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City University Distinguished Lecture Series

Speaker

Professor Sunney Chan

*George Grant Hoag Professor of Biophysical Chemistry, Emeritus
Division of Chemistry & Chemical Engineering, California Institute of Technology;
Distinguished Visiting Fellow, Institute of Chemistry, Academia Sinica*



Taming methane: Learning new chemistry from microbes

on

Friday, 18 January 2019 at 4:30 pm

at

Connie Fan Multi-media Conference Room
4/F Cheng Yick-chi Building
City University of Hong Kong
Tat Chee Avenue, Kowloon

Abstract

Methane is one of the major greenhouse gases. Although smaller amounts of methane gas are produced on planet Earth compared with carbon dioxide, methane is 33 times more detrimental molecule for molecule toward global warming. Presently, methane accounts for ca. 20 % of the global warming problem. The methane in the Earth's atmosphere is almost entirely produced by biology involving methanogens that inhabit natural ecosystems, such as ocean sediments, wetlands, and animal digestion, along with a small contribution from thermogenic sources, including volcanism, oil and gas production. Fortunately, the emission of methane produced from ecological systems is controlled by other microbes that metabolize methane as their sole source of carbon and energy. These methanotrophs convert substantial amounts of the methane produced by methanogenic bacteria into methanol in the presence of molecular oxygen. Over the past several decades, scientists have purified and studied in depth the proteins responsible for this chemistry. Methane oxidation is extremely challenging to perform in the laboratory, but scientists have discovered the chemical principles governing how these enzymes work. Based on this fundamental knowledge, a catalyst has been recently developed capable of efficient and selective conversion of methane into methanol at room temperature. This catalyst has been also applied to liquefy natural gas into its product oxygenates with success. These outcomes are sufficiently promising that we have begun to consider scaling up the catalyst and integrating the technology platform with other technologies that we are also developing to enhance catalytic performance and for capture and collection of seeping natural gas from stationary sources as well as methane emissions from various human activities.

Biography

Professor Sunney Chan is George Grant Hoag Professor of Biophysical Chemistry, Emeritus at California Institute of Technology; Distinguished Research Chair Professor of Chemistry at National Taiwan University, and Distinguished Visiting Fellow at Academia Sinica. Professor Chan obtained his B.S. degree in chemical engineering and Ph.D. degree in physical chemistry from UC Berkeley. After one year of postdoctoral study in physics at Harvard University, he taught at UC Riverside before joining the faculty at California Institute of Technology in 1963, where he was associated with the Division of Chemistry and Chemical Engineering until his retirement in 2002.

In 1997, Professor Chan went to Taiwan and took up the post as Vice President for Research at Academia Sinica, where he established research infrastructures for research in chemical biology and genomic medicine as well as the Taiwan International Graduate Program.

Professor Sunney Chan is best known for his research on membrane proteins, especially metalloproteins that mediate the diverse range of activities in biological cells. For these contributions, he has garnered many honors and awards, including the William C. Rose Award from the American Society of Biochemistry and Molecular Biology (2004); and election to Academia Sinica (1986), TWAS (Academy of Sciences for the Developing World) (2004), International Academy of Physical Sciences (2010), and American Academy of Arts and Sciences (2011).

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