


## BERN KOHLER

Professor and Ohio Eminent Scholar  
Department of Chemistry and Biochemistry  
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### Education

B.S. 1985 Chemistry *Stanford University*  
Ph.D. 1990 Physical Chemistry *Massachusetts Institute of Technology*  
Advisor: Prof. Keith A. Nelson

Thesis: Ultrafast Dynamics of Molecular Liquids Investigated by Femtosecond Light Scattering

### Appointments

July 2016 – present **Professor and Ohio Eminent Scholar**, Department of Chemistry and Biochemistry, The Ohio State University  
2009 – 2016 **Professor of Chemistry**, Montana State University  
2011 – 2012 **Interim Department Head**, Department of Chemistry and Biochemistry, Montana State University  
Summer 2008 **Visiting Professor of Physics**, Aarhus University  
1995 – 2009 **Assistant, Associate, Full Professor**, Department of Chemistry, *The Ohio State University*

### Honors and Awards

ERUDITE Scholar-in-Residence, Kerala State Higher Education Council, India, 2019.  
Inter-American Photochemical Society (I-APS) Award in Photochemistry, 2017.  
AAAS Fellow, 2015.  
Cox Award for Creative Scholarship and Teaching, MSU, 2015.  
Charles and Nora L. Wiley Faculty Award for Meritorious Research, Montana State University, 2010.  
Arts and Sciences Outstanding Teaching Award Finalist, The Ohio State University, 2009.  
Visiting Professor Fellowship, University of Aarhus, Denmark, summer 2008.  
Research Fellow of the Alexander von Humboldt Foundation, 2004-2005.  
Associate Editor, *Photochemistry and Photobiology*, 2004-present.

### Research Interests

Ultrafast excited state dynamics in biomolecules (DNA, melanin) and nanomaterials; electronic and vibrational spectroscopy in the condensed phase; exciton and charge transport dynamics in self-assembled nanomaterials for photocatalysis and solar energy conversion; photophysics of disordered carbon nanomaterials and non-stoichiometric metal oxides

### Recent Research Grants

1. National Science Foundation, Dynamics of Excited Electronic States in DNA Strands and DNA-Silver Nanoclusters, 8/1/18 – 7/31/21, \$435,000. *Photophysics of DNA-metal nanoassemblies*.
2. ACS Petroleum Research Fund, Probing Elementary Photochemical Events in Cerium Oxide by Steady-State and Ultrafast Spectroscopy, 7/1/16 – 8/31/19, \$110,000. *Investigating carrier dynamics and the interfacial photochemistry of ceria nanoparticles*.
3. National Science Foundation, Dynamics of Excited Electronic States in DNA Strands, 8/1/15 – 7/31/18, \$433,300. *Study of proton-coupled electron transfer in DNA strands in water and in ionic liquids by femtosecond TRIR spectroscopy*.
4. NASA, *A Bottom-up Approach to Understanding UV Hardiness in Prebiotic Nucleic Acids*, 1/17/12 – 6/30/16, \$281,658 (MSU portion), co-PI. *Investigated photostability mechanisms of DNA and related prebiotic compounds using time-resolved spectroscopy*.

## Professional Service

President-Elect and Board Member, Telluride Science Research Center  
Alternate Councilor, Physical Division of the American Chemical Society  
Co-Vice Chair (2009) and Co-Chair (2012) of Electronic Spectroscopy & Dynamics Gordon Conference.  
Co-Vice Chair (2011) and Co-Chair (2013) of Photochemistry Gordon Research Conference.

## Current Graduate Students and Postdocs

Dr. Yuyuan Zhang, Dr. Chris Grieco, Jennifer Empey, Forrest Kohl, Alex Hanes

## Recent and Selected Publications (>7,000 citations, *h*-index = 42)

127. Zhang, Y.; Chen, H.; Petty, J. T.; Kohler, B. "Time-Resolved Vibrational Fingerprints for Two Silver Cluster-DNA Fluorophores," *J. Phys. Chem. Lett.* **2020**, *11*, 8958-8963. DOI: 10.1021/acs.jpcclett.0c02486.
126. Grieco, C.; Kohl, F. R.; Hanes, A. T.; Kohler, B. "Probing the Heterogeneous Structure of Eumelanin using Ultrafast Vibrational Fingerprinting," *Nature Commun.* **2020**, *11*, 4569 (9 pages). DOI: 10.1038/s41467-020-18393-w.
123. Pettinger, N. W.; Empey, J. M.; Froebel, S.; Kohler, B. "Photoreductive Dissolution of Cerium Oxide Nanoparticles and Their Size-Dependent Absorption Properties," *Phys. Chem. Chem. Phys.*, **2020**, *22*, 5756-5764. DOI: 10.1039/C9CP06579B.
122. Kohl, F. R.; Grieco, C.; Kohler, B. "Ultrafast spectral hole burning reveals the distinct chromophores in eumelanin and their common photoresponse," *Chem. Sci.*, **2020**, *11*, 1248-1259. DOI: 10.1039/c9sc04527a.
121. Snyder, J. A.; Charnay, A. P.; Kohl, F. R.; Zhang, Y.; Kohler, B. "DNA-like Photophysics in Self-Assembled Silver(I)-Nucleobase Nanofibers," *J. Phys. Chem. B*, **2019**, *123*, 5985-5994. DOI: 10.1021/acs.jpccb.9b00660.
119. Grieco, C.; Hanes, A. T.; Blancafort, L.; Kohler, B. "Effects of Intra- and Intermolecular Hydrogen Bonding on O-H Bond Photodissociation Pathways of a Catechol Derivative," *J. Phys. Chem. A* **2019**, *123*, 5356-5366. DOI: 10.1021/acs.jpca.9b04573.
118. Zhang, Y.; de La Harpe, K.; Kohl, F. R.; Kohler, B. "Isotopic substitution affects excited state branching in a DNA duplex in aqueous solution," *Chem. Comm.* **2019**, *55*, 4174-4177. DOI: 10.1039/C9CC01105F.
96. Zhang, Y.; de La Harpe, K.; Beckstead, A. A.; Improta, R.; Kohler, B. "UV-induced Proton Transfer Between DNA Strands," *J. Am. Chem. Soc.* **2015**, *137*, 7059-7062. **Selected for a JACS spotlight and cover of issue 27, volume 137 (July 15, 2015).**
90. Zhang, Y.; Dood, J.; Beckstead, A.; Li, X.-B.; Nguyen, K. V.; Burrows, C. J.; Improta, R. "Efficient UV-induced charge separation and recombination in an 8-oxoguanine-containing dinucleotide," *Proc. Natl. Acad. Sci. USA*, **2014**, *111*, 11612-11617.
62. Schreier, W. J.; Schrader, T. E.; Koller, F. O.; Gilch, P.; Crespo-Hernández, C. E.; Swaminathan, V. N.; Carell, T.; Zinth, W.; Kohler, B. "Thymine Dimerization in DNA is an Ultrafast Photoreaction," *Science* **2007**, *315*, 625-629.
58. Crespo-Hernández, C. E.; Cohen, B.; Kohler, B. "Base stacking controls excited-state dynamics in A·T DNA," *Nature* **2005**, *436*, 1141-1144. DOI: 10.1038/nature03933

## Invited Seminar and Colloquium Presentations

100+ invited lectures at universities and international conferences since 2005.

## Research Capabilities

The Kohler group has state-of-the-art instrumentation for measuring absorption and emission from femtosecond to millisecond time scales. Probing of electronic and vibrational transitions is possible using femtosecond laser pulses with wavelengths that span the UV (200 – 400 nm) to the mid-IR (2 – 10  $\mu$ m). A full suite of instrumentation for steady-state spectroscopy (CD, UV/vis, FTIR, fluorescence) is also available for comprehensive photochemical investigations.