

## The 56<sup>th</sup> Linus Pauling Medal Award Symposium • Banquet



Saturday October 29, 2022  
Robertson Life Sciences Building  
2730 S Moody Ave  
Portland OR 97201

Sponsored by the Puget Sound, Oregon  
and Portland Sections  
of the American Chemical Society  
Hosted by Portland State University

## 2022 Pauling Medal Award Symposium Speakers



**Alison Butler, University of California Santa Barbara** was born in Chicago, Illinois on November 19, 1954. After graduating from Reed College as a chemistry major in 1977, she obtained her PhD degree in chemistry at UC San Diego with Robert G. Linck and Teddy G. Traylor in 1982. Following postdoctoral fellowships at UCLA with Joan Valentine, and at Caltech with Harry Gray, she joined the faculty in the Department of Chemistry at the University of California, Santa Barbara in 1986, as an Assistant Professor, rising through the ranks to her current position of Distinguished Professor of Chemistry and Biochemistry. She has served as Chair of the ACS Division of Inorganic Chemistry, President of the Society of Biological Inorganic Chemistry, and Chair of the Chemistry Section of AAAS. She is the recipient of the 2018 ACS Alfred Bader Award in Bioinorganic or Bioorganic Chemistry, the 2019 RSC Inorganic Mechanisms Award, and the 2022 W.H. Nichols Medal among other awards. She was elected to the American Academy of Arts and Sciences in 2018 and the US National Academy of Sciences in 2022.



**Valeria Molinero, University of Utah** is the Jack and Peg Simons Endowed Professor of Theoretical Chemistry and Distinguished Professor at The University of Utah, where she leads the Henry Eyring Center for Theoretical Chemistry. Molinero's research focuses on understanding and controlling phase transformation and dynamics in materials. She has been recognized with several awards, including the Beckman Young Investigator Award, Camille Dreyfus Teacher Scholar Award, the Cozzarelli Prize of Proceedings of the National Academy of Sciences. She is an elected member of the American Academy of Arts and Sciences and the National Academy of Sciences.



**Jonathan Sessler, University of Texas** was born in Urbana, Illinois, USA on May 20, 1956. He received a B.S. degree (with Highest Honors) in chemistry in 1977 from the University of California, Berkeley. He obtained a Ph.D. in organic chemistry from Stanford University in 1982 (supervisor: Professor James P. Collman). He was a NSF-CNRS and NSF-NATO Postdoctoral Fellow with Professor Jean-Marie Lehn at L'Université Louis Pasteur de Strasbourg, France. He was then a JSPS Visiting Scientist in Professor Tabushi's group in Kyoto, Japan. In September, 1984 he accepted a position as Assistant Professor of Chemistry at the University of Texas at Austin, where he is currently the Doherty-Welch Chair. Dr. Sessler was a co-founder (with Dr. Richard A. Miller) of Pharmacyclics, Inc., which was acquired by AbbVie for \$21B in 2015. His texaphyrin technology is now the basis for a new company, InnovoTex, Inc. Dr. Sessler was elected to the US National Academy of Sciences in April of 2021 and the American Academy of Arts and Sciences in April of 2022.

# 2022 Linus Pauling Medal Awardee

## Cynthia J. Burrows



### Biography

**Cynthia J. Burrows** is Thatcher Distinguished Professor of Chemistry at the University of Utah in Salt Lake City. She was trained as a physical organic chemist at the University of Colorado (B.A. 1975), Cornell University (PhD 1982) and as a postdoc at Université Louis Pasteur until 1983. Her initial academic appointment began in 1983 at Stony Brook University, and she moved to the University of Utah in 1995 as a full professor.

The Burrows research group investigates the chemistry and biochemistry of modified bases in DNA and RNA with a focus on oxidative stress, an underlying component of age-related diseases including cancer. Her work has been recognized with several

awards including the ACS Cope Scholar Award, the James Flack Norris Award in Physical Organic Chemistry and the Gibbs Medal of the ACS. Burrows was inducted into the American Academy of Arts and Sciences in 2009 and elected to the National Academy of Sciences in 2014.

### Abstract

***Beyond Watson & Crick (and Pauling!): DNA Chemistry Defines Who We Are.*** Cynthia J. Burrows, Thatcher Presidential Chair & Distinguished Professor, Department of Chemistry, University of Utah, Salt Lake City

The DNA double helix is where we store our genetic sequence, but how and when we read our genes is defined by chemical modifications and protein interactions with DNA. For example, adding a methyl group to cytosine (C) in DNA helps to silence a gene. In our work, we have found that oxidation of DNA, in essence adding an oxygen atom to guanine (G) in certain gene locations, can activate gene expression. This finding was unexpected because oxidation of DNA during oxidative stress from inflammation, radiation exposure and other environmental factors is normally considered mutagenic and potentially carcinogenic.

At play in the fine balance of DNA damage vs. gene oxidation is a non-Watson-Crick structure called a G-quadruplex comprised of 12 closely spaced Gs. This 4-stranded structure is common in regulatory elements of the genome and is also sensitive to oxidative stress. We hypothesize that G-rich sequences serve as sensors of the oxidation state of a cell, switching from duplex to quadruplex upon oxidation and processing by DNA repair enzymes, leading to recruitment of transcriptional machinery to turn on gene expression. Past, current and future challenges will be highlighted.

2022 Linus Pauling Medal Symposium  
RLSB Auditorium  
Saturday October 29, 2022

- 1:00 PM **Welcome and Preliminary Remarks**  
Prof. Dave Reingold, Symposium Co-Chair
- 1:05 PM **Siderophores in Stereo: The importance of Chirality  
in Microbial Iron Acquisition**  
Prof. Alison Butler  
University of California Santa Barbara
- 2:05 PM **Molecular recognition of ice by proteins: from ice nucleation  
to antifreeze**  
Prof. Valeria Molinero  
University of Utah
- 3:05 PM Break  
Funding for refreshments provided by Fujimi.
- 3:25 PM **Texas-inspired Drug Discovery Efforts**  
Prof. Jonathan Sessler  
University of Texas
- 4:25 PM **Beyond Watson & Crick (and Pauling!): DNA Chemistry De-  
fines Who We Are.**  
Cynthia J. Burrows, Thatcher Presidential Chair  
and Distinguished Professor, Department of Chemistry,  
University of Utah, Salt Lake City
- 5:30 PM **Reception and Presentation of Poster Awards**  
Dave Reingold, Poster Chair  
Funding for the Reception provided by FloraWorks.

*The Symposium and Reception are free and open to the public.*

2022 Linus Pauling Medal Award Banquet  
RLSB 3A002  
Saturday October 29, 2022

7:00 PM **Banquet** (Tickets Required)  
**Menu**

*If you want vegan options or have dietary limitations please alert a server.*

Harvest Salad (Mixed greens with cucumbers, tomatoes, cranberries, apples, and shredded carrots) with Pesto Ranch or Oregon Berry Vinaigrette Dressing  
Seasonal Vegetables sourced from local farmers  
Rosemary Roasted Baby Reds Potatoes (chunks of baby red potatoes, tossed lightly in oil, seasoning and fresh rosemary)  
Entrées:  
Seared Tri Tip Strips  
Grilled Pineapple-Teriyaki Chicken  
Smoked Lemon-Dill Salmon  
Vegetarian Lasagna  
HomeStyle Country Rolls served with butter  
Dessert: Maple Bourbon Crème Brûlée  
Coffee, tea, wine, beer, soft drinks

8:00 PM **Introduction of Award Recipient**  
Jonathan Sessler, University of Texas

8:10 PM **Certificate and Medal Presentation**  
Andrew Baggett, Chair, ACS Portland Section  
Sheri Tonn, Chair, ACS Puget Sound Section  
Richard Nafshun, Chair, ACS Oregon Section

8:15 PM **Pauling Medal Awardee Talk**  
Prof. Cynthia J. Burrows  
University of Utah  
Talk Title: *Will DNA and RNA Chemists 'Save the World'?*

*Student dinners are sponsored by ACS—Boeing Volunteer Match Fund  
on behalf of Marcie Merritt.*

## Pauling Medal Awardees

- 1966: Linus Pauling**, Staff Member, Center for the Study of Democratic Institutions
- 1967: Manfred Eigen**, Director, Max Planck –Institute for Physical Chemistry, Gottingen, Germany
- 1968: Herbert C. Brown**, Professor of Inorganic Chemistry, Purdue University
- 1969: Henry Eyring**, Dean of the Graduate School and Professor of Chemistry, University of Utah
- 1970: Harold C. Urey**, Professor at Large, University of California at San Diego
- 1971: Gerhard Herzberg**, Division of Pure Physics, National Research Council of Canada
- 1972: E. Bright Wilson**, Professor of Chemistry, Harvard University
- 1973: E. J. Corey**, Professor of Organic Chemistry, Harvard University
- 1974: Roald Hoffman**, Professor of Chemistry, Cornell University
- 1975: Paul Bartlett**, Professor of Chemistry, Texas Christian University
- 1976: F. Albert Cotton**, Professor of Chemistry, Texas A & M University
- 1977: John A. Pople**, Professor of Chemical Physics, Carnegie-Mellon University
- 1978: Dudley Herschbach**, Professor of Chemistry, Harvard University
- 1979: Daniel E. Koshland, Jr.**, Professor of Chemistry, University of California at Berkeley
- 1980: John D. Roberts**, Professor of Chemistry, California Institute of Technology
- 1981: Henry Taube**, Professor of Chemistry, Stanford University
- 1982: George C. Pimental**, Professor of Chemistry, University of California at Berkeley
- 1983: Gilbert Stork**, Professor of Chemistry, Columbia University
- 1984: John S. Waugh**, Professor of Chemistry, Massachusetts Institute of Technology
- 1985: Harold A. Scheraga**, Professor of Chemistry, Cornell University
- 1986: Harry B. Gray**, Professor of Chemistry, California Institute of Technology
- 1987: Harden M. McConnell**, Professor of Chemistry, Stanford University
- 1988: Keith Ingold**, Associate Director of the Division of Chemistry, National Research Council of Canada
- 1989: Neil Bartlett**, Professor of Chemistry, University of California at Berkeley
- 1990: James P. Collman**, Professor of Chemistry, Stanford University
- 1991: Rudolph A. Marcus**, Professor of Chemistry, California Institute of Technology
- 1992: Kenneth Wiberg**, Professor of Chemistry, Yale University
- 1993: Richard Zare**, Professor of Chemistry and Physics, Stanford University
- 1994: James Ibers**, Professor of Chemistry, Northwestern University
- 1995: Alexander Rich**, Professor of Biophysics, Massachusetts Institute of Technology
- 1996: Kyriacos C. Nicolaou**, Professor of Chemical Biology, Scripps Research Institute
- 1997: Ahmed H. Zewail**, Professor of Chemistry and Physics, California Institute of Technology
- 1998: Allen J. Bard**, Professor of Chemistry, University of Texas at Austin

- 1999: Peter B. Dervan**, Professor of Chemistry, California Institute of Technology
- 2000: Gabor A. Somorjai**, Professor of Chemistry, University of California at Berkeley
- 2001: Tobin J. Marks**, Professor of Catalytic Chemistry, Northwestern University
- 2002: John I. Brauman**, Professor of Chemistry, Stanford University
- 2003: Robert H. Grubbs**, Professor of Chemistry, California Institute of Technology
- 2004: Martin Karplus**, Professor of Chemistry, Harvard University
- 2005: George Whitesides**, University Professor, Harvard University
- 2006: Peter J. Stang**, Professor of Chemistry, University of Utah
- 2007: Jacqueline K. Barton**, Professor of Chemistry, California Institute of Technology
- 2008: Thomas C. Bruice**, Research Professor in Chemistry and Biochemistry, University of California at Santa Barbara
- 2009: Stephen J. Lippard**, Professor of Chemistry, Massachusetts Institute of Technology
- 2010: Armand Paul Alivisatos**, Professor of Chemistry and Materials Science and Engineering, and Director of the Lawrence Berkeley National Lab, University of California at Berkeley
- 2011: Larry R. Dalton**, Professor of Chemistry and Electrical Engineering, University of Washington
- 2012: Robert Cava**, Professor of Chemistry, Princeton University
- 2013: Chad Mirkin**, Professor of Chemistry, Professor of Medicine, Professor of Materials Science and Engineering, Professor of Biomedical Engineering, and Professor of Chemical and Biological Engineering, and Director of the International Institute for Nanotechnology and Center for Nanofabrication and Molecular Self-Assembly, Northwestern University
- 2014: Stephen Buchwald**, Professor of Chemistry, Massachusetts Institute of Technology
- 2015: Barry M. Trost**, Professor of Humanities and Sciences, Stanford University
- 2016: Timothy M. Swager**, Professor of Chemistry and director of the Deshpande Center for Technological Innovation, Massachusetts Institute of Technology
- 2017: Christopher C. Cummins**, Professor of Chemistry, Massachusetts Institute of Technology
- 2018: Geraldine Richmond**, Professor of Chemistry, University of Oregon
- 2019: Catherine Murphy**, Professor of Chemistry, University of Illinois at Urbana-Champaign
- 2020/2021: Paul Chirik**, Professor of Chemistry, Princeton University
- 2022: Cynthia J. Burrows**, Distinguished Professor and Thatcher Presidential Endowed Chair of Biological Chemistry, University of Utah

A history of the Pauling Medal Award is available online at <https://paulingblog.wordpress.com/2016/04/20/fifty-years-of-the-linus-pauling-medal/>. A list of awardees with links to their biographies is available at <https://sites.uw.edu/pauling2020/> and <https://paulingblog.wordpress.com/tag/linus-pauling-medal/>

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