

# ANDREW M. TURNER, PH.D.

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## EDUCATION

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- 2011-2018 **University of Hawaii at Manoa** Honolulu, HI  
Doctor of Philosophy. Major: Physical Chemistry  
Honors & Awards: ARCS Scholar
- 2006-2009 **Indiana University** Bloomington, IN  
Master of Arts for Teachers – Chemistry Department  
Course Concentration: Analytical Chemistry  
Honors & Awards: Department Fellowship
- 2002-2006 **DePauw University** Greencastle, IN  
Bachelor of Arts. Major: Chemistry. Minor: Environmental Geoscience  
Honors & Awards: Cum Laude, Science Research Fellow, Dow  
Foundation Scholar, Percy L. Julian Scholar

## RESEARCH EXPERIENCE

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- 2019- **University of Hawaii at Manoa** Honolulu, HI  
Assistant Director of W.M. Keck Laboratory in Astrochemistry  
Research Techniques Utilized: Fourier Transform Infrared Spectroscopy,  
Quadrupole Mass Spectrometry, Photoionization Reflectron Time-of-Flight  
Mass Spectrometry, Ultrahigh-Vacuum Systems ( $P < 10^{-11}$  Torr), Cryogenic  
Systems ( $T = 5$  to  $10$  K), Nd:YAG and Dye Lasers, Electron Irradiation,  
LabVIEW, AutoCAD
- 2018-2019 **University of Hawaii at Manoa** Honolulu, HI  
Post-Doctoral Fellow  
*On the Formation of Alkylsulfonic Acids in Low-Temperature Ices*  
Research Advisor: Ralf I. Kaiser, Ph.D.
- 2018-2019 **University of Hawaii at Manoa** Honolulu, HI  
Post-Doctoral Fellow  
*Alkylsulfonic Acids in Low-Temperature Ices*  
Research Advisor: Ralf I. Kaiser, Ph.D.
- 2011-2018 **University of Hawaii at Manoa** Honolulu, HI  
Graduate Assistant  
*On the Formation of Alkylphosphonic Acids in Low-Temperature Phosphine Ices*  
Secondary Project: *Decomposition of Perchlorates on the Martian Surface*  
Research Advisor: Ralf I. Kaiser, Ph.D.

- 2006-2008 **Indiana University** Bloomington, IN  
Graduate Assistant  
*Reaction Kinetics of Biogenic Terpenes with Hydroxyl-radicals and Ozone*  
Research Advisor: Ronald A. Hites, Ph.D.  
Research Techniques Utilized: Quadrupole Mass Spectrometry, UV-Induced Photolysis
- 2005 **DePauw University** Greencastle, IN  
Undergraduate Researcher  
*Characterization of the BCR Sequential Extraction Method*  
Research Advisor: David T. Harvey, Ph.D.  
Research Techniques Utilized: Atomic Absorption Spectroscopy, Sequential Extraction of sediment samples
- 2004 **SUNY Stony Brook** Stony Brook, NY  
Undergraduate Researcher  
*Complexation of Uranyl Ion ( $UO_2^{2+}$ ) with Organic Acids in Soil*  
Research Advisor: Gary Halada, Ph.D.  
Research Techniques: Ultraviolet/Visible Spectroscopy, High Performance Liquid Chromatography
- 2003-2004 **DePauw University** Greencastle, IN  
Undergraduate Researcher  
*Impacts of Acid Mine Drainage from the Green Valley Mine in SW Indiana*  
Research Advisors: Bridget L. Gourley, Ph.D. and Jeanette K. Pope, Ph.D.  
Research Techniques Utilized: Atomic Absorption Spectroscopy, Colorimetry

## TEACHING EXPERIENCE

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- 2018-2019 **University of Pikeville** Pikeville, KY  
Assistant Professor
  - CHE 113: General Chemistry I
  - CHE 114: General Chemistry II
  - CHE 400: Physical Chemistry I
  - CHE 405: Quantum Mechanics
  - CHE 480: Seminar in Chemistry
  - FS 102: First Year Seminar
  - Committees: Curriculum, Teacher Education
- 2011-2018 **University of Hawaii at Manoa** Honolulu, HI  
Lecturer (2018)
  - CHEM 162: General Chemistry II (Lecture and Lab)  
Teaching Assistant (2011-2018)
  - Head teaching assistant for CHEM 161: General Chemistry I (Lab)
  - Discussion section leader for CHEM 162: General Chemistry II (Lecture)
  - CHEM 161: General Chemistry I (Lab and Lecture)
  - CHEM 162: General Chemistry II (Lab)
  - CHEM 352: Physical Chemistry II (Lecture)
  - Twice received the department's "Outstanding Teaching Assistant" award

2009-2011 **North Miami High School** Denver, IN  
Chemistry Teacher  
•Introductory to Chemistry & Physics  
•Chemistry I, II, and AP  
•Astronomy and Geology  
•Committees: Accreditation  
•Extracurriculas: Quiz Bowl, Academic Team, Track & Field, Cross Country

2006-2009 **Indiana University** Bloomington, IN  
Associate Instructor  
•C117: Principles of Chemistry & Biochemistry I (Lab)  
•N330: Intermediate Inorganic Chemistry (Lab and Lecture)  
•Recognized by the department twice for outstanding performance as an instructor based on student evaluations

## CONFERENCE PRESENTATIONS

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- A. M. Turner**, M. J. Abplanalp, C. Meinert, R. I. Kaiser, *Synthesis of alkylphosphonic acids in interstellar analogue ices of phosphine and water*, ACS 258<sup>rd</sup> National Meeting, San Diego, CA, August 25-29, 2019 **[oral]**.
- A. M. Turner**, M. J. Abplanalp, C. Meinert, R. I. Kaiser, *Alkylphosphonic Acids from Irradiated Phosphine-Doped Interstellar Ice Analogues*, AbSciCon 2019 (American Geophysical Union), Bellevue, WA, June 24-28, 2019 **[oral]**.
- A. M. Turner**, R. Frigge, M. J. Aplanalp, R. I. Kaiser, *Exploiting Tunable Vacuum Ultraviolet Photoionization Combined with Reflectron Time-of-Flight Mass Spectrometry to Unravel the Nitrogen Chemistry of Complex Organics in the Interstellar Medium*, International Symposium on Molecular Spectroscopy 73<sup>rd</sup> Meeting, Champaign-Urbana, IL, June 18-22, 2018 **[oral]**.
- M. J. Abplanalp, Sandor Gobi, Alexandre Bergantini, **A. M. Turner**, R. I. Kaiser, *Chocolate molecules in space: Utilizing tunable vacuum ultraviolet light for isomer specific detection of complex organic molecules from astrophysical ice analogues*, ACS 255<sup>rd</sup> National Meeting, New Orleans, LA, March 18-22, 2018 **[oral]**
- A. M. Turner**, R. I. Kaiser, *Investigating the formation of alkylphosphonic acids in phosphine ices*, ACS 253<sup>rd</sup> National Meeting, San Francisco, CA, April 2-6, 2017 **[oral, invited]**
- A. M. Turner**, R. I. Kaiser, *Toward the formation of alkylphosphonic acids in phosphine ices*, AAS Division for Planetary Sciences 48<sup>th</sup> /European Planetary Science Congress 11<sup>th</sup> Annual Meeting, Pasadena, CA, October 16-21, 2016 **[oral]**
- A. M. Turner**, R. I. Kaiser, M. J. Abplanalp, *Laboratory synthesis of alkyl phosphanes in astrochemical ice analogs*, Pacificchem 2015, Honolulu, HI, December 15-20, 2015 **[poster]**
- A. M. Turner**, M. J. Abplanalp, R. I. Kaiser, *Production of Open-Chain Phosphanes and Alkyl-Phosphines in Astrochemical Ice Analogues*, Experimental Laboratory Astrophysics Workshop (ICE-2015), Kauai, HI, February 23-26, 2015 **[oral]**
- A. M. Turner**, R. I. Kaiser, R. Dayuha, *Formation of alkyl phosphonic acids using phosphine ices*, ACS 246<sup>rd</sup> National Meeting, Indianapolis, IN, September 8-12, 2013 **[poster]**
- A. M. Turner**, T. J. Blair, R. Dayuha, R. I. Kaiser, *Formation of alkyl phosphonic acids using phosphine ices*, Experimental Laboratory Astrophysics Workshop (ICE-2013), Kauai, HI, February 25-27, 2013 **[poster]**
- A. M. Turner**, E. C. Amt, C. Houston, B. L. Gourley, J. K. Jerz, *Water quality in West Little Sugar Creek is recovering but still impacted by acidic drainage from the abandoned Green Valley Mine in southwest Indiana*, ACS 227<sup>rd</sup> National Meeting, Anaheim, CA, March 28-April 1, 2004 **[poster]**
- E. C. Amt, C. Houston, **A. M. Turner**, J. K. Jerz, B. L. Gourley, *Water quality in West Little Sugar Creek is recovering but still impacted by acidic drainage from the abandoned Green Valley Mine in southwest Indiana*, Geological Society of America National Meeting, Seattle, WA, November 2-5, 2003 **[poster]**

## PROFESSIONAL AFFILIATIONS

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American Chemical Society  
Phi Lambda Upsilon, Honorary Chemistry Society  
ARCS Foundation, Scholar  
National Education Association

## PUBLICATION LIST

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- **A. M. Turner**, M. J. Aplanalp, A. Bergantini, R. Frigge, C. Zhu, B. J. Sun, C. T. Hsiao, A. H. H. Chang, C. Meinert, R. I. Kaiser, *Origin of Alkylphosphonic Acids in the Interstellar Medium*, Science Advances, Accepted for publication (2019).
- C. Zhu, R. Frigge, **A. M. Turner**, M. J. Abplanalp, B. J. Sun, Y. L. Chen, A. H. H. Chang, R. I. Kaiser, *A Vacuum Ultraviolet Photoionization Study on the Formation of Methanimine ( $\text{CH}_2\text{NH}$ ) and Ethylenediamine ( $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$ ) in Low Temperature Interstellar Model Ices Exposed to Ionizing Radiation*, Physical Chemistry Chemical Physics, 21, 1952 (2019).
- **A. M. Turner**, A. Bergantini, M. J. Abplanalp, C. Zhu, S. Góbi, B. J. Sun, K. H. Chao, A. H. H. Chang, C. Meinert, R. I. Kaiser, *An Interstellar Synthesis of Phosphorus Oxoacids*, Nature Communications, 9, 3851 (2018).
- R. Frigge, C. Zhu, **A. M. Turner**, M. J. Aplanalp, B. J. Sun, Y. S. Huang, A. H. H. Chang, R. I. Kaiser, *Synthesis of the hitherto elusive formylphosphine ( $\text{HCOPH}_2$ ) in the Interstellar Medium—A Molecule with an Exotic Phosphorus Peptide Bond*, Chemical Communications, 54, 10152, (2018).
- R. Frigge, C. Zhu, **A. M. Turner**, M. J. Aplanalp, A. Bergantini, B. J. Sun, Y. L. Chen, A. H. H. Chang, R. I. Kaiser, *A Vacuum Ultraviolet Photoionization Study on the Formation of N-methyl Formamide ( $\text{HCONHCH}_3$ ) in Deep Space: A Potential Interstellar Molecule with a Peptide Bond*, The Astrophysical Journal, 862, 84, (2018).
- C. Zhu, R. Frigge, A. M. Turner, R. I. Kaiser, B. J. Sun, S. Y. Chen, A. H. H. Chang, *First Identification of Unstable Phosphino Formic Acid ( $\text{H}_2\text{PCOOH}$ )*, Chemical Communications, 54, 5716 (2018).
- C. Zhu, **A. M. Turner**, M. J. Abplanalp, R. I. Kaiser, *Formation of High Order Carboxylic Acids ( $\text{RCOOH}$ ) in Interstellar Analogous Ices of Carbon Dioxide ( $\text{CO}_2$ ) and Methane ( $\text{CH}_4$ )*, The Astrophysical Journal Supplement, 234, 15 (2018).
- M. J. Abplanalp, S. Góbi, A. Bergantini, **A. M. Turner**, R. I. Kaiser, *On The Synthesis of Chocolate Flavovoids (Propanols, Butanals) in the Interstellar Medium*, ChemPhysChem, 19, 556 (2018).
- **A. M. Turner**, M. J. Abplanalp, T. J. Blair, R. Dayuha, R. I. Kaiser, *An Infrared Spectroscopic Study toward the Formation of Alkylphosphonic Acids and their Precursors in Extraterrestrial Environments*. The Astrophysical Journal Supplement, 234, 6 (2018).
- S. Góbi, A. Bergantini, **A. M. Turner**, R. I. Kaiser, *Electron Radiolysis of Ammonium Perchlorate: A Reflectron Time-of-Flight Mass Spectrometric Study*, Journal of Physical Chemistry A, 121, 3879-3890 (2017).
- B. M. McMurtry, S. E. J. Saito, **A. M. Turner**, H. K. Chakravarty, R. I. Kaiser, *On the Formation of Benzoic Acid and Higher Order Benzene Carboxylic Acids in Interstellar Model Ice Grains*, The Astrophysical Journal, 831, 174 (2016).
- B. M. McMurtry, **A. M. Turner**, S. E. J. Saito, R. I. Kaiser, *On the Formation of Niacin (Vitamin B3) and Pyridine Carboxylic Acids in Interstellar Model Ices*, Chemical Physics, 472, 173 (2016).
- **A. M. Turner**, M. J. Abplanalp, R. I. Kaiser, *Mechanistic Studies on the Radiolytic Decomposition of Perchlorates on the Martian Surface*, The Astrophysical Journal, 820, 127 (2016).
- **A. M. Turner**, M. J. Abplanalp, R. I. Kaiser, *Probing the Carbon-phosphorus Bond Coupling in Low-temperature Phosphine ( $\text{PH}_3$ )-Methane ( $\text{CH}_4$ ) Interstellar Ice Analogues*, The Astrophysical Journal 819, 97 (2016).

- **A. M. Turner**, M. J. Abplanalp, S. Y. Chen, Y. T. Chen, A. H. H. Chang, R. I. Kaiser, *A Photoionization Mass Spectroscopic Study on the Formation of Phosphanes in Low Temperature Phosphine Ices*, *Physical Chemistry Chemical Physics*, 17, 27281-27291 (**2015**).
- L. Zhou, S. Maity, M. J. Abplanalp, **A. M. Turner**, R. I. Kaiser, *On the Radiolysis of Ethylene Ices by Energetic Electrons and Implications to the Extraterrestrial Hydrocarbon Chemistry*, *The Astrophysical Journal*, 790, 38 (**2014**).
- R. A. Hites & **A. M. Turner**, *Rate constants for the gas-phase  $\beta$ -myrcene + OH and isoprene + OH reactions as a function of temperature*, *International Journal of Chemical Kinetics*, 41, 6 (**2009**).