

WILLIAM H. CASEY

Department of Chemistry; Department of Geology;
University of California, Davis,

Education:

Ph.D.: The Pennsylvania State University (1985)

M.Sc.: University of California (1980)

B. A.: The University of the Pacific (1976)

Employment History:

1976-1978 Graduate Student, University of California

1979-1980 Unocal Geothermal Division, isotope geochemist

1981-1985 Graduate Student, Pennsylvania State University

1986-1991 Sandia National Laboratories, geochemist

1991-present Professor, University of California

1991-2005 Department of Land, Air and Water Resources, College of Agriculture

1991-present Department of Geology, College of Math and Physical Sciences

2005-present Department of Chemistry, College of Math and Physical Sciences

Professional Details (partial list):

Herbert A. Young Society Dean's Fellow (2012-2015)

Recipient of the Inaugural *Werner Stumm Medal* for Technical Innovation, 2010, European Association of Geochemistry, June 2010.

Fellow, Geochemical Society; Fellow, European Association of Geochemistry

Associate Editor: *American Journal of Science*

Associate Editor: *Geochimica Cosmochimica Acta*, resigned 2012

Joint Publications Committee, *Geochimica Cosmochimica Acta 2010-2011*

Life Member, American Geophysical Union,

Former Editor, EOS

Awards Committee: ACS, Geochemistry Division (2000-2002)

National Chair: American Chemical Society Geochemistry Division (1999)

Program Chair: American Chemical Society Geochemistry Division (1998)

Selected Other Professional Service (partial list):

Tenure and Promotion Advice to Yale University, UC Berkeley, Princeton University, Stanford University, the University of Nebraska, Ben Gurion University, many others

Site Visitor to ORNL for the US DOE Basic Energy Sciences Directorate

Member of the DOE Committee of Visitors for OBES/Chemical Sciences

Review Committee, Environmental Molecular Science Institution, Stanford University

Selected and Recent University-wide Academic Service (partial list)

2010-2013 UCD Academic Senate - Joint Personnel Committee, Search Committee-Chemical Engineering and Material Science; Advisor to UC Campus Counsel (appointed by M. Stanton and B. Aguirre)

2009-2010 Chair of Search Committee, Dept. of Chemistry; Graduate Group review committee for Applied Science graduate group. UCD Academic Senate - Joint Personnel Committee, member.

2008-2009 Chair, UCD Academic Senate - Committee on Academic Personnel
UCD Academic Senate Executive Council; UCD NMR Usage Committee

2007-2008 Vice-Chair, UCD Academic Senate Committee on Academic Personnel
UCD Academic Senate Executive Council; 2007-2008 UC Systemwide Committee on Academic Personnel; UCD NMR Committee

2006-2007 member, UCD Academic Senate Committee on Academic Personnel; this committee handles faculty appointments, tenures and various promotion actions for UCD.

2005-2006 UC Systemwide Representative Assembly. UCD Chemical Safety Committee.
Executive Committee, Agricultural Chemistry Graduate Group

Recent Invited Lectures (partial list)

- 2014 (invitations) Seaborg Center, Lawrence Berkeley National Laboratory (host=D. Shuh); ACS National Meeting (Keynote address *Advances in understanding the environmental geochemistry of manganese (Mn) oxides*, March, 2013)
- 2013 Center for Sustainable Material Processing, Oregon (host=D. Johnson); Department of Geology, UC Berkeley (host=A. Hoffmann).
- 2012 University of California, Berkeley (host: D. DePaolo). Lawrence Berkeley National Laboratories Center for Isotope Geochemistry.
- 2011- Seminar speaker: Department of Earth Sciences, UCLA (host=Prof. McKeegan); Geology Dept. UCD Seminar;
- 2010- Keynote address at the Goldschmidt Conference in Geochemistry (host=Prof. Rustad); invited lecture to Institute for Advanced Studies at The Hebrew University in Jerusalem, July, 2010 (hosts=Profs. Ira A. Weinstock and Ronny Neumann). Invited lecture to the Geosciences Division, LBNL (host=Prof. DePaolo).
- 2009- Keynote addresses- *Molecular Computational Geochemistry*, National ACS Meeting, Salt Lake City (host=K. Rosso, B. Bickmore); *Crystal Growth and Co-precipitation*, National ACS Meeting, Salt Lake City (host=A. KapplerY. Fujita); *NSF-Oregon Green Chemistry Institute* (a joint University of Oregon/Oregon State Institute), Belknap Springs, Oregon (host=Darren Johnson). *LBNL Molecular Foundry* ((host=Dr. DeYoreo); *Dept. of Geology and Environmental Engineering*; Notre Dame University (host=Prof. Burns).
- 2008- Keynote address: *Advanced Approaches to Investigating Adsorption at the Solid-Water Interface* National ACS Meeting, New Orleans, Louisiana (host=L. Criscenti; L. Katz; H. Allen); *Emory University Dept. of Chemistry* (host=Prof. Hill); *Sandia National Laboratory* (host=M. Nyman). Keynote address: *Minerals as Molecules*; Goldschmidt Conference in Geochemistry, in Cologne, Germany. *NSF-Oregon Green Chemistry Institute* (a joint University of Oregon/Oregon State Institute), Belknap Springs, Oregon (host=Doug McKay).

Research Profile My research spans Chemistry and Earth Science and my goal is to transfer new concepts about molecular reaction pathways and pressing environmental problems between these fields. I want to articulate a set of principles explaining how rapidly oxide structures react in water and we have made great strides in understanding---these are ligand-exchange reactions and we have identified sets of common processes that affect both polyoxometalate clusters and extended oxide surfaces. The reaction pathways are not intuitive yet involve broadly similar chemistries. My research interests vary from field to laboratory to theory, but always with focus on aqueous solutions (see attached list of publications) and among my greatest pleasures is to collaborate with others and to advance the careers of young scientists.

This approach to research in the Earth sciences is best typified by an article in 2011 in *Nature Chemistry* (Hocking et al., 2011), where co-authors and I show that the most studied catalysts for solar energy production actually form common minerals. It is the mineral structure that does the important work, and this work in the Precambrian period of Earth history led to the evolution of Photosystem-II and photosynthesis.

Such a catholic view of reactions is not traditional within Geochemistry. Traditionally, this field has been dominated by estimates of element fluxes and large multicomponent thermodynamic calculations. I want to see this field evolve to the stage where reaction pathways can be confidently predicted and I now believe that isotope-exchange pathways in nanometer-size aqueous ions are at the appropriate scale to build this framework.

Evidence of Research Impact Textbooks incorporating Casey's research include Sposito's (*The Surface Chemistry of Natural Particles*, Oxford, 2004; pg. 115-121; *Chemical Equilibria and Kinetics in Soils*, Oxford, 1994; p.100), and McBride's (*Environmental Chemistry of Soils*, Oxford, 1994; p. 217-220), as well as textbooks within geochemistry (Lasaga, *Kinetic Theory in the Earth Sciences*, Princeton Press, p. 725) and chemistry (Richens, *The Chemistry of Aqua Ions*, Wiley, p. 165). This research was cited as particularly promising in the National Research Council Report *Basic Research Opportunities in the Earth Sciences* (National Academy Press; 2001, see p. 60) and is widely cited in chemistry, for such disparate subjects as catalysis and environmental chemistry (e.g., Kanan and Nocera, *Science* 321, 1071-).

Patents: '*Electrochemical Decomposition of Soil and Water Contaminants In Situ*' W. H. Casey, B. Miller, P. A. Rock. U.S. Patent #09,031,218. UC Case No. 95-002-1

Teaching: Casey proseletyzes wildly across disciplines, including '*Environmental Water Chemistry*' (CHE-100) that is taken by students from three colleges and some faculty. He emphasizes the enormous overlap in heritage between the pioneers of Inorganic Chemistry and Earth scientists. It begins by sending out samples of stream waters and ends with an enormous effort in thermodynamic simulation, and draws examples from such Earth science luminaries as Linus Pauling. Casey teaches well over 500 students each year and tells them that nothing is as exciting as changing the world through scientific research.

Mentoring: Former and Current Postdoctoral Scholars: Dr. Jungho Son (current at UCD), Dr. Andy Ohlin (Currently a Queen Elizabeth-II Fellow at Monash University, Australia), Dr. Stephen Harley (now at LLNL); Dr. Mathew Wander (now Post-Doc at Drexel University); Dr. Edina Balogh (BioRad Industries), Dr. Jay Black (CSIRO, Australia), Dr. Jorgen Rosenqvist (Post-Doc; University of Leeds), Prof. Andrew Stack (formerly faculty of Earth and Planetary Sciences, Georgia Tech, now at ORNL), Dr. John Loring (Research Professor, University of Umea, now at PNNL), Dr. Jan Nordin (Eka Chemicals, Sweden), Dr. David Sullivan (Solvay Corporation, USA), Prof. Susan Neugebauer-Crawford (chair of the Department of Chemistry, California State University-Sacramento), Dr. Ping Yu (Research Staff, UCD), Dr. Alasdair Lee (faculty, Curtin University, Australia), Dr. Magnus Karlsson (Industrial Research, Sweden), Dr. Ryoji Shiraki (Research Staff, UCD), Dr. Christian Ludwig (Professor at University of Lausanne and Permanent Scientist at the Paul-Scherrer Institute), Dr. J.-L. Devidal (Univ. Paul Sabatier), Dr. David Levy (Shepard-Miller Company), Prof. Britt Holmén (faculty, University of Connecticut),

Former and Current Graduate Students: Rene Johnson (finishing at UCD; NSF Fellow); Adele Panasci (at UCD, Lawrence Fellow), Lizhi Tao (UCD), Greg McAlpin (start-up biotech); Eric Villa (Creighton University), Hege Indresand (Research Staff, UCD); Fiona Lau (Toxicologist, Pfizer Corporation), Jackie Houston (faculty, California State University-Sacramento), Tiffany Thomas (Tetra Tech Corporation, Adjunct Faculty), Matt Weaver (Pace Corporation), Alex Chow (Industrial Research), Jeff Warner (Canadian staff synchrotron scientist), JoAnn Holloway (USGS), John Loring (Research Professor, University of Umea), Giulio Ferruzzi (USDA), Greg Mandell (Law School, University of California), Molly McBeath (formerly USGS), Maria Kelly, Colette Zemitis (California EPA).

Undergraduate Students: Ariel Vaughan (UCD); Chris Colla (UCD grad student), Katie Gronotte (biotech company), Will Elliot (UCSB grad student), Shauna Christianson (BYU), Alia Lateef (graduate school in Chemistry at USC), Nathan Andrews (Med School), Christian Lawler (grad student, Stanford University), Rebecca Sutton (PhD and staff scientist, The Environmental Working Group), Jeanette Sison (UCB School of Public Health), Ricki Villarreal (applying to graduate school in Geology), Erin Walling (Surgeon), Ursula Kubacki-Beard (Med School), Anye Mercy (former graduate student, Yale University).