



THE UNIVERSITY OF
SYDNEY

Hans Freeman Lecture 2023

Professor Katherine Franz

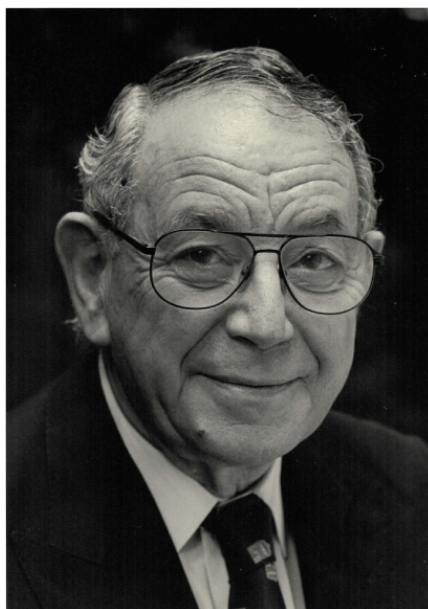


Tuesday 27th June 2023

Chemistry Lecture Theatre 4

Hans Freeman AM, FAA

Hans Freeman, born in 1929 in Breslau, Germany, immigrated to Australia in 1938. He excelled academically, receiving First Class Honours and a University Medal in Chemistry from Sydney University in 1949. Under the guidance of R. J. W. Le Fèvre, he completed his master's degree in 1952 before being granted a Rotary Foundation Fellowship to pursue a year of further studies at the California Institute of Technology, where he worked with the renowned crystallographer, Linus Pauling.



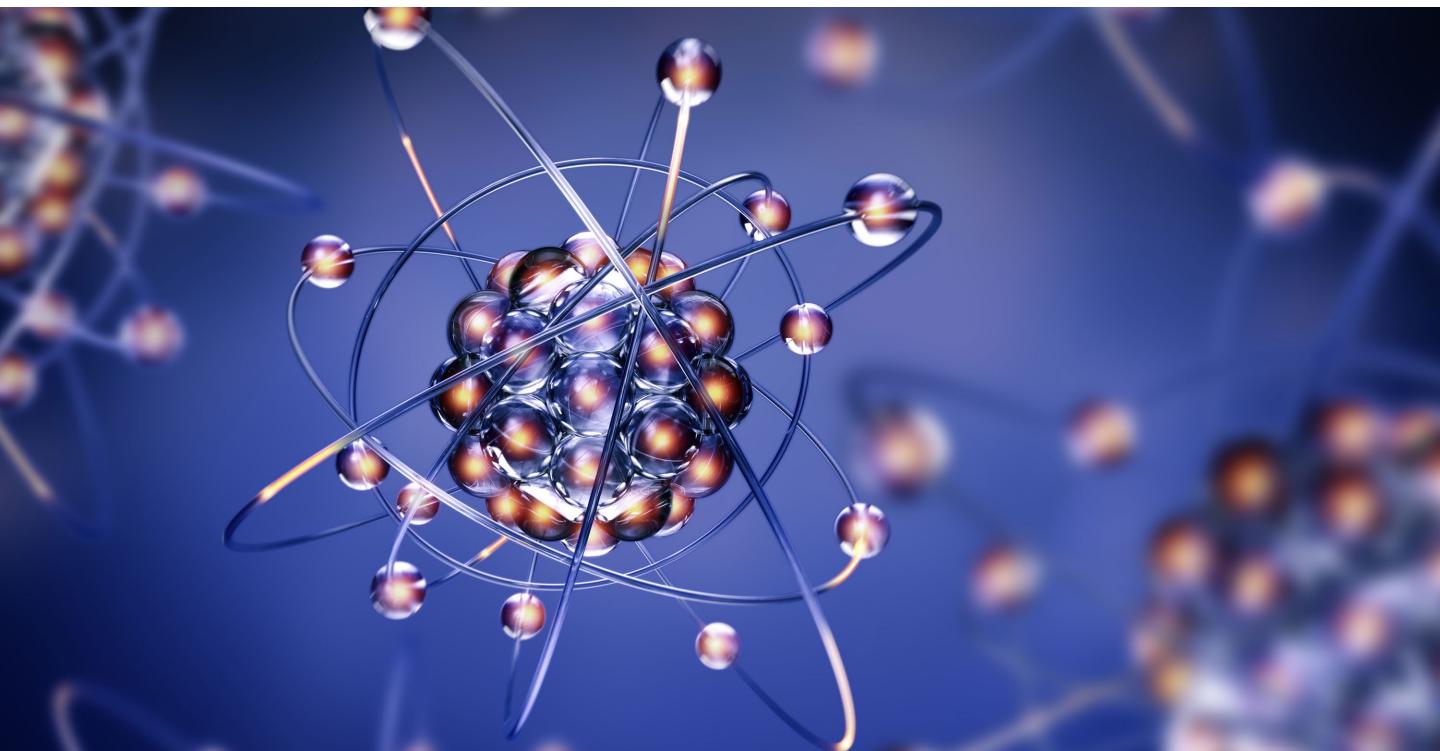
Upon returning to Sydney, Freeman completed his PhD under Le Fèvre's guidance, focusing on investigating the crystal structures of metal complexes with biological ligands to understand the function of metals in biological systems. Hans joined the School of Chemistry in 1954 and became Professor of Inorganic Chemistry in 1971.

Hans Freeman played a pioneering role in advancing X-ray crystallography in Australia, constructing his own crystallographic apparatus and mastering the necessary computations, initially performed by hand, and later aided by programs he developed for the SILLIAC computer. He was actively involved in connecting local organisations with international bodies of crystallographers, including his membership and chairmanship of Australia's National Committee on Crystallography, which was linked to the International Union of Crystallography. As a member of Australia's National Committee on Crystallography, Hans represented Australia as a delegate in international congresses of crystallography from 1984 to 1990. He was also instrumental in the development of synchrotron science in Australia.

Hans Freeman's remarkable contributions to crystallography, his pioneering spirit, and his dedication to advancing scientific knowledge have left an enduring legacy in the field.

About the Hans Freeman Lectureship

The Hans C. Freeman Lectureship was established in 2010 by the Foundation for Inorganic Chemistry within the University of Sydney, with generous support from the Freeman family and many other generous donors, to mark both the many outstanding contributions of Professor Hans Freeman AO, to Australian science and his co-founding of the Foundation with Dr Alexander Boden AO. The aim of the lectureship is to enhance the international standing of the School of Chemistry and the University by fostering new collaborations and linkages with outstanding academics from around the world. The recipient of the annual lectureship will have an outstanding record in any field related to inorganic chemistry or its teaching and will present a series of lectures within the School of Chemistry over a period of weeks. During their stay at the University, the lecturer will be expected to interact with postgraduate and honours students in a way that will enhance their appreciation of science and the international opportunities that it offers.



Previous Lecturers

- 2010 [Emeritus Professor Trevor Hambley](#)
University of Sydney
- 2011 [Professor Harry B. Gray](#)
California Institute of Technology
- 2012 [Professor Ed Solomon](#)
Stanford University, USA
- 2013 [Professor Ken Raymond](#)
University of California, Berkeley
- 2014 [Emeritus Professor Alan Bond](#)
Monash University, Australia
- 2015 [Professor Alison Butler](#)
University California Santa Barbara, USA
- 2016 [Professor Erwin Reisner](#)
University of Cambridge, UK
- 2017 [Professor Paul Mulvaney](#)
University of Melbourne
- 2018 [Professor Seth Cohen](#)
University of San Diego, USA
- 2022 [Professor Martina Stenzel](#)
School of Chemistry, UNSW Sydney

Professor Katherine Franz

Duke University, USA

EDUCATION

Massachusetts Institute of Technology

Ph.D., Inorganic Chemistry (2000); advisor: Prof. Stephen J. Lippard
NIH Postdoctoral Fellow (2000–2003); advisor: Prof. Barbara Imperiali
Wellesley College, Wellesley, MA

B.A., Chemistry and French, 1995, magna cum laude

PROFESSIONAL EXPERIENCE

Duke University

Chair, Department of Chemistry, 2017 – current

Professor, 2015 – current

Associate Chair, Department of Chemistry, 2013 – 2017

Associate Professor of Chemistry, 2010 – 2015

Assistant Professor of Chemistry, 2003 – 2010

HONORS, Select

Southern Chemists Award, Memphis Section of the ACS, 2022

Charles H. Stone Award, ACS Carolina Piedmont Section, 2021

ACS Award for Encouraging Women in the Chemical Sciences, 2020

Duke's Trinity College Dean's Diversity Award, 2020

Dean's Award for Excellence in Mentoring, Duke University Graduate School, 2016

Fellow of the Royal Society of Chemistry, 2014

Bass Society Fellow, 2014 (Duke program for excellence in research & teaching)

Camille Dreyfus Teacher-Scholar Award, 2009

Alfred P. Sloan Research Fellow, 2008

ACS PROGRESS/Dreyfus Lectureship Award, 2007

NSF CAREER Award, 2005

Professor Katherine Franz

Duke University, USA

Katherine J. Franz is the Alexander F. Hehmeyer Professor and Department Chair of Chemistry at Duke University in Durham, North Carolina, USA. As an undergraduate she conducted research with Prof. James Loehlin at Wellesley College and Dr. Richard Fish at the Lawrence Berkeley National Lab. She obtained her PhD in inorganic chemistry with Prof. Stephen J. Lippard at MIT, and completed an NIH postdoctoral fellowship with Prof. Barbara Imperiali, also at MIT. Since 2003, Kathy and her research team at Duke have worked to elucidate the structural and functional consequences of metal ion coordination in biological systems, both by endogenous species and by synthetic molecules of their own design.

Prof. Franz's research program in bioinorganic chemistry addresses questions related to how cells manage nutrient and toxic metals, and how this information can be used to find vulnerabilities and opportunities for chemical intervention against microbial infection, cancer and other diseases. Metal ions are required micronutrients for essential life processes, yet can be harmful depending on context. Prof. Franz and her research team pioneered the design, synthesis, and evaluation of molecules that are conditionally activated to alter their metal-binding properties to manipulate endogenous metal-trafficking processes for therapeutic benefit.

Of her many awards, she is most proud of those received for graduate student mentoring, diversity, and encouraging women in the chemical sciences. Prof. Franz has mentored over 40 graduate students and post-doctoral scholars, and more than 50 undergraduate student researchers. In her current role as Department Chair, she has implemented and championed best practices for inclusive excellence in order to cultivate a positive departmental culture of diverse scientists and community members.

Infectiously inorganic: A metallocentric and mentoring-centric view of advancing bioinorganic chemistry at the host-pathogen interface

Katherine J. Franz

*Department of Chemistry, Duke University, Durham, NC, USA
katherine.franz@duke.edu*

Normal and pathogenic cells require a menu of metal nutrients for optimal growth, while also deploying strategies to protect against toxicity associated with misregulated or excessive levels of metals, including iron, copper, and zinc. Cells adjust mechanisms of metal intake, outflux, storage, and usage depending on the type of cell, local growth conditions, and in response to stress. These situations present opportunities to manipulate cellular metals as therapeutic strategies across a number of diseases. In this presentation I offer a metallocentric view on utilizing small molecules and peptides that leverage unique metallobiology associated with infection to selectively inhibit growth of pathogenic microorganisms and combat drug-resistant infectious disease. As this research has been advanced by a diverse team of students and collaborators over many years, I will emphasize the many ways in which mentoring leads to desirable outcomes for science.

