

Curriculum Vitae

Dr. David S. Heroux
Department of Chemistry
Saint Michael's College
Colchester, VT

EDUCATION

Ph.D. Inorganic Chemistry, 2004

Kansas State University, Manhattan, Kansas.

Thesis Title: *Synthesis and Characterization of Semiconductor Nanoparticles Prepared by Novel Methods.*

Major Professor: Kenneth J. Klabunde

B.A. Chemistry, 1993

Manhattanville College, Purchase, New York.

Minor: Russian Studies.

AWARDS

- Leadership Development Award, Younger Chemist Committee, American Chemical Society (ACS). 2004
- Phi Lambda Upsilon Graduate Research Award, Kansas State University. 2004
- Graduate Research Award, Department of Chemistry, Kansas State University. 2003
- Wyvern Pin (blue), Alpha Chi Sigma. Highest recognition for outreach activities. 2002
- CRC Chemistry Award, Manhattanville College. 1990

PROFESSIONAL EXPERIENCE

Associate Professor of Chemistry, 2013-present

Department of Chemistry and Physics, St. Michael's College, Colchester, VT.

Visiting Professor (full year Sabbatical), 2012-2013

Department of Chemistry and Geochemistry, Colorado School of Mines, Golden, Co.
National Bioenergy Center, National Renewable Energy Laboratory, Golden, Co.

Associate Professor of Chemistry, 2010-2013

Assistant Professor of Chemistry, 2004-2010

Division of Natural Sciences, University of Maine at Farmington.

Visiting Professor, summer 2005

Laboratory of Catalyst Texture Research,
Boreskov Institute of Catalysis, Novosibirsk, Russia.

Graduate Research Assistant, 2000-2004

Department of Chemistry, Kansas State University.

Invited Scientist, 2001, 2003

Laboratory of Heterogeneous Catalysis
Boreskov Institute of Catalysis, Novosibirsk, Russia.

Graduate Teaching Assistant, 1999-2002

Department of Chemistry, Kansas State University.

Laboratory Manager/Teaching Assistant, 1997-1999

Department of Chemistry, The Catholic University of America, Washington, D.C.

COURSES TAUGHT

General Chemistry I, General Chemistry II, General Chemistry Laboratory, Inorganic Chemistry, Inorganic Chemistry Laboratory, Senior Seminar, First Year Seminar: Science That Changed History.

INDEPENDENT STUDIES

Advanced Synthesis. Spring 17, Jordan Roach. 4 Cr.

Water Remediation. Fall 16, Caroline Staples. 2 Cr.

Phospholipid Reactions. Fall 15, Katharine Tooke. 2 Cr.

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

- American Chemical Society
 - Chemical Education Division member
 - Inorganic, Nanosciences, Division member
- New England Catalysis Society
- Phi Lambda Upsilon (National Honorary Chemical Society)
- Sigma Xi The Scientific Research Society
- Alpha Chi Sigma (Chemistry Fraternity)
- Council on Undergraduate Research.

PROFESSIONAL SERVICE/OUTREACH ACTIVITIES

- General Chair, Organizer, 2020 Northeast Regional Meeting of the ACS.
- Chair, General Chemistry 2019 Exam Writing Committee, Exams Institute, ACS Division of Chemical Education. 2017-2019.
- Committee on Community Activities, American Chemical Society, 2017-
 - Co-Chair National Chemistry Week 2019 Theme Team
- Chair, Green Mountain Section, ACS, 2016, 2017
- National Chemistry Week Coordinator, Green Mountain Section, ACS. 2014-present
- Chemical Magic shows for community, admissions, and local schools. 2000-present
- Judge, Chemists Celebrate Earth Day Illustrated Poem Contest, 2017
- Scientific Review Committee of the Vermont State Science and Mathematics Fair. 2017
- General Chemistry Paired Exam Writing Committee, Exams Institute, ACS Division of Chemical Education. 2015-2017.
- Biennial Conference on Chemical Education Committee, ACS Division of Chemical Education, ACS. 2015-2017.
- Peer Reviewer, ACS Student Affiliates Chapter Annual Reports, 2014-present

- Reviewer for the Journal of Chemical Education, 2008-present.
- Reviewer for the ACS Journal 'Environmental Science and Technology', 2013-present.
- Reviewer for Journal of Applied Organometallic Chemistry, 2014-present.
- Chair-Elect, Green Mountain Section, ACS, 2015.
- Symposium Organizer, Modern Inorganic Chemistry Laboratory Experiments. BCCE, Greely, Colorado, 2016.
- Special Judge, Vermont State Science Fair, 2015, 2016
- Symposium Organizer, *Nanotechnology in Undergraduate Education and Research*. ACS National Meeting, Denver, Colorado, 2015.
- General Chemistry Conceptual Exam Writing Committee, Exams Institute, ACS Division of Chemical Education. 2013-2015.
- Scientific Review Committee of the Vermont State Science and Mathematics Fair. 2014
- Symposium Organizer, *Nanotechnology in Undergraduate Education and Research*. ACS National Meeting, Dallas, TX, 2014.
- Organizing Committee, Session Chair, Nanotechnology and Perspectives in Organometallic, Materials, and Environmental Chemistry Symposium, Manhattan, KS, 2013.
- Judge, Student presentations, Western States Catalysis Club, 2013 Annual Symposium.
- Session Chair, Nanomaterials in Catalysis, Division of Inorganic Chemistry, ACS National Meeting, New Orleans, 2013.
- Advisor for FIRST LEGO league team, Farmington, Maine, 2011, 2012.
- First Term General Chemistry Exam Writing Committee, ACS Division of Chemical Education, Exams Institute, 2010-2012.
- Symposium Organizer, *Nanotechnology in Undergraduate Education and Research*. ACS National Meeting, Philadelphia, 2012.
- National Chemistry Week Coordinator, Maine Local Section, ACS. 2011, 2012
- Book Proposal Reviewer, Environmental Toxicological Chemistry for Sustainable Chemical Science. S. Manahan, CRC press. 2011
- ACS Division of Chemical Education, Membership Committee, 2010.
- Advisor, co-founder, University of Maine at Farmington Science Club. 2004-2012
- Science Educator, Sishekanu Basic School, Kaoma, Zambia. 2008
- Scholarship Committee, Beta Rho Chapter, Alpha Chi Sigma. 2008
- Coordinator, Chemical Magic Show Program, Alpha Chi Sigma, Kansas State. 2001-2002
- National Chemistry Week Coordinator, Kansas State Local Section, ACS. 2002, 2003

COLLEGE SERVICE

- Faculty Welfare Committee, 2016-2018, Chair 2017-18
- Retirement Planning Committee, 2016-present
- Environmental Science Program Steering Committee, 2015-2017
- Committee for Undergraduate Research. 2013-present, *Chair* 2014-2016
- Faculty Advisor, Saint Michael's College Student Chapter of the ACS. 2013-present
- Faculty Affiliate for Athletics. 2014-2016
- Spring academic fair, chemistry program representative. 2014-
- Faculty Yield Initiative, Office of Admissions. 2014, 15, 16
- SMC Academic Preview Days. Chemistry representative. 2013-15

PRESENTATIONS/POSTERS OF ORIGINAL WORK BY MENTORED STUDENTS

Synthesis and Characterization of Mesoporous Zirconia. Jordan Roach and David S. Heroux. ACS National Meeting, San Francisco, CA, 2017. (also presented at Vermont Sigma Xi meeting 2017)

Total Conversion of Mixed Algae Lipids over Heterogeneous Catalysts. Emma Timmel and Dr. David S. Heroux. ACS National Meeting, San Francisco, CA, 2017. (also presented at Vermont Sigma Xi meeting 2017)

Investigation of Ultrahigh Surface Area & Highly Graphitic Carbon for the Removal of Gasoline Based Pollutants from Ground Water, Caroline Staples, SMC Symposium 2017.

An Undergraduate Laboratory Experiment to Investigate Surface Areas of Nanoscale Materials. Jillian Denhardt and David S. Heroux, ACS National Meeting, San Diego, CA. 2016.

Recyclability and Stability of High Surface Area CaO for Converting Algae Polar Lipids to Biodiesel. Amanda Trainor, David S. Heroux, ACS National Meeting, San Diego, CA, 2016. (also presented at the Vermont Space Grant Consortium annual meeting and awards ceremony. University of Vermont, 2015.)

Silica templated zirconia catalysts for condensation reactions, Zachary Minor and David S. Heroux, ACS National Meeting, San Diego, CA. 2016.

Cobalt Loaded Mesoporous Materials for Oxidation Catalysis. Ellen Murchie, David S. Heroux, ACS National Meeting, Denver, CO, 2015. (also presented at SMC Symposium 2015)

Synthesis of High Surface Area CaO and SrO and Their Use in the Conversion of Algae Polar Lipids to Biodiesel. Katharine Tooke, David S. Heroux, ACS National Meeting, Denver, CO, 2015. (also presented at SMC Symposium 2015 and the Vermont Space Grant Consortium annual meeting 2014)

Carbon Coated MgO(111) as a catalyst in an aqueous environment, Robert Tracy, David Heroux, SMC Dean's Reception and SMC Symposium, 2015.

Carbon coated nanoscale metal oxide for the production of biofuels from biomass, Robert Tracy, David S. Heroux. ACS National Meeting, Dallas, TX, 2014.

Synthesis of Carbon-coated MgO catalysts using green carbon sources. Harrison Neal, David S. Heroux, Ryan M. Richards. ACS National Meeting, New Orleans, LA, 2013.

Imparting Stability to Nanostructured Metal Oxides for Pyrolysis Oil Upgrading. Kenneth B. Finch, David S. Heroux, Ryan M. Richards. ACS Rocky Mountain Regional Meeting, Denver, CO, 2012.

An Analysis of Antioxidants Present in Coffee. Morgan Cousins. Michael D. Wilson Symposium, UMF, 2012.

Dye-Sensitized Solar Cells: A Method to Synthesize TiO₂ Thin Films, and Analysis of Anthocyanin and Betalain as Molecular Sensitizers. Benjamin Murphy, David S. Heroux. M. D. Wilson Symposium, UMF, 2012.

Analysis of sediments deposited near varying land use patterns in the Rangeley Lakes area. Samantha Burk, Morgan Cousins, Dmitry Skoog and Gabriel Williams, David S. Heroux. M. D. Wilson Symposium, UMF, 2011.

Lichen as Pollution Indicators. Megan Devine. M. D. Wilson Symposium, UMF, 2010.

Drinking Water Safety in Kaoma, Zambia. Abby Pettitt, David S. Heroux. Northeast Undergraduate Research and Development Symposium, University of New England, 2009.

Lichen as Pollution Indicators. Dale Menard, Michelle Michaud. M. D. Wilson Symposium, UMF, 2009.

Effective Heat Sinks and Thermal Absorber Materials and Designs for a Small Greenhouse. Ben Engel, David S. Heroux. M. D. Wilson Symposium, UMF, 2009.

Drinking Water Safety in Kaoma, Zambia. Abby Pettitt, David S. Heroux. M. D. Wilson Symposium, UMF, 2009.

Synthesis, Characterization, and Reactivity of Nanoscale MgO and V_xO_y/MgO: Effect of Synthesis Parameters. Ezra Pryor, David Heroux. University of Maine at Farmington, M. D. Wilson Symposium, 2007.

PRESENTATIONS/POSTERS (*invited)

An Undergraduate Laboratory Experiment to Investigate Surface Areas of Nanoscale Materials. David S. Heroux, ACS National Meeting, San Francisco, CA. 2017.

A Multi-Year Study on Using First-Day Assessments to Determine Math Readiness for General Chemistry, Christina Chant and David Heroux, ACS National Meeting, San Diego, CA. 2016.

An Undergraduate Laboratory Experiment to Investigate Surface Areas of Nanoscale Materials. David S. Heroux, Biennial Conference on Chemical Education. Greeley, CO, 2016.

Real-time Analysis of Deactivation of HZSM-5 during Upgrading of Biomass Pyrolysis Vapors. Calvin Mukarakate, David S. Heroux, Ryan Richards and Mark R. Nimlos. North American Catalysis Meeting, Pittsburg, PA, 2015.

Nanoscale and Mesoscale Materials Synthesis Experiments for an Upper Level Laboratory. ACS National Meeting, Denver, CO, 2015.

Using First-Day Assessments to Determine Math Readiness for General Chemistry. David Heroux, Christina Chant. ACS National Meeting, Denver, CO, 2015.

Perspectives on Assessing Math Readiness for General Chemistry at Three Institutions. Co-presented with Christina Chant, Biennial Conference on Chemical Education. Grand Valley State, MI, 2014.

Nanotechnology Experiments for an Undergraduate Inorganic Chemistry Laboratory. ACS National Meeting, Dallas, TX, 2014.

Production of biofuels from biomass via upgrading pyrolysis oils and vapors over nanostructured metal oxides. Binghamton University (SUNY), Chemistry Department Colloquium, Binghamton, NY, 2014.*

Nanotechnology for Energy Solutions. Chemistry and Physics Departmental Seminar, Saint Michael's College, 2014.

Biochemical Warfare: A Chemist's Perspective. SMC Honors Program Panel on Biochemical Warfare; An Exploration of its Nature and Effects on Society. 2013*

Nanostructured Metal Oxides for use in the Production of Biofuels from Biomass. Nanotechnology and Perspectives in Organometallic, Materials, and Environmental Chemistry, Manhattan KS, 2013.*

Nanostructured metal oxides for producing biofuels from polar phospholipids. Western States Catalysis Club Meeting, Provo, UT, 2013.

An initial assessment of americium oxidation limitations using NaBiO_3 for advanced nuclear fuel cycle separations. Jessica A. Drader, Bruce Mincher, David Heroux, Ryan Richards, Jenifer C. Braley, 37th Actinide Separations Conference, Spokane, WA, 2013.

Incorporating nanotechnology based laboratory experiments into first semester general chemistry. D. S. Heroux and B. Murphy. ACS National Meeting, New Orleans, LA, 2013.

Nanostructured metal oxides for use in the production of biofuels from biomass. ACS National Meeting, New Orleans, LA, 2013.

Imparting Stability to Nanostructured Metal Oxides for Bio-oil upgrading. Harrison Neal, Kenneth Finch, David S. Heroux, Ryan Richards. Colorado Center for Biofuels and Biorefining annual meeting, Boulder, CO 2013.

Nanostructured metal oxides for use in the production of biofuels from biomass. Chemistry Department Seminar, Adams State University, Alamosa, CO, 2013.*

Nano First with Atoms First. ACS Rocky Mountain Regional Meeting, Denver, CO, 2012.

Nano First with Atoms First. ACS National Meeting, Philadelphia, PA, 2012.

Early, Practical Assessment of Teaching Tools for General Chemistry. ACS National Meeting, Anaheim, CA, 2011.

Chemistry That Changed History: an Honors Course for Non-science Majors. Biennial Conference on Chemical Education, University of North Texas, 2010.

Chemistry That Changed History. ACS Northeast Regional Meeting, Hartford, CT, 2009.

Makuas in Zambia. Faculty Forum Series, University of Maine at Farmington, 2009.

Water Quality in Kaoma, Zambia. Farmington Rotary Club, Maine, 2008.*

Water Quality in Kaoma, Zambia. Waterville Rotary Club, Maine, 2008.*

Nanotechnology: The Very Big Promise of the Very Small. Faculty Forum Series, University of Maine at Farmington, 2006.

Destructive Adsorption of Freons on Nanocrystalline MgO. Boreskov Institute of Catalysis, Novosibirsk, Russia, 2005.*

Environmental Applications of Nanoparticles: Destructive Adsorption of Freons on MgO Nanocrystals. UMF, Symposium Day, 2005.

The Art and Science of Chemical Demonstrations. Colby College, Waterville, ME, 2004.*

CF₂Cl₂ Decomposition over Nanocrystalline MgO. Heroux, D.; Mishakov I.; Bedilo, A.; Zaikovskii, V.; Chesnokov, V.; Volodin, A. and Klabunde, K.; ACS, Northeast Regional Meeting, Rochester, NY, 2004.

ESR study of nanocrystalline aerogel-prepared magnesium oxide. Heroux, D.S.; Richards, R.M.; Volodin, A.M.; Bedilo, A.F.; Chesnokov, V.V.; Zaikovskii, V.I.; Klabunde, K.J.; The Russian-American Seminar: "Advances in the Understanding and Application of Catalysts" Moscow, Russia, 2003.

Environmental Applications of Nanoparticles: Destructive Adsorption of Freons on Magnesium oxide Nanocrystals. ChemChats, Augustana College, Rock Island, IL. 2003.*

Salt Vapor / Solvent Vapor Codeposition: A New Method toward Semiconductor Nanoparticles. ChemChats, Augustana College, Rock Island, IL. 2001.*

ADDITIONAL CONFERENCES AND WORKSHOPS ATTENDED

New England Catalysis Society Meeting, Providence, RI, 2016.

VIPeR (Virtual Inorganic Pedagogy Electronic Resource) Workshop: Heterogeneous Catalysis at the Frontiers of Inorganic Chemistry. Seattle, WA, 2015.

New England Catalysis Society Meeting, Worcester, MA, 2015.

Council on Undergraduate Research, Dialogs: Climbing the Ladder to Funding Success: Diverse Sources, Diverse Pathways, Washington, D.C. 2015.

Leadership Institute, American Chemical Society, Dallas TX, 2015.

Vermont Space Grant Consortium Awards Ceremony, Burlington, VT, 2014, 2015.

Vermont Genetics Network & VT EPSCoR Grant Writing Workshop, South Burlington, VT, 2014.

Leadership Institute, American Chemical Society, Dallas, TX, 2013.

Conference on Earth and Energy Research, Golden, CO, 2013.

ACS National Meeting, San Diego, CA, 2012.

“Institutionalizing Undergraduate Research in the STEM Disciplines at Public Liberal Arts Colleges,” University of North Carolina at Asheville. 2011.

Council on Undergraduate Research, CUR Dialogs Workshop. Washington, DC. 2011.

Council on Undergraduate Research National Meeting, Weber State, UT. 2010.

Maine Experimental Program to Stimulate Competitive Research (EPSCoR) State Conference, University of Maine, Orono. 2008, 2010.

Northeast Undergraduate Research and Development Symposium, University of New England. 2009.

Biennial Conference on Chemical Education, Indiana University. 2008.

Council on Undergraduate Research National Meeting, DePauw, IN. 2006.

2nd International School-Conference on Catalysis for Young Scientists: *Catalyst design*, Novosibirsk-Altai, Russia. 2005.

PEER REVIEWED PEDOGOGICAL TOOLS

Bi-weekly literature discussion with ACS’s “As Soon as Possible” ASAP alerts. Literature Discussion. Virtual Inorganic Pedagogical Electronic Resource (www.ionicviper.org) Heroux. 2015

A Short Laboratory Exercise on Reagent Purity. Authors: D. Heroux, E. Steinmiller, K. Holman K. Plass, S. K. St. Angelo, K. Holman. 2015

Exploring the Scientific Method in an Electrocatalysis Publication. Literature Discussion, S. K. St. Angelo, D. Heroux, E. Steinmiller, K. Holman, K. Plass. 2015

Interpreting XPS and CV data from an Electrocatalysis Publication. Literature Discussion. Authors: K. Holman, D. Heroux, E. Steinmiller, K. Plass, S. K. St. Angelo. 2015

PUBLICATIONS

13. A. F. Bedilo, E. I. Shuvarakova, A. M. Volodin, E. V. Ilyina, I. V. Mishakov, A. A. Vedyagin, V. V. Chesnokov, D. S. Heroux, and K. J. Klabunde. *Effect of Modification with Vanadium or Carbon on Destructive Sorption of Halocarbons over Nanocrystalline MgO: The Role of Active Sites in Initiation of the Solid-State Reaction. Journal of Physical Chemistry C.* 2014, 118, 13715–13725
12. Mukarakate, X. Zhang, A. R. Stanton, D. J. Robichaud, P. N. Ciesielski, K. Malhotra, B. S. Donohoe, E. Gjersing, R. J. Evans, D. S. Heroux, R. Richards, K. Iisa and M. R. Nimlos. *Real-*

time monitoring of the deactivation of HZSM-5 during upgrading of pine pyrolysis vapors. Green Chemistry, 2014, 16, 1444–1461.

11. D.S. Heroux, G. Eason; *Working Towards Sustainability One Room at a Time. Journal of Sustainability Education*, 3, 2012.
10. Schmidt, K.J. Klabunde, A. Ponce, A. Smetana, D. Heroux, *Metal Vapor Synthesis of Transition Metal Compounds* in Encyclopedia of Inorganic Chemistry and Bioinorganic Chemistry. John Wiley & Sons, Ltd., New York, 2011.
9. Heroux, A. Ponce, S. Cingarapu, K. J. Klabunde; *Nanoparticles Prepared by Salt Vapor-Solvent Vapor Cocondensation and Controlled Nucleation: Metal Sulfides (ZnS, CdS, CdSe, PbS), and Metal Halide (LiF). Size, Aggregates, Structures, Digestive Ripening, Superlattices, and Impregnations. Advanced Functional Materials*, 17, 2007, 3562-3568.
8. Schmidt, K.J. Klabunde, A. Ponce, A. Smetana, D. Heroux, *Metal Vapor Synthesis of Transition Metal Compounds* in Encyclopedia of Inorganic Chemistry 2nd Edition. Wiley publishers, New York, 2006.
7. A. Volodin, A. F. Bedilo, D.S. Heroux, V.I. Zaikovskii, I.V. Mishakov, V.V. Chesnokov and K. J. Klabunde; *Nanoscale oxides as destructive sorbents for halogenated hydrocarbons. Surface Chemistry in Biomedical and Environmental Science*. Ed. J. P. Blitz and V. M. Gun'ko. NATO Science Series, 2006
6. K.J. Klabunde, G. Medine, A. Bedilo, P. Stoimenov, D. Heroux; *Nanocrystalline Metal Oxides: A New Family of Mesoporous Inorganic Materials Useful for Destructive Adsorption of Environmental Toxins. Nanotechnology and the Environment: Applications and Implications: ACS Symposium Series 890*. Ed. Barbara Karn. American Chemical Society, Washington, DC. 2005
5. I.V. Mishakov, D.S. Heroux, V.V. Chesnokov, S.G. Koscheev, M.S. Mel'gunov, A.F. Bedilo, R.A. Buyanov, and K.J. Klabunde. *Reaction of Nanocrystalline MgO with 1-Iodobutane. Journal of Catalysis*, 229, 2005, 344-351.
4. I.V. Mishakov, V.I. Zaikovskii, D.S. Heroux, A.F. Bedilo, V.V. Chesnokov, A.M. Volodin, I.N. Martyanov, S.V. Filimonova, V.N. Parmon, and K. J. Klabunde. *CF₂Cl₂ Decomposition over Nanocrystalline MgO: Evidence for Long Induction Periods. Journal of Physical Chemistry B*, 2005; 109(15); 6982-6989.
3. D.S. Heroux, A.M. Volodin, V.I. Zaikovskii, V.V. Chesnokov, A.F. Bedilo and K.J. Klabunde. *ESR and HRTEM study of Carbon Coated Nanocrystalline MgO. Journal of Physical Chemistry B.*, 2004; 108(10); 3140-3144.
2. P.N. Kapoor, D.S. Heroux, R.S. Mulukutla, V. Zaikovskii and K.J. Klabunde. *High surface area homogeneous nanocrystalline bimetallic oxides obtained by hydrolysis of bimetallic m-oxo alkoxides. Journal of Materials Chemistry*, 13, 2003, 410-414.

1. V.V. Chesnokov, A.F. Bedilo, D.S. Heroux, I.V. Mishakov, and K.J. Klabunde. *Oxidative dehydrogenation of butane over nanocrystalline MgO, Al₂O₃ and VO_x/MgO catalysts in the presence of small amounts of iodine. **Journal of Catalysis**, 218, 2003, 438-446.*

MANUSCRIPTS IN PREPARATION

Juncheng Hu, Upakul Deka, Lifang Chen, Xue Wang, Yuan Yang, David S. Heroux, Danilo Roccatano and Ryan M. Richards. *In situ spectroscopy and theoretical study of Claisen-Schmidt condensation on highly active MgO(111) nano-sheets.*

A. Corpuz, D. Heroux, K. Tooke, A. Lizotte, C. Cadigan, G. Atiaga, B. Ho, L. Chen, A. York, M. Posewitz, R. Richards. *Conversion of polar phospholipids to biofuels over nanostructured magnesium oxide and calcium oxide: mechanism, reactivity, and catalyst recyclability.*

Alan Chant, David Heroux and Christina M. Kraemer-Chant. "Integrating Scientific Communication into the Liberal Arts Science Classroom Using Multiple Learning Strategies."