

UCSD chemist Mark Thiemens named to receive U.S. Department of Energy's Lawrence Award

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Media Contact: C. Michael Dabney, (619) 822-0761, mdabney@dur.ucsd.edu UCSD CHEMIST MARK THIEMENS NAMED TO RECEIVE

U.S. DEPARTMENT OF ENERGY'S LAWRENCE AWARD

The scientific achievements of chemist Mark H. Thiemens of the University of California, San Diego are lofty in more ways than one. Delving into the mystery of atmospheric phenomena, including greenhouse warming and ozone depletion from ground level into the stratosphere, Thiemens has contributed much to current thinking on environmental science, the solar system and the Earth's formation and evolution.

But these achievements would not have been possible had it not been for another milestone: Thiemens' discovery in 1991 that carbon dioxide in the stratosphere possesses a large and variable mass-independent isotopic composition, which later provided crucial insight into the study of atmospheric molecules and processes. For this discovery, Thiemens, professor of chemistry and biochemistry, has been named a 1998 recipient of the U.S. Department of Energy's Ernest O. Lawrence Award in the category of Environmental Science and Technology, Secretary of Energy Bill Richardson announced this week.

Thiemens is one five scientists nationwide chosen this year to receive the Lawrence Award, which recognizes scientists and engineers in various award categories, for their exceptional contributions to atomic energy and influences on such fields as materials science, nuclear medicine, physics and environmental research. Each winner will receive a gold medal, a citation and \$15,000.

Secretary Richardson said: "Ernest Lawrence's name recalls the American-born and educated scientist who, combining his scientific insights, engineering know-how and personal persistence, exemplifies the beginning of the rise of American science and engineering. The scientists we honor today follow in his footsteps. They have made marvelous contributions to our understanding of who we are and the world around us."

Thiemens' discovery, known as the mass independent isotope effect, has direct applications to the study of global climate, greenhouse gases, acid rain, stratospheric ozone chemistry and chemical physics. ("Mass independent" means that a chemical's atomic elements during chemical reaction cannot be distinguished or separated according to their mass.)

This discovery gave rise to additional achievements by Thiemens and his research group, including:

Being the first to identify a new isotopic form of airborne nitrous oxide that is created in the upper atmosphere. Nitrous oxide, commonly known in dental medicine as "laughing gas," is a chemical long considered a culprit in global warming and upper atmospheric ozone destruction. It enters the atmosphere through a variety of natural and man-made processes ranging from soil bacteria, the burning of organic matter including fossil fuels and the tropical forests, and the production of nylon. Thiemens' discovery of a new version of nitrous oxide challenged established thinking on the sources of this gas, and therefore, what happens to it when it enters the atmosphere.

Revealing from a series of small rocket launches in 1992 into the Earth's upper stratosphere and beyond that atmospheric ozone briefly merges with carbon dioxide and oxygen, transferring a significant amount of energy in the process. Until these findings, atmospheric chemists did not know that ozone reacted at these heights (roughly 27 miles above the Earth's surface) with anything other than man-made chemicals and light.

Being the first to demonstrate, with UCSD inorganic chemist William Trogler, how the manufacture of nylon contributes to both the "greenhouse effect" and the depletion of the ozone layer of the atmosphere. In a study published in 1991, Thiemens reported how large quantities of nitrous oxide are being released into the atmosphere as a byproduct of nylon manufacturing. (During manufacturing, nitrous oxide is released as a byproduct in the synthesis of adipic acid, one of the ingredients used in making nylon.) Citing Thiemens' work, DuPont, a major producer of adipic acid in nylon manufacturing, recognized the problem and has implemented emission controls. Other producers of adipic acid later followed.

Leading a team of UCSD chemists that concluded that grains of carbonate minerals found in a meteorite from Mars did not suggest past life on Mars, as previously thought by scientists at NASA and Stanford University, but were most likely the product of reactions with atmospheric carbon dioxide.

Thiemens received his Ph.D. at Florida State University and conducted post-doctoral research at the Enrico Fermi Institute for Nuclear Studies at the University of Chicago. The recipient of numerous professional awards and honors, Thiemens came to UCSD in 1980 where he chairs the Department of Chemistry and Biochemistry, and is founder and director of the multidisciplinary Center for Environmental Research and Training.

The Lawrence Award is named for the late Dr. Ernest Orlando Lawrence, inventor of the cyclotron (a particle accelerator). Two major Department of Energy laboratories in Berkeley and Livermore, Calif., are also named for him.

More than 2,000 scientists and research organizations were invited to make nominations for the award. The awards will be presented at a ceremony in Washington, D.C., this winter.

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