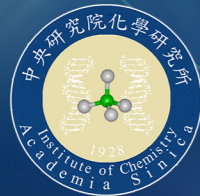


Sunney Chan Lecturer

- 2004—■ Douglas C. Rees
- 2005—■ Gary W. Brudvig
- 2006—■ Harry B. Gray
- 2007—■ Carolyn R. Bertozzi
- 2008—■ Dennis A. Dougherty
- 2009—■ Edward I. Solomon
- 2010—■ Michael P. Sheetz
- 2011—■ Michael A. Marletta
- 2013—■ James C. Liao
- 2014—■ Kenneth D. Karlin
- 2015—■ Chad A. Mirkin
- 2017—■ David Milstein
- 2018—■ Jennifer A. Doudna
- 2019—■ Mark E. Davis
- Apr. 2023—■ Peter H. Seeberger
- Oct. 2023—■ Michael K. Rosen

Liquid-Liquid Phase Separation of Biological Systems

Biomolecular condensates are two- and three-dimensional cellular compartments that concentrate specific collections of proteins, nucleic acids and small molecules without an encapsulating membrane. Many condensates behave as dynamic liquids, and are believed to form through liquid-liquid phase separation (LLPS) driven by interactions between multivalent macromolecules. The biochemical and cellular functions of condensates arise from composition—the specific exclusion or enrichment of molecules. While much is known about the factors that dictate the macromolecular composition of condensates, our understanding of small molecule composition remains limited. In my talk I will describe our recent experimental and computational studies of the partitioning of small organic compounds into condensates. These have revealed a generic hydrophobicity that emerges in condensates upon LLPS, which then governs the enrichment and exclusion of organic compounds based on their physical properties. Additionally, I will discuss a new direction in my lab focused on understanding how chromatin may be organized by LLPS, and dynamically regulated by various remodeling machineries. These behaviors may contribute to formation of functionally distinct compartments in the eukaryotic nucleus, which are important to processes including gene regulation and DNA repair.



Institute of Chemistry
Academia Sinica



Sunney Chan Lecture

The 16th Annual

Sunney Chan Lecture

International Conference Hall
Humanities and Social
Sciences Building

2023

10/6
2:30 pm



Michael K. Rosen

Department of Biophysics
Howard Hughes Medical Institute
University of Texas Southwestern Medical Center

Liquid-Liquid Phase Separation of Biological Systems

Sunney Chan Lecture



The Sunney Chan lecture was established at Academia Sinica in 2003 to honor Sunney for his six years of dedicated service to Academia Sinica and Taiwan during his term as Vice President of Research at Academia Sinica. Sunney took an early retirement from Caltech in 1997, where he spent essentially the bulk of his professional career, to work in Taiwan. Aside from rebuilding the Institute of Chemistry in a modern image, he established the Taiwan International Graduate Program and led the development of biotechnology in Taiwan. He helped the National Science Council of Taiwan put together the National Research Program in Genomic Medicine to promote basic and applied research in genomics, proteomics, and bioinformatics within the life science community in Taiwan. He also led the effort to create a Research Center on Genomics at Academia Sinica. Largely through Sunney's vision and hard work, Taiwan has now in place a research infrastructure to promote and support research in biomedical sciences and modern life sciences on this Island.

As expected, Sunney has also been active in the chemical community, promoting modernization of the undergraduate curriculum in chemistry, raising the standards of graduate research in the national universities, nurturing young scholars and junior faculty, and pointing the way to improving the infrastructure for basic and applied research in the molecular sciences. He has been particularly inspirational to young scientists, and the generosity, with which he has shared his chemistry, insights about science, wisdom on life, and his knowledge about wine, food, gourmet dining, and restaurants, is well known throughout the community here.

In recognition of these efforts, President Yuan T. Lee has established the Sunney Chan Lecture in Chemical Biology in order to bring to the Taiwan Scientific Community an eminent scientist who best exemplifies Sunney's enthusiasm as a scientist, teacher and mentor, and his devotion to public service.

The 2023 Lecturer

Michael K. Rosen

Michael K. Rosen received B.S. and B.S.E. degrees in Honors Chemistry and Chemical Engineering from the University of Michigan in 1987. He was a Winston Churchill Foundation Scholar in Allen Battersby's laboratory at the University of Cambridge in 1987-8. He received his Ph.D. in 1993 from Stuart Schreiber's laboratory in the Harvard Chemistry Department for structural and biochemical studies of FKBP12. He was a Damon Runyon-Walter Winchell post-doctoral fellow in the laboratories of Lewis Kay and Tony Pawson at the University of Toronto and the Samuel Lunenfeld Research Institute from 1993-1995. There he studied autoinhibition of the Crk protein and developed methods for selective methyl group labeling of proteins in a deuterated background, enabling NMR studies of large macromolecules. Rosen began his independent laboratory in the Cellular Biochemistry and Biophysics Program at the Memorial Sloan-Kettering Cancer Center, and Department of Biochemistry and Structural Biology at Weill Cornell Medical College in 1996. He joined the Department of Biochemistry at UT Southwestern Medical Center in 2001, and was elected into HHMI in 2005. In 2012 he was named the inaugural Chair of the Department of Biophysics, and holds the Mar Nell and F. Andrew Bell Chair in Biochemistry. Rosen uses biophysical techniques to discover principles of cellular organization. His early work elucidated physical mechanisms underlying Rho GTPase signaling pathways that control actin dynamics, establishing general principles of

allostery and signal integration. Since 2009 he has studied macromolecular liquid-liquid phase separation and biomolecular condensates, eukaryotic cell compartments that concentrate macromolecules without an encapsulating membrane. His work has informed on the formation, regulation, composition and function of phase separated compartments *in vitro* and in cells. For this work he was awarded the 2019 Wiley Prize, and in 2020 was elected into the U.S. National Academy of Sciences.

Selected Honors and Awards

- United States National Academy of Sciences, 2020
- Wiley Prize, 2020
- Allen Distinguished Investigator, Paul G. Allen Foundation, 2018
- Emil Kaiser Award, Protein Society, 2018
- Mar Nell and F. Andrew Bell Distinguished Chair in Biochemistry, UT Southwestern, 2009
- Inaugural Edith and Peter O'Donnell Award from the Texas Academy of Medicine, Engineering and Science, 2006
- Howard Hughes Medical Institute, 2005
- Boyer Award, Memorial Sloan-Kettering Cancer Center, 2001
- Kimmel Scholar Award, Sidney Kimmel Foundation for Cancer Research, 1998
- Presidential Early Career Award for Scientists and Engineers (PECASE), 1997
- Beckman Foundation Young Investigator Award, 1997