the fellow of American Assoc. for the Advancement of Science, and he is also the fellow of American Physical Society and Invitation Fellow of Japan Society for the Promotion of Science.

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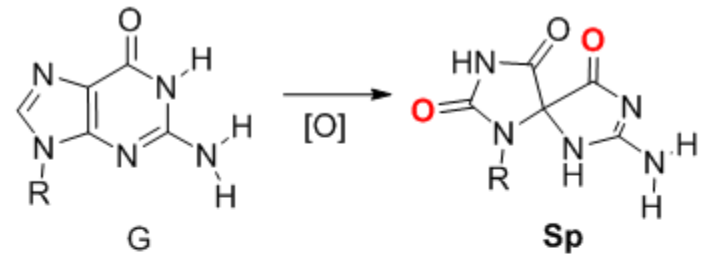
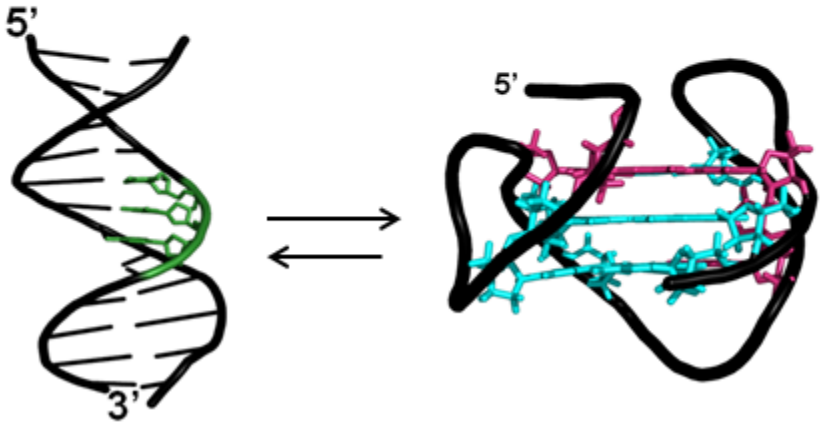
Using Nanopores to Interrogate DNA: How Oxidation of Guanine Leads to Structural and Functional Changes in the Genome

Cynthia J. Burrows, Ph.D.

University of Utah

Oxidative stress in the cell results in modifications to DNA and RNA bases and downstream events including effects on transcription and replication as well as signaling for repair. Ultimately, unrepaired damage in DNA leads to mutagenesis that is a contributing factor to cancer and other diseases. Our studies focus on base modifications arising from guanine (G) oxidation, including how and where they form in the genome. To investigate this, we have developed a single-molecule nanopore approach that is complementary to other biophysical techniques for interrogating nucleic acid structure. Specifically, the electrophoretic capture of DNA strands, either Watson-Crick duplexes or folded G-quadruplexes, inside a protein nanopore (alpha-hemolysin) provides information about the presence of oxidized bases as well as the dynamics of unfolding. Changes in the duplex-quadruplex equilibrium have significant effects on both genome integrity and gene expression.





Chemistry of, and catalysis by nanoparticles

Scott L. Anderson

Chemistry Department, University of Utah,

315 S. 1400 E., Salt Lake City, UT 84112

The surface chemistry of small metal nanoparticles can be substantially different than that observed for bulk metal or larger nanoparticles, due to differences in the availability of particular binding sites, and quantum confinement effects on electronic structure. Two approaches to probing size effects will be discussed. For very small particles, in the cluster size regime, it is practical to prepare atomically monodisperse beams of cluster ions, which we deposit on well characterized surfaces and study by surface science or electrochemical techniques. Examples of both electronic and geometric site effects will be presented to illustrate the sorts of effects seen.

For larger particles, with thousands-to-millions of atoms, the size selection approach becomes impractical, but single particle trapping techniques can be used instead. A single particle is trapped, and then its mass is measured non-destructively to high precision while the particle is heated and/or exposed to gaseous reactants. The kinetics of surface reactions can be measured with high sensitivity by tracking the mass; by carrying out measurements on a series of particles, the effects of particle size are determined. Oxidation and sublimation chemistry of carbon nanoparticles will be used to illustrate the method.