

Alice E. Bruce

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Department of Chemistry
University of Maine
Orono, Maine 04469-5706

Professional Experience

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| 2018- present | University of Maine, Orono, Maine
<i>Professor of Chemistry</i> |
| 2018-present | University of Maine, Orono, Maine
<i>Chair, Department of Chemistry</i> |
| 2008 – 2011 | University of Maine, Orono, Maine
<i>Chair, Department of Chemistry</i> |
| 2006 – 2008 | University of Maine, Orono, Maine
<i>Interim Chair, Department of Chemistry</i> |
| 1993- 2018 | University of Maine, Orono, Maine
<i>Associate Professor of Chemistry</i> |
| 1987- 1993 | University of Maine, Orono, Maine
<i>Assistant Professor of Chemistry</i> |
| 1985 – 1987 | University of North Carolina, Chapel Hill, NC
<i>Postdoctoral Research Associate, Department of Chemistry</i>
Advisor: Professor Joseph L. Templeton <ul style="list-style-type: none">Conducted synthesis and reactivity studies of low oxidation state tungsten phosphonium carbene and carbyne complexes |
| 1985 – 1987 | University of North Carolina, Chapel Hill, NC
<i>Visiting Lecturer, Evening College Program</i> |
| 1977 – 1980 | Kettering Research Laboratory, Yellow Springs, Ohio
<i>Research Technician</i>
Research Supervisor: Dr. Edward I. Stiefel <ul style="list-style-type: none">Synthesized dioxo molybdenum complexes with sulfur and nitrogen donor ligands as models for molybdoenzymes |

Education

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| 1980 - 1985 | Columbia University, New York, NY
Ph.D.; M.S.; and M.Phil. in Chemistry
Thesis advisor: Professor David R. Tyler <ul style="list-style-type: none">Dissertation topic: photochemical reactivity of LMCT excited states in high oxidation state organometallic sulfur complexes. |
| 1974 - 1978 | Antioch College, Yellow Springs, Ohio
B.S. in Chemistry |

Research interests

- Synthesis and reactivity of gold(I) complexes
- Thiolate-disulfide exchange in the bioinorganic chemistry of gold(I) and zinc(II)
- Redox reactivity of metal sulfur complexes
- Synthesis and catalytic reactivity of water soluble organo-gold nanoparticles
- Chemical education research on connecting macroscopic and submicroscopic domains through the process of creating representations

Research Collaborators

Dr. Mitchel Bruce, Department of Chemistry, University of Maine; Dr. Shirly Avargil, School of Education, Faculty of Social Science, Bar-Ilan University, Ramat-Gan, Israel; Dr. Touradj Solouki, Department of Chemistry and Biochemistry, Baylor University, Texas; Dr. Ahmed Mohamed, Department of Chemistry, University of Sharjah, UAE

Courses Taught

General Chemistry II (CHY 122)
Advanced Inorganic Chemistry (CHY 461)
Physical Methods in Inorganic Chemistry (CHY 560)
Organometallic Chemistry (CHY 462/CHY 562)
Advanced Integrated Chemistry Laboratory I and II (CHY 491 and CHY 492)
Bioinorganic Chemistry (topics course) (CHY 661)
Chemistry Seminar (writing intensive) (CHY 393)
Chemistry for Everyday Living (chemistry for nonscientists) (CHY 101/CHY 102)
Majoring in Chemistry (introduction and advising for 1st year chemistry majors; CHY 105)

Service and Professional Activities

American Chemical Society member (1983 - present)
Faculty Senate, CLAS representative (2017 - present)
Academic Council, CLAS, University of Maine (2016 - present)
Advance Initiative Council, University of Maine (2009-2011)
Graduate Coordinator, Department of Chemistry, University of Maine (1996 - 2006)
University of Maine Committee on NCAA Athletics Certification (2004 – 2005)
Faculty Research Funds Committee, University of Maine (2000 - 2003)
Chair, President's Council on Women, University of Maine (2002 - 2005)
Co-chair, President's Council on Women, University of Maine (1999 – 2001)
President's Council on Women, University of Maine (1998 – 1999)
Graduate Board, University of Maine (1992 – 1995; 1998 – 2006)
Distinguished Maine Professor College Nominating Committee (1999 - 2000)
Editorial Board Member, *Metal-Based Drugs* (2000 - 2005)
Science Mentor for National Public Radio (1997 – 1998)
Honors Council, University of Maine (1997 - 2000)
Secretary, Graduate Board, University of Maine (1994 - 1995)
Executive Committee, Graduate Board, University of Maine (1993 - 1995)
Expanding Your Horizons (1993 - 2015)
New England Board of Higher Education, Science & Engineering Academic Support Network (1992 – 2002)
Women in Science and Engineering Task Force, University of Maine (1991 - 1992)
Project SEED Program, University of Maine (1991 - 2004)
Advisory Board Member and Faculty for Upward Bound Math-Science Initiative, University of Maine (1991 - 1998)
Curriculum Revision Committee, Women in the Curriculum Program, University of Maine (1992 - 1995)
Curriculum Revision Committee, Dept. of Chemistry, University of Maine (1992 - 1997)
Faculty Advisor for ACS Student Affiliate Group, University of Maine (1989 - 1995)
Association for Women in Science member (1991 - 2003)
Volunteer Scientist for Science-by-Mail, Boston Museum of Science (1989 - 1995)

Publications

71. Wilhelm, K.; Pokhrel, S.; Stolpman, D.; Worth, C.; Mehta, S.; Villacob, R.; Zechmann, B.; Ahmad, A. A. L.; Taube, T.; Bruce, M. R. M.; Bruce, A. E.; Solouki, T., "Evaluating the Antiproliferative Effects of Tri(2-furyl)- and Triphenylphosphine-Gold(I) Pyridyl- and Pyrimidine-Thiolate Complexes", *Biomolecules*, **2026**, Vol. 16, Issue 1, <https://doi.org/10.3390/biom16010154>
70. Bruce, M. R. M.; Bruce, A. E.; Prats, Z.; Walter, J.; Leland, M., "One Rule to Rule Them All: Inviting Discussions about Content and Process in Johnstone's Triangle", *Journal of Chemical Education*, **2025**, 102(12), 5027-5035. <https://doi.org/10.1021/acs.jchemed.4c01475>
69. Frei, A.; Elliott, A. G.; Kan, A.; Dinh, H.; Bräse, S.; Bruce, A. E.; Bruce, M. R.; Chen, F.; Humaidy, D.; Jung, N.; King, A. P.; Lye, P. G.; Maliszewska, H. K.; Mansour, A. M.; Matiadis, D.; Muñoz, M. P.; Pai, T.-Y.; Pokhrel, S.; Sadler, P. J.; Sagnou, M.; Taylor, M.; Wilson, J. J.; Woods, D.; Zuegg, J.; Meyer, W.; Cain, A. K.; Cooper, M. A.; Blaskovich, M. A. T., "Metal Complexes as Antifungals? From a Crowd-Sourced Compound Library to the First In Vivo Experiments", *JACS Au*, **2022**, 2, 2277-2294. <https://doi.org/10.1021/jacsau.2c00308>
68. Bruce, M. R. M., Bruce, A. E., & Walter, J., "Creating Representation in Support of Chemical Reasoning to Connect Macroscopic and Submicroscopic Domains of Knowledge", *Journal of Chemical Education*, **2022**, 99, 1734-1746. <https://doi.org/10.1021/acs.jchemed.1c00292>
67. Ahmad, A. A. L., Parambath, J. B. M., Postnikov, P. S., Guselnikova, O., Chehimi, M. M., Bruce, M. R. M., Bruce, A. E., & Mohamed, A. A., "Conceptual Developments of Aryldiazonium Salts as Modifiers for Gold Colloids and Surfaces", *Langmuir*, **2021**, 37(30), 8897-8907. <https://doi.org/10.1021/acs.langmuir.1c00884>
66. Bruce, M. R. M., Bruce, A. E., Bernard, S. E., Bergeron, A. N., Ahmad, A. A. L., Bruce, T. A., Perera, D. C., Pokhrel, S., Saleh, S., Tyrina, A., & Yaparathne, S., "Designing a Remote, Synchronous, Hands-On General Chemistry Lab Course" *Journal of Chemical Education*, **2021**, 98(10), 3131-3142. <https://doi.org/10.1021/acs.jchemed.1c00559>
65. Ahmad, A. A. L.; Panicker, S.; Chehimi, M. M.; Monge, M.; Lopez-de-Luzuriaga, J. M.; Mohamed, A. A.; Bruce, A. E.; Bruce, M. R. M., "Synthesis of water-soluble gold-aryl nanoparticles with distinct catalytic performance in the reduction of the environmental pollutant 4-nitrophenol", *Catalysis Science & Technology* **2019**, 9 (21), 6059-6071.
64. Avargil, Shirly; Bruce, Mitchell R. M.; Klemmer, Susan A.; Bruce, Alice E. "A Professional Development Activity to Help Teaching Assistants Work as a Team to Assess Lab Reports in a General Chemistry Course", *Israel Journal of Chemistry*, **2018**, 58, 1 – 11.
63. Garusinghe, Gamage S. P; Bessey, S. Max, Bruce, Alice E.; Bruce, Mitchell R. M. "Influence of Gold(I) on the Mechanism of Thiolate, Disulfide Exchange", *Dalton Transactions* **2016**, 45(28), 11261-11266.
62. Bruce, Mitchell R. M.; Bruce, Alice E.. Avargil, Shirly; Amar, François G.; Wemyss, Thomas M.; Flood, Virginia J.; "Polymers and Cross Linking: a CORE Experiment to Help Students Think on the Atomic Scale", *Journal of Chemical Education*, **2016**, 93(9), 1599-1605.
61. Bruce, Mitchell R. M.; Wilson, Tiffany A.; Bruce, Alice E.; Bessey, S. Max; Flood, Virginia J., "A Simple, Student-Built Spectrometer to Explore Infrared Radiation and Greenhouse Gases", *Journal of Chemical Education*, **2016**, 93(11), 1908-1915.
60. Kurian, Roby; Bruce, Mitchell R. M.; Bruce, Alice E.; Amar, Francois G., "The influence of zinc(II) on thioredoxin/glutathione disulfide exchange: QM/MM studies to explore how zinc(II) accelerates exchange in higher dielectric environments", *Metallomics*, **2015**, 7, 1265-1273.

59. Garusinghe, Gamage S. P.; Bessey, S. Max; Boyd, Chelsea; Aghamoosa, Mostapha; Frederick, Brian G.; Bruce, Mitchell R. M.; Bruce, Alice E., "Identification of dimethyl sulfide in dimethyl sulfoxide and implications for metal-thiolate disulfide exchange reactions", *RSC Advances*, **2015**, 5, 40603-40606.
58. Avargil, Shirly; Bruce, Mitchell R. M.; Amar, Francois G.; Bruce, Alice E., "Students' Understanding of Analogy in a CORE (Chemical Observations, Representations, Experimentation) Learning Cycle, General Chemistry Experiment", *Journal of Chemical Education*, **2015**, 92, 1626-1638.
57. Garusinghe, Gamage S. P.; Bessey, S. Max; Aghamoosa, Mostapha; McKinnon, Meaghan; Bruce, Alice E.; Bruce, Mitchell R. M., "Disulfide competition for phosphine gold(I) thiolates: phosphine oxide formation vs. thiolate disulfide exchange", *Inorganics*, **2015**, 3, 40-54.
56. Chandrasoma, A.; Grant, R.; Bruce, A. E.; Bruce, M. R. M. "Electrochemical polymerization of aniline on carbon-aluminum electrodes for energy storage", *Journal of Power Sources*, **2012**, 219, 285-291.
55. Chandrasoma, A.; Hamid, A. A.; Bruce, A. E.; Bruce, M. R. M.; Tripp, C. P. "An Infrared Spectroscopic Based Method for Mercury(II) Detection in Aqueous Solutions", *Analytica Chimica Acta*, **2012**, 728, 57-63.
54. Hamid, A. A.; Tripp, C. P.; Bruce, A. E.; Bruce, M. R. M. "Application of Structural Analogs of Dimercaptosuccinic Acid-functionalized Silica Nanoparticles (DMSA-[silica]) to Adsorption of Mercury, Cadmium, and Lead", *Research on Chemical Intermediates*, **2011**, 37, 791-810.
53. Hamid, A. A.; Tripp, C. P.; Bruce, A. E.; Bruce, M. R. M. "A Selective Optical Chemosensor for Iron(III) Ions in Aqueous Medium Based on [bis(22'-bipyridine)-bis(2-carboxypyridine)]ruthenium(II) complex", *Jordan Journal of Chemistry*, **2011**, 6, 393-401.
52. Bruce, Alice E.; Tripp, Carl P.; Bruce, Mitchell R. M.; Al Abdel Hamid, Amer A. G.; Acharige, Asela C. Maha "Sensitive and selective detection method for mercury (II) in aqueous solution", U.S. Pat. Appl. Publ. (**2011**), US 20110281363.
51. Hamid, A. A.; Tripp, C. T.; Bruce, A. E.; Bruce, M. R. M. "Mercury, Cadmium, and Lead Chelation to meso-2,3-Dimercaptosuccinic Acid Covalently Attached to Silica Gel via Amide Bond Linkages", *Journal of Coordination Chem.*, **2010**, 63, 731-741.
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49. Bessey, S.; Aghamoosa, M.; Garusinghe, G. S. P.; Chandrasoma, A.; Bruce, A. E. and Bruce, M. R. M. "The Synthesis of Triethylphosphine Gold(I) 4-Nitrobenzenethiolate and Solvent Dependent Visible Absorption Spectra of 4-Nitrobenzenethiolate", *Inorganica Chimica Acta*, **2009**, 363(1), 279-282.
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46. Makarov, M. V.; Lemenovskii, D. A.; Bruce, A. E.; Bruce, M. R. M.; Dyadchenko, V. P. "Thermotropic Liquid Crystals Based on Ferrocenylbiphenyl and Ferrocenylterphenyl", *Liquid Crystals*, **2006**, 33, 485-494.
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44. Larkin, S.; Krause Bauer, J. A.; Konoplev, V.; Dyadchenko, V.; Lemenovskii, D.; Bruce, M. R. M.; Bruce, A. E. " μ -Biphenyl-2,2'-dithiolato- $k^2\text{S}:\text{S}'$ -bis[(triphenylphosphine- $k\text{P}$)gold(I)]", *Acta Crystallographica, Section C: Crystal Structure Communications*, **2004**, C60(9), m440-m442.
43. Mohamed, A. A.; Krause Bauer, J. A.; Bruce, A. E.; Bruce, M. R. M. " $[\mu\text{-o-Phenylenebis(diphenylphosphine)-}k^2\text{P:P}']\text{bis}[\text{chlorogold(I)}]$, dppbz(AuCl) $_2$ ", *Acta Crystallographica, Section C: Crystal Structure Communications*, **2003**, C59(3), m84-m86.
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40. Mohamed, A. A.; Abdou, H. E.; Chen, J.; Krause Bauer, J. A.; Bruce, A. E.; Bruce, M. R. M. "Perspectives in Inorganic and Bioinorganic Gold Sulfur Chemistry", *Comments on Inorganic Chemistry*, **2002**, 23(5), 321-334.
39. Chadwick, S.; English, U.; Ruhlandt-Senge, K.; Watson, C. Bruce, A.E.; Bruce, M.R.M. "Formation of Separated versus Contact Ion-Pairs in Alkali Thiolates and Selenolates", *Journal of the Chemical Society, Dalton Transactions*, **2000**, 2167-2173.
38. Chen, J.; Jiang, T.; Wei, G.; Mohamed, A.A.; Homrighausen, C.; Krause Bauer, J.A.; Bruce, A.E.; Bruce, M.R.M. "Electrochemical and Chemical Oxidation of Gold(I) Thiolate Phosphine Complexes: Formation of Gold Clusters and Disulfide", *Journal of the American Chemical Society*, **1999**, 121, 9225.
37. Watson, C. M.; Dwyer, D. J.; Andle, J.; Bruce, A.E.; Bruce, M.R.M. "Stripping Analyses of Mercury Using Gold Electrodes: Irreversible Adsorption of Mercury", *Analytical Chemistry*, **1999**, 71, 3181.
36. Foley, J. B.; Gay, S.E.; Turmel, C.; Wei, G.; Jiang, T.; Narayanaswamy, R.; Foxman, B.M.; Vela, M.J.; Bruce, A.E.; Bruce, M.R.M. "Electronic Structure of Dinuclear Gold(I) Complexes", *Metal-Based Drugs*, **1999**, 6, 255.
35. DiLorenzo, M.; Ganesh, S.; Tadayon, L.; Bruce, M.R.M.; Bruce, A.E. "Reactions of Organic Disulfides and Gold(I) Complexes", *Metal-Based Drugs*, **1999**, 6, 247.
34. Mohamed, A.A.; Bruce, A.E.; Bruce, M.R.M. "Cyclic Voltammetry of Auranofin", *Metal-Based Drugs*, **1999**, 6, 233.
33. Mohamed, A.A.; Bruce, A.E.; Bruce, M.R.M. "Electrochemistry of Gold and Silver Complexes", in *Organic Derivatives of Silver and Gold*, Patai, S. and Rappaport, Z., Eds., John Wiley & Sons, England, 1998.
32. Schwerdtfeger, P.; Bruce, A.E.; Bruce, M.R.M. "Theoretical Studies on the Photochemistry of the *cis* to *trans* Conversion in Dinuclear Gold Halide Bis(diphenylphosphino)ethylene Complexes", *Journal of the American Chemical Society*, **1998**, 120, 6587.

31. Andle, J.; Schwyer, M.; Munson, J.; Roderick, R.; McAllister, D.; French, L.; Vetelino, J.; Watson, C.; Foley, J.; Bruce, A.; Bruce, M. "Electrochemical Piezoelectric Sensors for Trace Ionic Contaminants", *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, **1998**, 45, 1408.
30. Lee, C.C.; Halbert, T.; Pan, W.-H.; Harner, M.A.; Wei, L.; Lenowicz, M.E.; Dim, C.O.; Miller, K.F.; Bruce, A.E.; McKenna, S.; Corbin, J.L.; Wherland, S.; Stiefel, E.I. "Synthesis, Reactivity and Redox Properties of Molybdenum Sulfur Complexes", *Inorganica Chimica Acta*, **1996**, 243, 147.
29. Foley, J.B.; Bruce, A.E.; Bruce, M.R.M. "An Unprecedented Photochemical Cis to Trans Isomerization of Dinuclear Gold(I) Bis(diphenylphosphino)ethylene Complexes", *Journal of the American Chemical Society*, **1995**, 117, 9596.
28. Jones, W.B.; Yuan, J.; Narayanaswamy, R.; Young, M.A.; Elder, R.C.; Bruce, A.E.; Bruce, M.R.M. "Solid State EXAFS and Luminescence Studies of Neutral, Dinuclear Gold(I) Complexes. Gold(I)-Gold(I) Interactions in the Solid State", *Inorganic Chemistry*, **1995**, 34, 1996.
27. Jiang, T.; Wei, G.; Turmel, C.; Bruce, A.E.; Bruce, M.R.M.; "Redox Chemistry of Gold(I) Phosphine Thiolates: Sulfur-Based Oxidation", *Metal Based Drugs*, **1994**, 1, 419.
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23. Saravanamuthu, A.; Bruce, A.E.; Bruce, M.R.M.; Fermin, M.C.; Hneihen, A.S.; Bruno, J.W. "Spectroelectrochemistry: Reversible C-C Bond Activation in Niobium Ketene Complexes", *Organometallics*, **1992**, 11, 2190.
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21. Bourquet, J.L.; Leblanc, M.; Saravanamuthu, A.; Bruce, M.R.M.; Bruce, A.E. "Reactions of Molybdenum(0) Tricarbonyl Complexes with 8-Azidoquinoline. Crystal Structure of the Phosphinimine Complex, $\text{Mo}(\text{CO})_4[\text{N}(\text{PPh}_3)(\text{C}_9\text{H}_6\text{N})]$ and Evidence for a Bent Nitrene Intermediate", *Inorganic Chemistry*, **1991**, 30, 3242.
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17. Willis, L.J.; Loehr, T.M.; Miller, K.F.; Bruce, A.E.; Stiefel, E.I. "Raman and Infrared Spectroscopic Studies of Dioxomolybdenum (VI) Complexes with Cysteamine Chelates", *Inorganic Chemistry*, **1986**, 25, 4289.
16. Bruce, M.R.M.; Bruce, A.E.; Tyler, D.R. "SCF-X α -SW Molecular Orbital Calculation of [CpMoS(μ -S)]₂, a Molecule that Undergoes a Photochemically Induced Isomerization." *Polyhedron*, **1985**, 2073.
15. Bruce, A.E.; Tyler, D.R. "Photochemical Isomerization of [Cp*MoS(μ -S)]₂ to Cp*₂Mo₂(μ -S₂)(μ -S)₂ and [Cp*MoS]₂(μ -S₂)", *Inorganic Chemistry*, **1984**, 23, 3433.
14. Bruce, A.E.; Bruce, M.R.M.; Sclafani, A.; Tyler, D.R. "Photochemistry and Electronic Structure of the Cp₂MoS₂ Complex", *Organometallics*, **1984**, 3, 1610.
13. Bruce, A.E.; Bruce, M.R.M.; Tyler, D.R. "Photochemistry and Electronic Structure of the Cp₂TiS₅ Complex", *Journal of the American Chemical Society*, **1984**, 106, 6660.
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10. Berg, J.M.; Hodgson, K.O.; Bruce, A.E.; Corbin, J.L.; Pariyadath, N.; Stiefel, E.I. "The Crystal and Molecular Structures of Dioxo Mo(VI) Complexes of Tripodal Tetradentate N,S-Donor Ligands", *Inorganica Chimica Acta*, **1984**, 90, 25.
9. Corbin, J.L.; Miller, K.F.; Pariyadath, N.; Wherland, S.; Bruce, A.E.; Stiefel, E.I. "Preparation and Properties of Tripodal and Linear Tetradentate N,S-Donor Ligands and Their Complexes Containing the MoO₂²⁺ Core", *Inorganica Chimica Acta*, **1984**, 90, 41.
8. Berg, J.M.; Spira, D.; Wo, K.; McCord, B.; Lye, R.; Co, M.S.; Belmont, J.; Barnes, C.; Kosydar, K.; Raybuck, S.; Hodgson, K.O.; Bruce, A.E.; Corbin, J.L.; Stiefel, E.I. "Structural Comparison of Octahedral MoO₂²⁺ Complexes of Bidentate and Linear Tetradentate N,S-Donor Ligands", *Inorganica Chimica Acta*, **1984**, 90, 35.
7. Marabella, C.P.; Enemark, J.H.; Miller, K.F.; Bruce, A.E.; Pariyadath, N.; Corbin, J.L.; Stiefel, E.I. "Complexes Containing the Mo₂O₅²⁺ Core: Preparation, Properties, and Crystal Structure of Mo₂O₅[(CH₃)₂NCH₂CH₂NHCH₂C(CH₃)₂S]₂", *Inorganic Chemistry*, **1983**, 22, 3456.
6. Bruce, A.E.; Corbin, J.L.; Dahlstrom, P.L.; Hyde, J.R.; Minelli, M.; Stiefel, E.I.; Spence, J.T.; Zubieta, J. "Investigations of the Coordination Chemistry of Molybdenum with Facultative Tetradentate Ligands Possessing N₂S₂ Donor Sets", *Inorganic Chemistry*, **1982**, 21, 917.
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