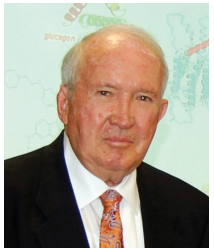
ROBERT M. MAHONEY is President and Chief Executive Officer of Belmont Savings Bank.

Mahoney received his M.B.A. from Columbia Business School in 1971. He is a 1970 graduate of the University of Massachusetts, where he earned a Bachelor of Science degree in Chemistry. He received the 1996 Distinguished Alumnus Award from the University of Massachusetts, and the 2006 Columbia University School of Business Leadership Award. He is the recipient of the 2009 Henry L. Shattuck Boston City Champion Award and the 2011 USS Constitution Museum's Charles Francis Adams Award for public service.

In February 2014, Mahoney was named the "most-admired CEO of a small or mid-sized company in Massachusetts" by the Boston Business Journal. The award follows the bank's significant recent success, doubling its assets in the past three years, surpassing one billion dollars, and opening three new in-store branches. In addition the bank created the Belmont Savings Bank Foundation, which has become a financial partner to many local non-profit groups, institutions, and schools operating within the communities where the bank operates. Since its inception two years ago, the Foundation has donated over $150,000 to local organizations.

Mahoney has held several community leadership positions in Massachusetts. He is Past Chairman of the United Way Board of Directors and Executive Committee, and serves on the University of Massachusetts Amherst Foundation board. He is also a cofounder of Community Gems, a collaboration of non-profit agencies that work together with community partners to meet the diverse needs of Greater Boston's youth and families. He is a board member of the Sitel Corporation, a $1.5B worldwide customer-service firm in Nashville and International Data Group, a $3B technology media and research group based in Boston. Mahoney also sits on the Archdiocese of Boston Finance Council and chairs the Council's Finance and Real Estate Steering Committee.

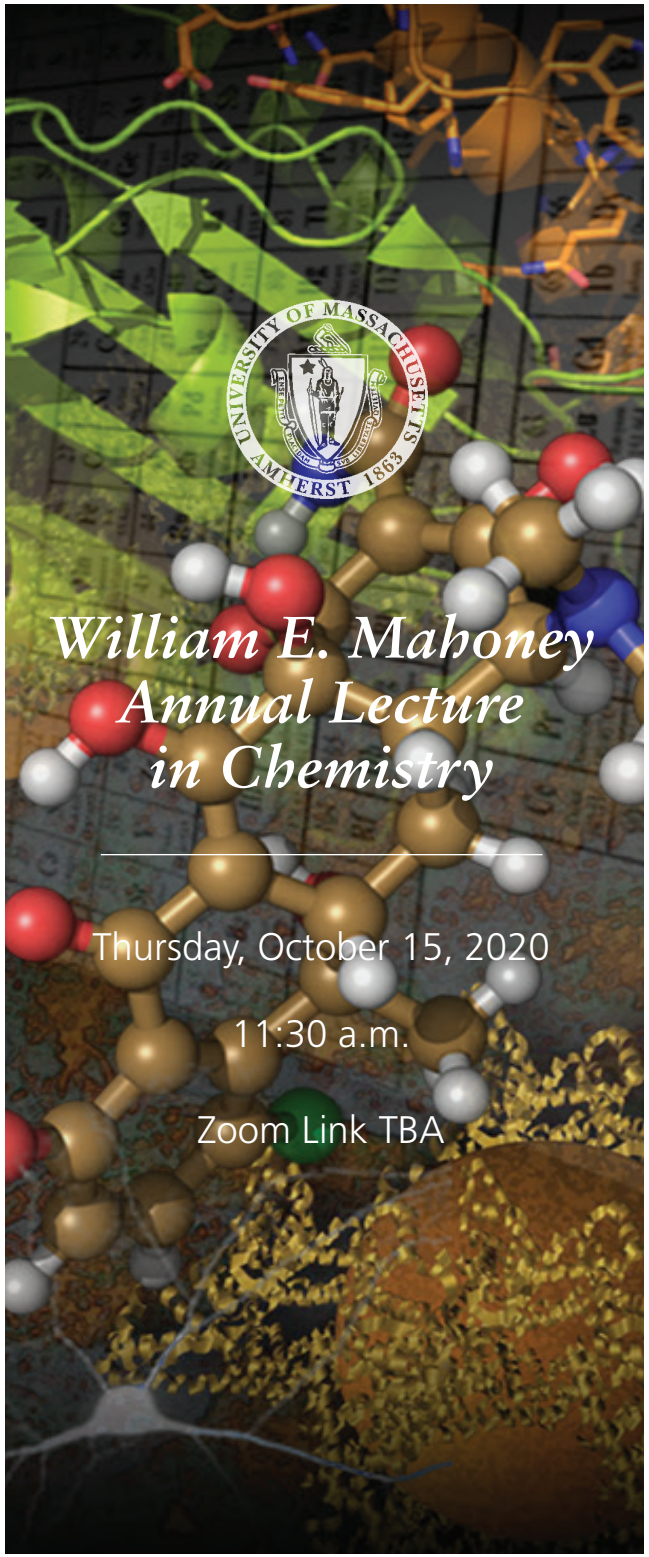


WILLIAM E. MAHONEY is a 1955 alumnus of the Department of Chemistry at the University of Massachusetts, Amherst. Professor Mahoney was Vice Chairman and Chief Operating Officer, as well as Chairman of the Executive Committee of the Board of Directors, of Witco Corporation (now Chemtura Corporation), a Fortune 500 manufacturer of specialty chemical and petroleum products.

After retiring from Witco in 1996, Professor Mahoney diverted his energies to developing the next generation of leadership in science and industry. Professor Mahoney was a longtime adjunct faculty member in the UMass Chemistry Department. He taught a highly successful seminar series entitled "The Business of Science: Contemporary Practices" for several years. Through this seminar series, students were introduced to topics in the management of science and technology by speakers from the business management communities. Professor Mahoney also chaired the Natural Sciences and Mathematics Advisory Council. In recognition of his distinguished achievements, the University of Massachusetts conferred to him the Chancellor's Medal in 1996. In 2006 he received the Distinguished Achievement Award. This award honors individuals for exceptional achievements in a chosen profession, demonstrated leadership, and exemplary accomplishments that merit special recognition by the campus. Professor Mahoney has served as director on several corporate boards, and was until recently the director of Harbor Acquisition Corporation. Currently, Professor Mahoney serves on a non-profit board.

Previous Mahoney Speakers

Professor George R. Church, 2019-2020
Professor Jack W. Szostak, 2018-2019
Professor Joanne Stubbe, 2017-2018
Professor Stuart Schreiber, 2016-2017
Professor Prashant Kamat, 2015-2016
Professor Paul Alivisatos, 2014-2015
Professor Peter Schultz, 2013-2014
Professor Richard DiMarchi, 2012-2013
Professor Hagan Bayley, 2011-2012
Professor Harry Gray, 2010-2011
Chancellor Marye Anne Fox, 2009-2010
Dr. Patricia Dehmer, 2008-2009
Professor Roald Hoffmann, 2007-2008
Dr. Ioannis Miaoulis, 2006-2007
Dr. Madeleine Jacobs, 2005-2006
Professor Richard Zare, 2004-2005
Professor Lawrence Krauss , 2003-2004
Professor Bassam Shakashiri, 2002-2003
Professor Dudley Herschbach, 2001-2002



William E. Mahoney Annual Lecture in Chemistry

Thursday, October 15, 2020

11:30 a.m.

Zoom Link TBA

“Capture of Carbon Dioxide from Room Air in Accelerated Droplet Reactions with Amines: Superacid/Superbase Chemistry at Air/Water Interfaces”

R. GRAHAM COOKS

Department of Chemistry
Purdue University, West Lafayette, Indiana

R. Graham Cooks, Henry Bohn Hass Distinguished Professor of Chemistry, Purdue University, was educated at the University of KwaZulu/Natal and Cambridge University. In a series of contributions to instrumentation, his group has built many novel instruments that were influential in the development of mass spectrometry. By combining soft ionization with two stages of mass analysis, the group introduced direct analysis of mixtures by tandem mass spectrometry, a capability that reflected on Cooks’ Ph.D. research in Natural Products isolation and characterization. The lab has also contributed to the development of miniature mass spectrometers, molecular imaging by desorption electrospray ionization (DESI), surface modification by ion soft landing and ion dissociation by surface-induced dissociation (SID). Cooks’ interests involve fundamental studies of ionic reactions and ion/surface collision processes on the one hand and applications of MS to medicine, biochemistry and organic chemistry on the other. Graham Cooks is the author of 1200 publications and more than US 50 patents. He has an h-index of 109 (ISI Web of Science) and he is privileged to have served as major professor to 150 Ph. D. graduates. He is a member of the American Academy of Arts and Sciences, the National Academy of Inventors and the US National Academy of Sciences.

ABSTRACT

Microdroplets display distinctive interfacial chemistry, manifested as accelerated reactions relative to those observed for the same reagents in bulk.[1] Examples of this phenomenon are given. The key factor responsible is partial solvation of reagents at the interface.[2] The example of the capture of carbon dioxide by amines at the interfaces of organic droplets to form carbamic acids is described in detail.[3] The reaction is followed by electrospray ionization (ESI) mass spectrometry which shows the protonated and deprotonated carbamic acid in the positive and negative modes, respectively. By using electrosonic spray ionization (ESSI) the amine droplets are only exposed to CO_2 vapor (used as nebulization gas) so confining reaction to the gas-liquid interface. Reaction proceeds much faster in droplets than in the bulk. Trace amounts of water accelerate the reaction, presumably by water autoionization at the charged interface with formation of superacid. This suggested mechanism of protonation of CO_2 followed by nucleophilic attack by the amine is analogous to that previously advanced for imidazole formation from diamines and carboxylic acids. Evidence for this mechanism comes from explicit solvent computations [4] and from reaction acceleration in other systems, such as benzimidazole formation from formic acid and 1,2-diaminobenzene, which involves protonated formic acid. [5]

[1] Wei, Z.; Li, Y.; Cooks, R. G.; Yan, X., Accelerated Reaction Kinetics in Microdroplets: Overview and Recent Developments. *Annu Rev Phys Chem* **2020**, 71, 31-51.
[2] Yan, X.; Bain, R. M.; Cooks, R. G., Organic reactions in microdroplets: Reaction acceleration revealed by mass spectrometry. *Angew. Chem., Int. Ed.* **2016**, 55 (42), 12960-12972.
[3] Huang, K.-H. Wei, Z. and R. Graham Cooks, submitted for publication.
[4] Narendra, N.; Chen, X.; Wang, J.; Charles, J.; Cooks, R. G.; Kubis, T., Quantum Mechanical Modeling of Reaction Rate Acceleration in Microdroplets. *J. Phys. Chem. A* **2020**, 124 (24), 4984-4989.
[5] Basuri, P.; Gonzalez, L. E.; Morato, N. M.; Pradeep, T.; Cooks, R. G., Accelerated microdroplet synthesis of benzimidazoles by nucleophilic addition to protonated carboxylic acids. *Chem. Sci.* **2020**. DOI: 10.1039/d0sc02467h