Celebrating the Legacy of Anna S. Naff

The Department of Chemistry at the University of Kentucky organizes an annual Symposium on Chemistry and Molecular Biology. This Symposium was established in honor of Anna S. Naff, a University of Kentucky graduate, through the generous support of Dr. Benton Naff of the N.I.H. The Symposium has an interdisciplinary character and is attended by students and faculty from Chemistry, Biochemistry, Biology, Pharmacy, Engineering, Agriculture and Medicine. The Symposium features renowned experts from around the world, including Nobel prize-winning scientists, and is attended by faculty and students from colleges and universities in Kentucky and the contiguous States.

Biography

ANNA LEA SCHOULTIES NAFF was born on a small farm in Northern Kentucky, November 29, 1920. Her early education and that of a younger brother began at Dale Grade School and continued through Cold Spring High where her favorite subject was mathematics. She was the salutatorian for her high school class.

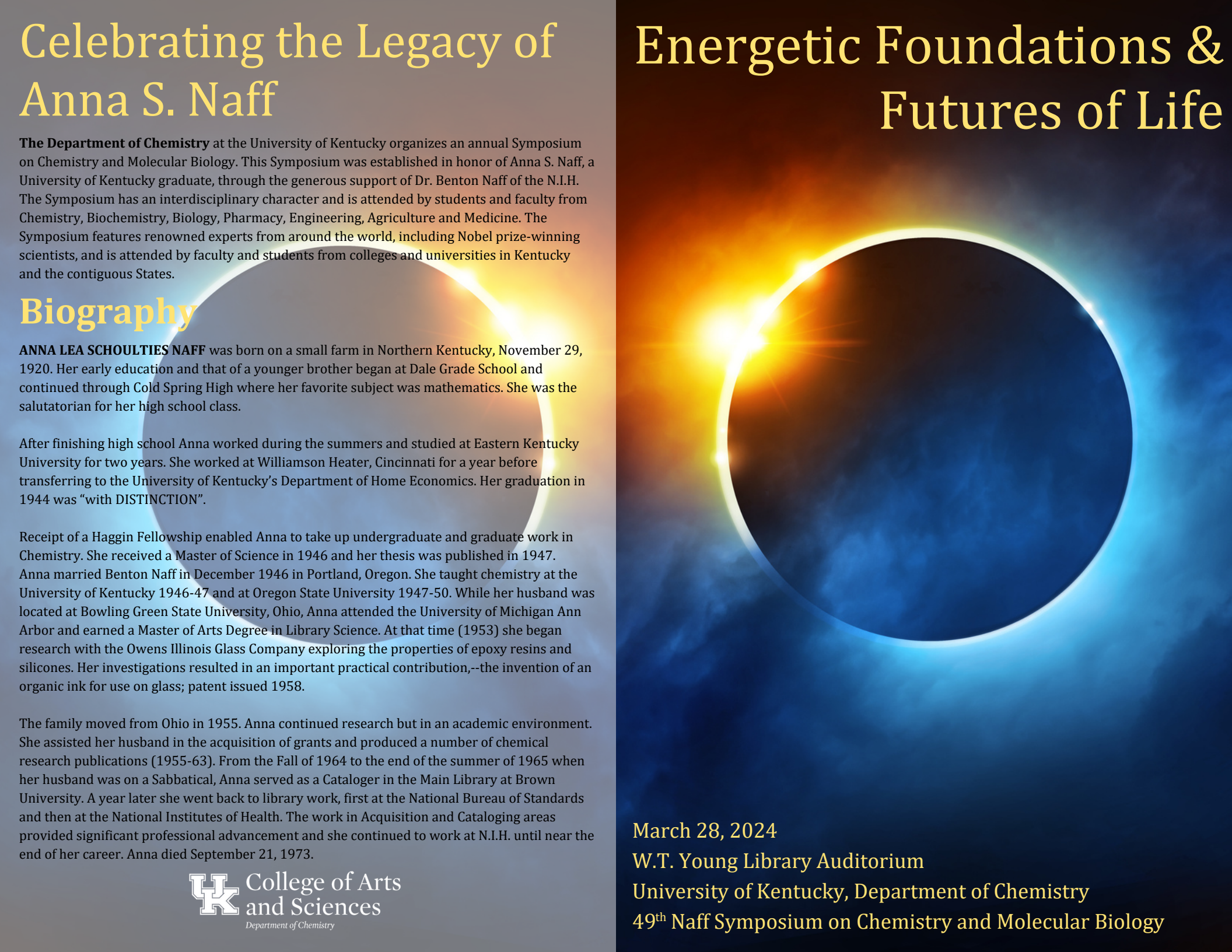
After finishing high school Anna worked during the summers and studied at Eastern Kentucky University for two years. She worked at Williamson Heater, Cincinnati for a year before transferring to the University of Kentucky's Department of Home Economics. Her graduation in 1944 was "with DISTINCTION".

Receipt of a Haggin Fellowship enabled Anna to take up undergraduate and graduate work in Chemistry. She received a Master of Science in 1946 and her thesis was published in 1947. Anna married Benton Naff in December 1946 in Portland, Oregon. She taught chemistry at the University of Kentucky 1946-47 and at Oregon State University 1947-50. While her husband was located at Bowling Green State University, Ohio, Anna attended the University of Michigan Ann Arbor and earned a Master of Arts Degree in Library Science. At that time (1953) she began research with the Owens Illinois Glass Company exploring the properties of epoxy resins and silicones. Her investigations resulted in an important practical contribution,--the invention of an organic ink for use on glass; patent issued 1958.

The family moved from Ohio in 1955. Anna continued research but in an academic environment. She assisted her husband in the acquisition of grants and produced a number of chemical research publications (1955-63). From the Fall of 1964 to the end of the summer of 1965 when her husband was on a Sabbatical, Anna served as a Cataloger in the Main Library at Brown University. A year later she went back to library work, first at the National Bureau of Standards and then at the National Institutes of Health. The work in Acquisition and Cataloging areas provided significant professional advancement and she continued to work at N.I.H. until near the end of her career. Anna died September 21, 1973.

College of Arts and Sciences
Department of Chemistry

Energetic Foundations & Futures of Life



March 28, 2024
W.T. Young Library Auditorium
University of Kentucky, Department of Chemistry
49th Naff Symposium on Chemistry and Molecular Biology

Speakers

WOLFGANG NITSCHKE

CNRS, Marseille, France

Prof. Nitschke has been studying bioenergetics all his academic life, beginning with a Ph. D. on photosynthetic electron transfer in plants at the University of Regensburg in Germany and, after drifting towards prokaryotic photosynthesis during 5 years as post-doctoral fellow in Paris, serving as a professor in Freiburg Germany. Upon moving to Marseille, France, he addressed electron transport and the implied energetics in an expanding repertoire of biochemical processes and bacterial species. He led the "Evolution of Bioenergetics" research group from 1995 until his retirement in 2023 and was vice-director of the department "Bioenergetics and Protein Engineering" from 2002 to 2006. Through a career dedicated to biological energy conversion, he was convinced of the fundamental importance of energy to life (and beyond). His professional bio reports that since his retirement he is 'able to finally do research without the crazy administrative workload'.

GARY W. BRUDVIG

Director, Yale Energy Sciences Institute at Yale University

Prof. Gary Brudvig is the Benjamin Silliman Professor of Chemistry, Professor of Molecular Biophysics & Biochemistry, and Director of the Yale Energy Sciences Institute at Yale University. He received his B.S. (1976) from the University of Minnesota, his Ph.D. (1981) from Caltech and was a Miller Postdoctoral Fellow at the University of California, Berkeley from 1980 to 1982. Professor Brudvig has been on the faculty at Yale since 1982. Brudvig served as Chair of the Chemistry Department from 2003-2009 and 2015-2018. Since 2012, Brudvig has been the Director of the Energy Sciences Institute located at Yale's West Campus where he oversees the development of new research programs and facilities related to renewable energy, alternative fuels, and materials science. His research involves study of the chemistry of solar energy conversion in photosynthesis and work to develop artificial bioinspired systems for solar fuel production.

SHELLEY MINTEER

Director, Kummer Institute Center for Resource Sustainability, Missouri University of Science and Technology

Prof. Shelley Minteer is a Professor of Chemistry and the Director of the Kummer Institute Center for Resource Sustainability at Missouri University of Science and Technology. She is also the Director of the NSF Center for Synthetic Organic Electrochemistry. She received her PhD in Analytical Chemistry at the University of Iowa in 2000 under the direction of Professor Johna Leddy. After receiving her PhD, she spent 11 years as faculty in the Department of Chemistry at Saint Louis University before moving to the University of Utah in 2011 to lead the USTAR Alternative Energy Cluster. She was a Technical Editor for the Journal of the Electrochemical Society (2013-2016) and also an Associate Editor for the Journal of the American Chemical Society (2016-2020) before becoming the inaugural Editor-in-Chief of the ACS Au Journals. She has published greater than 450 publications and greater than 550 presentations at National and international conferences and universities. She has won several awards including the Luigi Galvani Prize of the Bioelectrochemical Society, International Society of Electrochemistry Tajima Prize and Bioelectrochemistry Prize, The Grahame Award of the Electrochemical Society, Fellow of the Electrochemical Society and the International Society of Electrochemistry, American Chemical Society Division of Analytical Chemistry Award in Electrochemistry, and the Society of Electroanalytical Chemists' Young Investigator Award and Reilley Award.

Schedule of Events

8:30am
Registration & Welcome
Alumni Auditorium, W.T. Young Library

L. Cassis
Ph.D., Professor of Pharmacology & Nutritional Sciences, Vice President for Research

A-F. Miller
Ph.D., Distinguished Professor of Arts & Sciences, Department of Chemistry

9:00am
Dr. Wolfgang Nitschke
Alumni Auditorium, W.T. Young Library

How and Why Life Emerged: Insights from Microbial Bioenergetics or Erwin Schrödinger meets Peter Mitchell

In 1946, the physicist and Nobel laureate Erwin Schrödinger confronted biology with the thermodynamic truism that the ordering (i.e. entropy decrease) inherent to life must necessarily be fueled by a flux of enthalpy from the environment. The very existence of life requires that there be a mechanism converting environmental free energy into the structural and temporal order of living cells. Studies of energy converting processes in diverse microorganisms now strongly suggest that Peter Mitchell's chemiosmotic principle (phosphorylation driven by electron transfer) is common to all organisms and therefore was operative in the last universal common ancestor (LUCA) of all three domains of life (Bacteria, Archaea and Eukarya). Chemiosmosis is fundamentally an electrochemical process, rather than "biological". Thus, this presentation argues the possibility that chemiosmosis was the ancestral (abiotic) mechanism of free energy conversion that set life in motion 4 billion years ago.

10:15am
Dr. Gary W. Brudvig
Alumni Auditorium, W.T. Young Library

Learning from Nature How to Make Solar Fuels

Photosystem II (PSII) uses energy from light to split water into protons, electrons and oxygen. In this reaction, Nature has solved the difficult chemical problem of efficient four-electron oxidation of water to yield O_2 without significant side reactions. To exploit Nature's mechanisms in new materials that split water for solar fuel production, we need to understand them. We know the structure of the catalytic Mn and Ca complex, and the locations of redox-active tyrosines and critical nearby ions, from structures based on X-ray crystallography and cryo-electron microscopy. The solved structures of this oxygen-evolving complex (OEC) are augmented by spectroscopy detailing the intermediate oxidation states of the catalytic cycle, the binding of substrate water molecules to the OEC and the water oxidation chemistry as well. Thus we are now able to unite biophysical, spectroscopic and computational methods with rigorous inorganic chemistry to elucidate how the natural photosynthetic system works. Recent developments in this exciting area of artificial photosynthesis will be discussed.

11:30am
Lunch and Poster Session
Jacobs Science Building Atrium

2:30pm
Dr. Shelley Minteer
Alumni Auditorium, W.T. Young Library

Enzymatic Bioelectrocatalysis for Electrosynthesis

In the last 5 years, there have been extensive studies and new materials designed for interfacing biocatalysts with electrode surfaces for applications in energy storage and electrification of the chemical industry. This talk will discuss electroanalytical techniques for studying biocatalysis, including both mediated enzymatic bioelectrocatalysis and direct enzymatic bioelectrocatalysis. The talk will discuss electrode materials innovation for interfacing complex proteins with electrode surfaces as well as using them for electrosynthesis of ammonia as well as other value-added products (i.e. chiral amines, chiral imines, polymers, etc.) with a focus on sustainability in the chemical industry. Finally, this talk will discuss the use of synthetic biology for microbial bioelectrosynthesis of ammonia and other value-added products, as an alternative to enzymatic bioelectrocatalysis.

3:30pm
Presentation of Poster Awards
Alumni Auditorium, W.T. Young Library

4:00pm
Closing Remarks of the 49th Naff Symposium
Alumni Auditorium, W.T. Young Library

2024 Naff Committee Members
Prof. Anne-Frances Miller (Chemistry) Chair
Prof. Ken Graham (Chemistry)
Prof. Marcelo Guzman (Chemistry)
Prof. Isabel Escobar (Chemical & Materials Engineering)

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