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## EDUCATION

**University of California, Berkeley** Ph.D. expected December 2007

**Department of Chemistry**

*Dissertation:* "The Stable Isotopic Compositions of Trace Stratospheric Gases: from Crossed Molecular Beam Experiments to Global Scale Modeling"

*Research Advisor:* Professor Kristie A. Boering

**Georgetown University, Washington, D.C.** B.S. with Honors, 2002

*Major:* Chemistry

*Minors:* Mathematics, French

*Honors Thesis:* "Modeling Vibrational Energy Transfer Among Pairs of Linear Triatomic Molecules"

*Thesis advisor:* Professor Richard D. Bates, Jr.

## AWARDS AND HONORS

Participant in Atmospheric Brown Clouds Training School, 2006

National Science Foundation Graduate Research Fellowship, 2003-2006

Valedictorian, Georgetown College, Class of 2002

Clare Boothe Luce Foundation Scholarship, 2000-2002

American Institute of Chemists Award, 2002

Award for Outstanding Undergraduate Research in Chemistry, Georgetown University, 2002

## RESEARCH EXPERIENCE

### **Graduate Research Assistant, 2002-present**

#### **Department of Chemistry, University of California, Berkeley**

*Advisor:* Professor Kristie A. Boering

Investigated isotope-specific chemistry of the stratosphere by (1) carrying out 2D model simulations to evaluate the distribution of  $^{18}\text{O}$  and  $^{17}\text{O}$  in oxygen-containing species in the stratosphere ( $\text{O}_3$ ,  $\text{CO}_2$ ,  $\text{NO}_2$ ) and to investigate the isotopic composition of photochemically produced  $\text{H}_2$ , (2) probing the dynamics of  $^{18}\text{O}+\text{O}_2$  and  $^{18}\text{O}+\text{NO}_2$  reactions via crossed molecular beam experiments in collaboration with Professors Jim Jr-Min Lin and Yuan T. Lee (Institute of Atomic and Molecular Science, Academia Sinica, Taipei, Taiwan), and (3) testing and validating a laboratory technique for measurement of the  $^{17}\text{O}$ ,  $^{18}\text{O}$ , and  $^{13}\text{C}$  content of stratospheric  $\text{CO}_2$ .

**Undergraduate Honors Research, 2000-2002****Department of Chemistry, Georgetown University**

*Advisor:* Professor Richard D. Bates, Jr.

Performed kinetic modeling of vibrational energy transfer for the systems CO<sub>2</sub>-OCS, CO<sub>2</sub>-CS<sub>2</sub>, N<sub>2</sub>O-OCS and N<sub>2</sub>O-CS<sub>2</sub> for comparison to results from laser-induced fluorescence experiments.

**National Science Foundation – Research Experiments for Undergraduates, 2000****Department of Chemistry, Wellesley College**

*Advisor:* Professor James H. Loehlin

Used x-ray crystallography to probe the structure of saturated hydrogen bonded crystals.

**TEACHING EXPERIENCE****Graduate Student Instructor, 2002-2005****Department of Chemistry, University of California, Berkeley**

Assisted the teaching of General Chemistry and Quantitative Analysis, Physical Chemistry Laboratory, and Physical Chemistry (“Quantum”). Prepared laboratory discussions, oversaw experiments, administered oral exams; designed problem sets and classroom lectures; held weekly review sessions and office hours.

**Calculus Tutor, 2001-2002****Department of Mathematics, Georgetown University****Linear Algebra and Multivariable Calculus Grader, 1999-2000****Department of Mathematics, Georgetown University****SERVICE****Volunteer, Expanding Your Horizons Workshop, 2006-2007**

Designed and led workshops for middle school girls on metal salt spectroscopy.

**Officer, Hydrogen Chapter, Iota Sigma Pi, 2004-2007**

Held offices of President, Vice President, and Treasurer for the local chapter of the National Honor Society for Women in Chemistry.

**PROFESSIONAL AFFILIATIONS**

Member, Hydrogen Chapter, Iota Sigma Pi, 2003-present

Member, American Chemical Society, 2004-present

Member, American Geophysical Union, 2002-present

Phi Beta Kappa, inducted 2001

## PUBLICATIONS

A. Van Wyngarden, **K. A. Mar**, K. Boering, J. J. Lin, Y. T. Lee, S. Y. Lin, H. Guo, and G. Lendvay, *Non-statistical behavior of the reactive scattering in the  $^{18}\text{O}+^{32}\text{O}_2$  isotope exchange reaction*, *J. Am. Chem. Soc.*, **129**(10), 2866-2870, 2007.

**K. A. Mar**, M. C. McCarthy, P. Connell, and K. A. Boering, *Modeling the photochemical origins of deuterium enrichment in stratospheric  $\text{H}_2$* , submitted 2007.

A. Van Wyngarden, **K. A. Mar**, K. Boering, J. J. Lin, Y. T. Lee, S. Y. Lin, H. Guo, and G. Lendvay, *Dynamics and energy dependence of the  $^{18}\text{O} + ^{32}\text{O}_2$  isotope exchange reaction*, manuscript in preparation.

**K. A. Mar**, A. Van Wyngarden, J. J. Lin, Y. T. Lee and K. A. Boering, *Dynamics of  $^{18}\text{O}+\text{NO}_2$ : isotope exchange and  $\text{O}_2$  formation*, manuscript in preparation.

## ORAL PRESENTATIONS

G. Lendvay, A. L. Van Wyngarden, K. A. Mar, K. A. Boering, J. J. Lin, Y. T. Lee, S. Lin, H. Guo. *How statistical is the  $\text{O} + \text{O}_2$  isotope exchange reaction? A combined theoretical and experimental study*. American Chemical Society Fall Meeting, San Francisco, CA, September 2006.

## POSTER PRESENTATIONS

K. A. Mar, M. C. McCarthy, P. Connell, K. A. Boering. *Heavy Molecular Hydrogen in the Stratosphere and the Global  $\text{H}_2$  Budget: Reducing Uncertainties in Predicting the Environmental Effects of a Hydrogen Fuel Cell-Based Economy*. UC Berkeley Energy Symposium, Berkeley, CA, March 2007.

K. A. Mar, A. L. Van Wyngarden, S. Lin, H. Guo, G. Lendvay, J. J. Lin, Y. T. Lee, K. A. Boering. *Statistical and Non-statistical Behavior in Oxygen Isotope Exchange Reactions*. 54<sup>th</sup> Annual Western Spectroscopy Association Meeting, Pacific Grove, CA, February 2006.

A. L. Van Wyngarden, K. A. Mar, J. J. Lin, Y. T. Lee, K. A. Boering, S. Lin, G. Lendvay, H. Guo. *Dynamics of the  $^{18}\text{O} + \text{O}_2$  isotope exchange reaction: Experiment and theory*. 53<sup>rd</sup> Annual Western Spectroscopy Association Meeting, Pacific Grove, CA, January 2006.

A. L. Van Wyngarden, K. A. Mar, J. J. Lin, Y. T. Lee, K. A. Boering. *Dynamics of oxygen atom isotope exchange reactions*. 20<sup>th</sup> Conference on the Dynamics of Molecular Collisions, Pacific Grove, CA, July 2005.

A. L. Van Wyngarden, K. A. Mar, J. J. Lin, Y. T. Lee, K. A. Boering. *Dynamics of oxygen atom isotope exchange reactions*. 52<sup>nd</sup> Annual Western Spectroscopy Association Meeting, Pacific Grove, CA, January 2005.

K. A. Mar, M. C. McCarthy, P. Connell, K. A. Boering. *Modeling the photochemical origins of deuterium enrichment in stratospheric H<sub>2</sub>*. Poster A31B-0053 at the American Geophysical Union (AGU) Fall Meeting. San Francisco, CA, December 2004.

K. A. Mar, M. C. McCarthy, P. Connell, K. A. Boering. *Modeling the photochemical origins of deuterium enrichment in stratospheric H<sub>2</sub>*. Atmospheric Science Symposium sponsored by the UC Berkeley Atmospheric Science Center (BASC). Berkeley, CA, October 2004.