James Murdoch Brenan

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Education

Ph.D. (Geology) Rensselaer Polytechnic Institute, Fall 1990
B.Sc. (Geological Sciences, Honours), McGill University, Spring 1985

Professional Experience

Full Professor and Chair, Department of Earth Sciences, Dalhousie University, January 2016-present

Full Professor-status only, Department of Earth Sciences, University of Toronto, May-2016-present

Full Professor, Department of Earth Sciences, University of Toronto, July 2013-December, 2015

Visiting Professor, Laboratoire Magmas et Volcans, Université Blaise Pascal, July, 2012

DAAD (German Overseas Exchange) Investigator, Freie Universitat, Berlin, June, 2011

Associate Chair (Undergraduate Studies), Department of Geology, University of Toronto, July 2008-June, 2009

Associate Chair (Graduate Studies), Department of Geology, University of Toronto, July 2003-June 2007

Visiting Investigator, Lawrence Livermore National Laboratory, Jan-Jul, 2004

Associate Professor, Department of Geology, University of Toronto, July 2003-June 2013

Assistant Professor, Department of Geology, University of Toronto, July 1996-June, 2003

Geochemist, Lawrence Livermore National Laboratory, Oct. 1995-June, 1996

Chemistry Instructor, Foothill College, Los Altos, CA, Sept.-Dec. 1995

Post-Doctoral Research Staff, Lawrence Livermore National Laboratory, Oct. 1992-Oct. 1995

Post-Doctoral Fellow, Geophysical Laboratory, Carnegie Institution of Washington, Nov. 1990-Oct. 1992

Teaching Assistant, Rensselaer Polytechnic Institute, Spring, 1990

Research Assistant, Rensselaer Polytechnic Institute, 1985-1990

Summer Intern, Lunar and Planetary Institute, Summer 1985

Field Assistant, McGill University, Summer 1983 and 1984

Honours

Dalhousie Faculty of Science Killam Professor, 2017-2022

Julian Boldy Award for Best Paper in Mineral Deposit Research, 2012

Dean's Outstanding Teaching Award, University of Toronto, 2004

Hawley Medal, Best Paper Award, Mineralogical Association of Canada, 2003

Young Scientist Medal, Mineralogical Association of Canada, 2002

Premier's Research Excellence Award, 2000

Fellow and Life Member of the Mineralogical Society of America, 1998-present

Mineralogical Society of America Award, 1998

Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellowship, location of tenure at the Geophysical Laboratory, Carnegie Institution of Washington. 1990-1992

Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship, 1985-1989.

Logan Gold Medal, McGill University, Department of Geology, Spring 1985.

William Henry Howard Scholarship, McGill University, 1984-85

Faculty Scholar, McGill University, Spring 1984

Professional Affiliations and Activities Last 6 Years

NASA Emerging Worlds Proposal Review Panel, August, 2019

External Evaluator, Steacie Prize, 2019

Co-Convener (with H. Rizzo and J. Mungall) session on Chalcophile and Siderophile elements, Goldschmidt Conference, Boston, 2018

NASA Solar System Workings Proposal Review Panel, July 2017; May, 2018

External Committee Member, Mineral Resources Faculty Search, ETH Zurich, 2017-2018

Member, College of Reviewers, Canada Research Chairs, 2017

Co-Editor (with C. Dale, S-J Barnes) Special Issue of Geochimica et Cosmochimica Acta: Papers Presented at the 4th Highly Siderophile Element Workshop, 2016-2017

Co-editor, Geochemical News (Jan 2014- Jan 2016)

Editorial Advisory Board, Chemical Geology, 2001-2018

Member: American Geophysical Union, European Association of Geochemistry, Mineralogical Society of America, Mineralogical Association of Canada, European Union of Geosciences, Society of Economic Geology

Research Awards (held as PI or CoPI, last 6 years)

Title of Proposal	Funding Source/Type	Amount	Duration
Experimental Constraints on the Behaviour of HSE During Planetary Differentiation (PI)	NSERC Discovery Grant	$205,000 (total)	2011-2016
Experimental Constraints on the Behaviour of HSE During Planetary Differentiation (PI)	NSERC Accelerator Grant	$120,000 (total)	2011-2014

Title of Proposal	Funding Source/Type	Amount	Duration
Deciphering the behaviour of chalcophile and siderophile elements during planetary Differentiation (PI)	NSERC Discovery Grant	$200,000 (total)	2016-2021
Experimental Investigation of the Role of Magma Contamination in the Genesis of Chromitite in the	NRCan Targeted Geoscience Initiative	$87,780 (total)	2016-2018

Ring of Fire (Co-PI)			
Laser ablation sampling system for ICP-MS Analysis (PI)	NSERC Equipment Grant	$150,000 (total)	2016-2018
Operations and maintenance support for facilities for materials characterization (PI Zwanziger)	NSERC Equipment Grant	$295,974 (total)	2016-2018
Origin of Chromitites in the Ring Fire Part II: Trace element fingerprinting of contaminants (Co-PI)	NRCan Targeted Geoscience Initiative	$90,000 (total)	2018-2020
Evaluation of the oxygen fugacity of the South Mountain Batholith	Nova Scotia DNR	$9,750	2018-2019
Carbon-coater for the Dalhousie Regional Electron Microprobe Facility	NSERC Equipment Grant	$58,500	2019-2020
Development of new mineralization pathfinders for the South Mountain Batholith (NS) using biotite and apatite trace element geochemistry	Nova Scotia DNR	$27,800	2020-2021

Current Citation Statistics:

Google Scholar H-index: 43

Total number of citations: 6718

Publications

Submitted/in prep

Sullivan, N.A., Zajacz, Z, Brenan, J.M. Mobilization of Platinum by Magmatic Brines, submitted to *Geochimica et Cosmochimica Acta, currently in revision*

Sullivan, N.A., Zajacz, Z, Brenan, J.M. Mobilization of Gold and Palladium by Magmatic Brines, submitted to *Geochimica et Cosmochimica Acta, currently in revision*

Published/In Press Journal Articles:

Mungall J.E., Jenkins, M.C., Robb, S.J., Yao, Z. and Brenan, J.M. Upgrading of magmatic sulfides revisited. *Economic Geology, Scientific Communication*, 115 (8), 1827-1833, 2020.

Lesher, C.E., Dannberg, J., Barfod, G.H., Glessner, J., Bennett, N. and Brenan, J.M. Iron isotope fractionation at the core–mantle boundary by thermodiffusion. *Nature Geoscience*, 13, 382-386, 2020.

Maciag, B. and Brenan, J.M. Speciation of arsenic and antimony in basaltic magmas. *Geochimica et Cosmochimica Acta*, 276, 198-218, 2020.

Brenan, J.M., Mungall, J.E. and Bennett, N. Abundance of highly siderophile elements in lunar basalts controlled by iron sulfide melt, *Nature Geoscience*, 12, 701–706, 2019.

Sullivan, N.A., Zajacz, Z, Brenan, J.M. The solubility of Pd and Au in hydrous alkaline intermediate melts: The effect of oxygen fugacity and the addition of Cl and S, *Geochimica et Cosmochimica Acta*, 231, 15-29, 2018.

Mungall, J.E., Long, K., Smythe, D., Brenan, J.M. and Naslund, H.R. Role of liquid immiscibility in the generation of magmatic Fe-P-O deposits. *Geology*, 46, 255-258, 2018.

Liu, Y, Brenan, J.M. and Bray, C.J. Synthesis of a chalcogenide glass standard for laser-ablation inductively coupled mass spectrometry (LA-ICPMS). *Economic Geology*, 112, 2005-2021, 2017.

Canali, A.C, Brenan, J.M., Sullivan, N.A. Solubility of platinum-arsenide melt and sperrylite in synthetic basalt at 0.1 MPa and 1200^{o}C with implications for arsenic speciation and platinum sequestration in mafic igneous systems. *Geochimica et Cosmochimica Acta*, 216, 153-168, 2017.

Smythe, D. and Brenan, J.M. Magmatic oxygen fugacity estimated using zircon-melt partitioning of cerium. *Earth and Planetary Science Letters*, 453, pp 260-266, 2016.

Bennett, N., Brenan, J.M., and Fei, Y. Thermometry of the magma ocean: Controls on the metal-silicate partitioning of gold. *Geochimica et Cosmochimica Acta,* 184, pp 173-192, 2016.

Smythe, D. and Brenan, J.M. The effects of fO_2 and melt composition on cerium speciation in silicate melts. *Geochimica et Cosmochimica Acta*. 170, pp 173-187, 2015

Liu, Y and Brenan, J.M. Partitioning of platinum-group elements (PGE) and chalcogens (Se, Te, As, Sb, Bi) between monosulfide-solid solution (MSS), intermediate solid solution (ISS) and sulfide liquid at controlled fO_2-fS_2 conditions. *Geochimica et Cosmochimica Acta,* 159, pp 139-161, 2015.

Bennett, N., Brenan, J.M. and Fei, Y. Metal-Silicate Partitioning Experiments at High Pressures and Temperatures: Experimental Methods and a Protocol for Suppressing Highly Siderophile Element Inclusions. *Journal of Visualized Experiments*, 100, e52725, doi:10.3791/52725, 2015.

Brenan, J.M. Se-Te fractionation by sulfide–silicate melt partitioning: Implications for the composition of mantle-derived magmas and their melting residues. *Earth and Planetary Science Letters*, 422, 45-57, 2015.

Mungall, J.E., Brenan, J.M., Godel B., Giallard, F., and Barnes, S. Transport of S, Cu and Au in magmas by flotation of sulfide melt on vapor bubbles. *Nature Geoscience*, 8, pp 216-219, 2015.

Bennett, N., Brenan, J.M. and Koga, K.T. The solubility of platinum in silicate melt under reducing conditions: Results from experiments without metal inclusions. *Geochimica et Cosmochimica Acta*, 133, pp 422-442, 2014.

Mungall, J. E, and Brenan, J.M. Partitioning of platinum-group elements and Au between sulfide liquid and basalt and the origins of mantle-crust fractionation of the chalcophile elements. *Geochimica et Cosmochimica Acta*, 125 pp 265-289, 2014. ****ISI Highly Cited Paper****

Smythe, D. and Brenan, J.M, Henderson, G.S. Quantitative determination of cerium oxidation state in alkali-aluminosilicate glasses using Ce M4,5-edge XANES. *Journal of Non-crystalline Solids,* 378, pp 258-264, 2013.

Barnes, S.J., Godel, B., Gürer, D., Brenan, J.M., Robertson, J. and Paterson, D., Sulfide-olivine Fe-Ni exchange and the origin of anomalously Ni-rich magmatic sulfides. *Economic Geology*, 108, pp 1971-1982, 2013.

Bennett, N. and Brenan, J.M. Controls on the solubility of rhenium in silicate melt: Implications for the osmium isotopic composition of Earth's mantle. *Earth and Planetary Science Letters*, 361, pp 320-332, 2013.

Brenan, J.M., Finnigan, C.F., McDonough, W.F. and Homolova, V. Experimental constraints on the partitioning of the Ru, Rh, Ir, Pt and Pd between chromite and silicate melt: The importance of ferric iron. *Chemical Geology*, 302–303, pp 16–32, 2012.

Caciagli-Warman, N.C., Brenan, J.M., McDonough, W.F., and Phinney, W.C. Experimental constraints on Li partitioning and Li isotope fractionation during subduction zone dehydration. *Chemical Geology*, 280, pp 384–398, 2011.

Brenan, J.M. and Bennett, N. Soret separation of highly siderophile elements in Fe-Ni-S melts: Implications for solid metal-liquid metal partitioning. *Earth and Planetary Science Letters*, vol 298, pp 299-305, 2010

Brenan, J.M. and McDonough, W.F. Core formation and metal-silicate fractionation of osmium and iridium from gold. *Nature Geoscience*, vol 2, pp 798-801, 2009.

Rose-Weston, L.A., Brenan, J.M., Fei, Y., Secco, R.A. and Frost, D. Perspectives on Earth Differentitation from Metal-Silicate Partitioning of Te, Se, and S. *Geochimica et Cosmochimica Acta.,* vol 73, 4598-4615, 2009.

Brenan, J.M., Haider, N. and Andrews, D. Experimental evaluation of liquid immiscibility in a portion of the system Fe-Ni-Cu-S using high gravitational acceleration. *Economic Geology*, vol 103, pp 1563-1570, 2008

Brenan, J.M. The platinum-group elements: "Admirably adapted" for science and industry. *Elements*, vol 4, pp 227-232, 2008.

Finnigan, C.S., Brenan, J.M., Mungall, J.E. and McDonough, W.F. Experiments and models bearing on the role of chromite as a collector of platinum group minerals by local reduction. *Journal of Petrology,* vol 49, pp 1647-1665, 2008.

Brenan, J.M. Re-Os fractionation by sulfide-silicate partitioning: A new spin. *Chemical Geology, Special Issue on Highly Siderophile Elements*, vol 248, pp 140-165, 2008

Brenan, J.M., McDonough, W.F. and Ash, R. An experimental study of the solubility and partitioning of iridium, osmium and gold between olivine and silicate melt. *Earth and Planetary Science Letters*, 237:855-872, 2005.

Conly, A.G., Brenan, J.M., Bellon, H. and Scott, S.D. Arc to rift transitional volcansim in the Santa Rosalia region, Baja California Sur, Mexico. *Journal of Volcanology and Geothermal Research*, vol 142, 303-341, 2005.

Wang, H.M., Henderson, G.S. and Brenan, J.M. Measuring quartz solubility by in situ weight-loss determination using a hydrothermal diamond anvil cell. *Geochimica et Cosmochimica Acta*, Vol 68, 5197-5204, 2004

Schulze, D.J., Harte, B, Valley, J.W., Brenan, J.M. and Channer, D.M.De R. Extreme Crustal Oxygen Isotope Signatures Preserved in Coesite Diamond, *Nature*, 423: 68-70, 2003.

Brenan, J.M., McDonough, W.F. and Dalpe, C. Experimental Constraints on the Partitioning of Rhenium and Some Platinum-Group Elements between Olivine and Silicate Melt, *Earth and Planetary Science Letters*, 212:135-150, 2003.

Mungall, J. E. and Brenan, J.M. Experimental Evidence for the Chalcophile Behaviour of the Halogens, *Canadian Mineralogist*, 41: 207-220, 2003.

Brenan, J.M. Effects of fO_2, fS_2, Temperature and Melt Composition on Fe-Ni Exchange Between Olivine and Sulfide Liquid: Implications for Natural Olivine-Sulfide Assemblages, *Geochimica et Cosmochimica Acta*, 67: 2663-2681, 2003.

Andrews, D.R.A. and Brenan, J.M. Phase Equilibrium Constraints on the Magmatic Origin of Laurite + Ru-Os-Ir Alloy, *Canadian Mineralogist*, 40: 1705-1716, 2002.

Brenan, J.M. and Rose, L.A. Experimental Constraints on the Wetting of Chromite by Sulfide Liquid, *Canadian Mineralogist*,40:1113-1126, 2002.

Brenan, J.M. Re-Os Fractionation in Magmatic Sulfide Melt by Monosulfide Solid Solution, *Earth and Planetary Science Letters*, 199: 257-268, 2002.

Andrews, D.A. and Brenan, J.M. The Solubility of Ruthenium in Sulphide Liquid: Implications for Platinum-Group Mineral (PGM) Stability and Sulphide Melt/Silicate Melt Partitioning, *Chemical Geology*,192:163-181, 2002.

Sattari, P., Brenan, J.M., Horn, I. and McDonough, W.F. Experimental constraints on the sulfide- and chromite-silicate melt partitioning behavior of rhenium and platinum-group elements, *Economic Geology*, 97: 385-398, 2002.

Brenan, J.M. and Andrews, D. High Temperature Stability of Laurite and Ru-Os-Ir Alloy and Their Role in PGE Fractionation in Mafic Magmas, *Canadian Mineralogist*, 39:573-592, 2001.

Rose, L.A. and Brenan, J.M. Wetting Properties of Fe-Ni-Co-Cu-O-S Melts Against Olivine: Implications for Sulfide Melt Mobility. *Economic Geology*, 96:145-157, 2001.

Brenan, J.M., Cherniak, D.J. and Rose, L.A., Diffusion of Osmium in Pyrrhotite and Pyrite: Implications for Closure of the Re-Os Isotopic System. *Earth and Planetary Science Letters*, 180:399-413, 2000.

Brenan, J.M. and Li, C., Constraints on Oxygen Fugacity During Ore Formation in the Voisey's Bay Intrusion, Labrador, Canada. *Economic Geology*, 95:901-915, 2000.

Brenan, J.M. and Caciagli, N. Fe-Ni Exchange between Olivine and Sulphide Liquid: Implications for Oxygen Barometry in Sulphide-Saturated Magmas. *Geochimica et Cosmochimica Acta*, 64:307-320, 2000

Brenan, J.M., Shaw, H.F. and Ryerson, F.J. The Role of Aqueous Fluids in the Slab-to-Mantle Transfer of Boron, Beryllium and Lithium During Subduction: Experiments and Models, *Geochimica et Cosmochimica Acta*, 62:3337-3347, 1998.

Brenan, J.M., Neroda, E., Lundstrom, C.C., Shaw, H.F., Ryerson, F.J. and Phinney, D.L. Behaviour of Boron, Beryllium and Lithium During Melting and Crystallization: Constraints from Mineral-Melt Partitioning Experiments, *Geochimica et Cosmochimica Acta*, 62:2129-2141, 1998

Brenan, C.J.H., Brenan, J.M. and Hunter, I.W., Non-invasive Confocal Raman Imaging of Immiscible Liquids in a Porous Medium, *Journal of Analytical Chemistry*, 69:45-50, 1997.

Brenan, J.M., Shaw, H.F. and Ryerson, F.J. Experimental Evidence for the Origin of Lead Enrichment in Convergent Margin Magmas, *Nature*, 378:54-56, 1995

Brenan, J.M., Shaw, H.F. Ryerson, F.J. and Phinney, D.L., Experimental Determination of Trace Element Partitioning Between Pargasitic Amphibole and Hydrous Silicate Melt, *Earth and Planetary Science Letters,* 135:1-11, 1995.

Brenan, J.M., Shaw, H.F., Ryerson, F.J. and Phinney, D.L., Mineral-Aqueous Fluid Partitioning of Trace Elements at 900 ^{o}C and 2.0 GPa: Constraints on the Trace Element Chemistry of Mantle and Deep Crustal Fluids, *Geochimica et Cosmochimica Acta,* 59:3331-3350, 1995.

Brenan, J.M., Shaw, H.F., Phinney, D.L. and Ryerson, F.J., Rutile-Fluid Partitioning of Nb, Ta, Zr, U and Th: Implications for High-Field-Strength Element Depletions in Island-Arc Basalts, *Earth and Planetary Science Letters*, 128:327-339, 1994.

Brenan, J.M. Diffusion of Chlorine in Fluid-Bearing Quartzite: Effects of Fluid Composition and Total Porosity, *Contributions to Mineralogy and Petrology* , 115:215-224, 1993.

Brenan, J.M., Kinetics of Fluorine, Chlorine and Hydroxyl Exchange in Fluorapatite, *Chemical Geology,* 110:195-210, 1993.

Brenan, J.M. Partitioning of Fluorine and Chlorine between Apatite and Aqueous Fluids at High Pressure and Temperature: Implications for the Fluorine and Chlorine Content of High P-T Fluids, *Earth and Planetary Science Letters,* 117:251-263, 1993.

Ayers, J.C., Brenan, J.M., Watson, E.B., Wark, D.A. and Minarik, W.G., A New Capsule Technique for Hydrothermal Experiments Using the Piston Cylinder Apparatus, *American Mineralogist*, vol 77, 1080-1086, 1992.

Brenan, J.M. and Watson, E.B., Partitioning of Trace Elements Between Olivine and Aqueous Fluids at High P-T Conditions: Implications for the Effect of Fluid Composition on Trace Element Transport, *Earth and Planetary Science Letters*, vol 107, p 672-688, 1991.

Brenan J.M. and Watson, E.B., Partitioning of Trace Elements Between Carbonate Melt and Clinopyroxene and Olivine at Mantle P-T Conditions, *Geochimica et Cosmochimica Acta*, vol 55, p 2203-2214, 1991.

Brenan, J.M. and Watson, E.B., Fluids in the Lithosphere, 2: Experimental Constraints on CO_2 Transport in Dunite and Quartzite at Elevated P-T Conditions with Implications for Mantle and Crustal Decarbonation Processes, *Earth and Planetary Science Letters*, vol 85, p 497-515, 1987.

Watson, E.B. and Brenan, J.M., Fluids in the Lithosphere, 1: Experimentally-Determined Wetting Characteristics of CO_2-H_2O Fluids and Their Implications for Fluid Transport, Host-Rock Physical Properties, and Fluid Inclusion Formation, *Earth and Planetary Science Letters*, vol 85, p 497-515, 1987.

Refereed Books and Chapters

Brenan, J.M. Entries on Pt, Pd and Re for the Encyclopedia of Geochemistry, 2016.

Brenan, J.M., Bennett, N. and Zajacz, Z. Experimental results on fractionation of the highly siderophile elements (HSE) at variable pressures and temperatures during planetary and magmatic differentiation. *Reviews in Mineralogy and Geochemistry*, Vol 81, pp 1-88, 2016. ****ISI Highly Cited Paper****

Brenan, J.M. Melts and Fluids: An Overview of Recent Advances, *Reviews of Geophysics, Supplement,* pp 33-40, *U.S. National Report to the IUGG: Properties of the Solid Earth,* 1995.

Brenan, J.M. Chapter 6: Development and Maintenance of Metamorphic Permeability: Implications for Fluid Transport Processes, in *Reviews in Mineralogy*, vol 26: Contact Metamorphism, pg 291-315, 1991.

Watson, E.B., Brenan, J.M. and Baker, D.R., Chapter 5: Distribution of Fluids, in: Continental Lithospheric Mantle, Menzies, M (ed.), Oxford University Press, 1990.

Other Written Contributions

Brenan, J.M. News and Views: The magmatic forge. *Nature Geoscience*, 13 (11), 716-717.

Brenan, J.M., Woods, K., Mungall, J.E. and Weston, R. Origin of chromitites in the Esker Intrusive Complex, Ring of Fire Intrusive Suite, as revealed by chromite trace element chemistry and simple crystallization models. *Geological Survey of Canada Open File report*, in press.

Brenan, J.M. News and Views: Ubiquitous Late Veneer. *Nature Geoscience*, vol 5, pp 1-2, 2012.

Barnes, S-J and Brenan, J. M. Preface: Chemical Geology, Special Issue on Geochemistry of Chalcophile and Siderophile Elements, *Chemical Geology*, vol 302–303, pp 1-2, 2012.

Brenan, J.M. Basalt, *McGraw-Hill Yearbook of Science and Technology*, 2001

Brenan, J.M. Partitioning of Fluorine and Chlorine between Apatite and Non-silicate Fluids at High Pressure and Temperature, *Annual Report of the Director, Geophysical Laboratory*, 1991.

Luguet, A., Pearson, D.G., Selby, D., Meisel, T. and Brenan, J. Preface: Highly siderophile element geochemistry. *Chemical Geology, Special Issue on Highly Siderophile Elements*, vol 248, pp 115-118, 2008

Contributions to Conferences (Last 6 Years)

Drage, N. and Brenan, J.M. Experimental evaluation of the pressure reduction hypothesis for the origin of chromitites. Atlantic Geoscience Society 47th Colloquium, Virtual, 5-6 Feb, 2021.

Maciag, B.J., Brenan, J.M. and Hanley, J. Variation in the Major and Trace Element Geochemistry of Biotite and Apatite from the South Mountain Batholith, Nova Scotia. Atlantic Geoscience Society 47th Colloquium, Virtual, 5-6 Feb, 2021.

Maciag, B.J. and Brenan, J.M. Experimental calibration of an apatite oxybarometer for felsic magmas. Atlantic Geoscience Society 46th Colloquium, Truro, 7-8 Feb, 2020.

Koga, K.T., Rouleau, M. and Brenan, J.M. Grain boundary diffusion of Re, Os, Pt, and Pb, in olivine aggregate in presence of sulfide. V.M. Goldschmidt Conference, Barcelona, August, 2019.

Sullivan, N.A., Zajacz, Z. and Brenan, J.M. Mobilization of platinum by NaCl+HCl-bearing orthomagmatic brines. GAC/MAC meeting, Quebec City, May, 2019. **Best Student Paper Award**

Maciag, B.J. and Brenan, J.M. Apatite Accommodating Arsenic: A Potential New Oxybarometer. GAC/MAC meeting, Quebec City, May, 2019.

Woods, K., Keltie, E., Brenan, J.M. and Mungall, J.E., Weston, R. The role of country rock assimilation on chromite crystallization in the Ring of Fire, James Bay Lowlands, Ontario. GAC/MAC meeting, Quebec City, May, 2019.

Woods, K., Keltie, E., Brenan, J.M. and Mungall, J.E., Weston, R. The role of country rock assimilation on chromite crystallization in the Ring of Fire, James Bay Lowlands, Ontario. Atlantic Geoscience Society 45th Colloquium, Fredricton, 8-9 Feb, 2019.

Chavez, J, Brenan, J.M. and MacHattie, T.G. Redox state of the South Mountain batholith: A reconnaissance study using zircon geochemistry. Atlantic Geoscience Society 45th Colloquium, Fredricton, 8-9 Feb, 2019.

Keltie, E., Brenan, J.M. and Mungall, J.E., Weston, R. The role of contamination in the formation of chromitites in the Ring of Fire Intrusive Suite, James Bay Lowlands, Ontario V.M. Goldschmidt Conference, Boston, August, 2018.

Maciag, B., Brenan, J.M. and Keltie, E. Speaking Septic Speciation: An Experimental Study of Arsenic and Antimony in Basalts. V.M. Goldschmidt Conference, Boston, August, 2018.

Zhang, X, Brenan, J.M., Mungall, J.E. Controls on orthopyroxene-melt partitioning of palladium. V.M. Goldschmidt Conference, Boston, August, 2018.

Keltie, E., Brenan, J.M. and Mungall, J.E., Weston, R. An experimental investigation of the effect of country rock assimilation on chromite crystallization in the Ring of Fire, James Bay lowlands, Ontario. Atlantic Geoscience Society 44th Colloquium, Truro, 2-3 Feb, 2018.

Maciag, B., Brenan, J.M. and Keltie, E. Valence State of Arsenic and Antimony in Basalts: An Experimental and Synchrotron Study. Atlantic Geoscience Society 44th Colloquium, Truro, 2-3 Feb, 2018.

Woods, K. and Brenan, J.M. An experimental study of the effect of water on chromite saturation in komatiite. Atlantic Geoscience Society 44th Colloquium, Truro, 2-3 Feb, 2018. **Best Student Paper Award**

Keltie, E., Brenan, J.M. and Mungall, J.E., Weston, R. An experimental investigation of the effect of country rock assimilation on chromite crystallization in the Ring of Fire, James Bay lowlands, Ontario. PDAC-SEG Student Research Colloquium, March 2018. **Best Student Paper Award**

Brenan, J.M. and Mungall, J.E. A sulfide-saturated Lunar mantle? EGU General Assembly, Vienna, 23-28 April, 2017

Brenan, J.M. Sulphur solubility of reduced, iron-rich melts. Atlantic Geoscience Society 43rd Colloquium, Fredricton, 10-11 Feb, 2017.

Jorgenson C. and Brenan, J.M. Sulphur solubility of carbonatites, with implications for mass transfer in Earth's mantle. Atlantic Geoscience Society 43rd Colloquium, Fredricton, 10-11 Feb, 2017. **Best Student Paper Award**

Keltie, E., Brenan, J.M. and Mungall, J.E. Experimental investigation of the role of contamination on chromite crystallization in the Ring of Fire deposit, Ontario. Atlantic Geoscience Society 43rd Colloquium, Fredricton, 10-11 Feb, 2017.

Maciag, B., and Brenan, J.M. Apatite for reduction: A potential new oxybarometer for felsic magmatic systems. Atlantic Geoscience Society 43rd Colloquium, Fredricton, 10-11 Feb, 2017.

Sullivan, N.A., Brenan, J.M. and Canali, A.C. Solubility of the assemblage Pt-PtAs(melt) in basalt with implications for As speciation and Pt sequestration. *Highly Siderophile Elements Workshop*, Durham, UK, July, 2016.

Brenan, J.M. and Fowler-Gerace, N.A. Partitioning of Se and Te in mantle melting residues: Implications for the upper mantle Se-Te array. *Highly Siderophile Elements Workshop*, Durham, UK, July, 2016.

Brenan, J.M. and Fowler-Gerace, N. Se-Te fractionation by sulfide-silicate partitioning: Implications for the late accretion history of Earth. *Joint Assembly, Montreal* May, 2015.

Canali A. and Brenan, J.M. Solubility of the assemblage Pt-PtAs(melt) in basalt with implications for Pt-As complexing and As speciation. *Joint Assembly, Montreal* May, 2015.

Mungall, J.E., Long, K., Smythe, D., Brenan, J.M. and Naslund, H.R. Role of liquid immiscibility in the generation of magmatic Fe-P-O deposits. *Joint Assembly, Montreal* May, 2015.

Mungall, J.E., Brenan, J.M., Godel, B., Barnes, S.J. Transfer of S, Cu and Au to felsic magmas by flotation of sulfide melt on vapor bubbles. *V.M. Goldschmidt Conference, Sacramento,* June, 2014.

Mungall, J.E., Long, K., Smythe, D., Brenan, J.M. and Naslund, H.R. Genesis of a magmatic end-member IOCG deposit at El Laco. *V.M. Goldschmidt Conference, Sacramento,* June, 2014.

Mungall, J.E. and Brenan, J.M. Mantle-Crust Fractionation of the Platinum-Group Elements. *V.M. Goldschmidt Conference, Florence,* August, 2013.

Brenan, J.M. Effect of sulfur on the solubility of platinum in molten silicate: Preliminary results. *GAC/MAC meeting, Winnipeg,* May, 2013

Turchario, F. and Brenan, J.M. Experimental investigation of Pt and Rh solubility in basalt-rhyolite mixtures. *GAC/MAC meeting, Winnipeg,* May, 2013
Jerome H. Remick Poster Award*

Barnes, S.J., Godel, B. and Brenan, J.M. Sulfide-olivine Fe-Ni exchange and the origin of anomalously Ni-rich magmatic sulfides. *12th International Ni-Cu-(PGE) Symposium, Guiyang, China,* June, 2012.

Liu, Y and Brenan, J.M. Experimental measurement of PGE and semi-metal partitioning during sulfide melt crystallization at controlled fO_2-fS_2 conditions. *12th International Ni-Cu-(PGE) Symposium, Guiyang, China,* June, 2012.

Lesher, C.E., Brenan, J.M., Barfod, G.H. and Glessner, J. Experimental constraints on Fe-isotope fractionation at the core-mantle boundary. *V.M. Goldschmidt Conference, Montreal*, June, 2012.

Bennett, N. and Brenan, J.M. Equilibrium core formation loses its lustre: High pressure and temperature partitioning of gold. *V.M. Goldschmidt Conference, Montreal*, June, 2012

Brenan, J.M. Sulfide-silicate partitioning of PGEs (and Au): Implications for noble metal behaviour in magmatic systems. *V.M. Goldschmidt Conference, Montreal*, June, 2012

Liu, Y and Brenan, J.M. MSS-sulfide melt partitioning of PGE and semi metal at controlled fO_2-fS_2 conditions. *V.M. Goldschmidt Conference, Montreal*, June, 2012

Smythe, D.J. and Brenan, J.M. Ce Speciation in Silicate Melts: Application to Ce-in-Zircon Oxybarometry. *V.M. Goldschmidt Conference, Montreal*, June, 2012

Brenan, J.M. Sulfide-silicate partitioning of PGEs (and Au): Implications for noble metal behaviour in magmatic systems. *GAC/MAC meeting, St. John's, May*, 2012.

Invited Lectures and Presentations (Last 6 Years)

Mungall, J.E., Yao, Z.-S., and Brenan, J.M. Role of compound drops in magmas. 14th International Ni-Cu-PGE and Naldrett Memorial Symposium – November 2020 (keynote).

Maciag, B.J. and Brenan, J.M. Experimental Calibration of an Arsenic-in-Apatite Oxybarometer. *V.M. Goldschmidt Conference, On-line,* June, 2020 (invited).

Brenan, J.M. Soret separation of iron isotopes in metallic liquids: Evidence for a leaky core? Geological Association of Canada, Volcanology-Igneous Petrology Section National Webinar, 1 April, 2020.

Brenan, J.M. Experiments and observations on the behavior of siderophile elements in magmas. Washington University. St. Louis, 9 November, 2017.

Brenan, J.M. A new oxygen barometer for felsic magmas with application to the Early Earth. AGS-Science Atlantic Speaker, University of New Brunswick, 24 March, 2017.

Brenan, J.M., Mungall, J.E., Homolova, V. and Luo, D. A sulfide-saturated lunar mantle? *Highly Siderophile Elements Workshop*, Durham, UK, July, 2016.

Brenan, J.M. Ce in zircon oxygen barometry. Bedford Institute of Oceanography, 18 May, 2016.

Deciphering the formation of the Earth and Moon using the highly siderophile elements (HSE). Dept of Chemical and Physical Sciences, U of Toronto, Mississauga, 24 November, 2015.

Brenan, J.M. Late accretion to the Earth –Moon system. Rensselaer Polytechnic Institute, Troy, NY, November 10, 2015.

Brenan, J.M., Canali A.C. and Sullivan, N.A. Solubility of the assemblage Pt-PtAs(melt) in basalt with implications for Pt-As complexing and As speciation (invited). *V.M. Goldschmidt Conference, Prague,* August, 2015.

Mungall, J.E., Brenan, J.M., Godel, B., Barnes, S.J. and Gaillard, F. Upward transport of S, Cu and Au in magmas by flotation of sulphide melt on vapour bubbles (keynote). *V.M. Goldschmidt Conference, Prague,* August, 2015.

Brenan, J.M. Ce in zircon oxygen barometry. Dalhousie University, 13 April, 2015.

Brenan, J.M. Experiments and observations bearing on the behaviour of the HSEs in magmatic systems. Dalhousie University, 14 April, 2015.

Brenan, J.M. Experimental Constraints on HSE Fractionation during Basalt Genesis (keynote). *V.M. Goldschmidt Conference, Florence,* August, 2013.

Brenan, J.M. Experimental constraints on late accretion of the Earth and Moon. Penn. State University, 19 March, 2013.

List of Courses Taught (Last 6 Years)

Undergraduate Courses

2014/2015 (Toronto)
GLG420 Capstone Field Trip: Newfoundland and SE Labrador (17 days plus prep)
GLG318F Igneous and Metamorphic Processes (8 hours/week; 2 Lab sections)
GLG470Y Undergraduate Thesis: Kristyna Buchan
GLG470Y Undergraduate Thesis: Robin Wolf

2015/2016 (Toronto)
GLG318F Igneous and Metamorphic Processes (8 hours/week; 1 Lab section)
GLG470Y Undergraduate Thesis: Stephanie Vaughn

2016-17 (Dalhousie)
ERTH 3020 Metamorphic Petrology (9 hours/week; 2 lab sections)
ERTH 4000 Honours Thesis: Corin Jorgenson

2017-18 (Dalhousie)
ERTH 3020 Metamorphic Petrology (6 hours/week; 1 lab section)
ERTH 4000 Honours Thesis: Kate Woods

2018-19 (Dalhousie)
ERTH 3020 Metamorphic Petrology (6 hours/week; 1 lab section)
ERTH 4000 Honours Thesis: Juan Chavez

2019-20 (Dalhousie)
ERTH 3020 Metamorphic Petrology (6 hours/week; 1 lab section)

2020-21 (Dalhousie)
On leave

Graduate Courses

2012/13 (Toronto)
GLG2304H Geochemistry (4 hours/week)

2013/14 (Toronto)
ESS1101 Graduate Seminar Course (3 hours/week)

2014/15 (Toronto)
ESS1101 Graduate Seminar Course (3 hours/week)

2015/16 (Toronto)
ESS1101 Graduate Seminar Course (3 hours/week)

2016/17 (Dalhousie)
ERTH 5000 Seminar Course Early Earth (with Nick Culshaw) (3 hours/week)

2017/18 (Dalhousie)
ERTH 5000 Seminar Course Himalayan Magmatism (with Chris Beaumont) (1.5 hours/week)

Theses Supervised/In Progress

B.Sc.
Natalie Caciagli, B.Sc. thesis title:"An experimental study of Fe-Ni exchange between olivine and sulphide melt: Implications for Ni-Cu deposits and oxygen barometry", Completed April, 1998

David Andrews, B.A.Sc. thesis title: "An experimental study of the solubility of iridium in sulphide liquid: Implications for high temperature alloy phase stability", Completed April, 1999

Vivian Schatz, B.Sc. thesis title:"Do melt inclusions in olivine preserve primary liquid compositions?", Completed April, 1999

Andrew Stewart, B.Sc. thesis title:"Hydrothermal growth of quartz single crystals", Completed April, 2000

Lisa Tomory, B.Sc. thesis title:"Diffusion of sulphur in a basaltic melt", Completed April, 2000

Christine Kwan, B.Sc. thesis title:"Characterisation of PGE mineralisation at East Bull Lake", Completed April, 2001

Peter Gower, B.A.Sc. thesis title: "An experimental study of the solubility of ruthenium and stability of laurite in a basaltic system", Completed June, 2002

Mike Wood, B.A.Sc. thesis title: "Arsenic in igneous systems: An experimental investigation" Completed April, 2003

Seth Ninaviggi, B.Sc. thesis title: "The geology and origin of the Essonville Carbonatite", Completed April, 2003.

Ashley Harrett, B.Sc. thesis title: "Zircon-melt partitioning of Ce and Eu as a function of oxygen fugacity", Completed April, 2005

Veronika Homolova, B.Sc. thesis title: " Spinel-silicate melt partitioning of platinum group elements (PGEs) as a function of oxygen fugacity", Completed April, 2008

Victoria Mackenzie, B.Sc. thesis title: "Chromite and PGE precipitation induced by magma mixing", Completed April, 2009

Katherine Kelley, B.Sc. thesis title: "MSS-melt partitioning of PGEs and semi-metals at controlled fO_2-fS_2 conditions", began Summer, 2008.

Kieran Jederman, B.Sc. thesis title: "Behaviour of chalcophile elements and semi-metals during solidification of the Mt. St. Gregoire intrusion, Quebec", began Fall 2009.

Caitlin Beland, B.Sc. thesis title "Petrology of Li pegmatites east of James Bay, Quebec", completed April, 2011.

Danica Pascua, B.Sc. thesis title: "Stability of copper rich sulfide minerals at high temperature: Implications for Au-PGE fractionation in felsic magmas", completed, April, 2012.

Alex Pernin, B.Sc. thesis title: "Evidence for shallow level degassing at Mt. St. Gregoire, QC", completed, April, 2013.

Mark Lawrence, B.Sc. thesis title: "Investigation of ash layers, Ordovician Table Point Formation, Newfoundland", completed, April, 2013.

Dennis Luo B.Sc. thesis title: "Is there Fe metal in the source regions of lunar magmas?", completed, April, 2014.

Andrew Canali, B.Sc. thesis title: "Solubility of the assemblage Pt-PtAs in basalt with implications for Pt complexing and As speciation", completed, April, 2014.

Kristyna Buchan, B.Sc. thesis title: "Origin of amphibole in the Skinner Cove Formation, Newfoundland, Canada", completed, April, 2015

Robin Wolf, B.Sc. thesis title: "Solubility of precious metals in carbonate melt, with implications for mantle metasomatism", completed, April, 2015

Stephanie Vaughn, B.Sc. thesis title: "Oxidation state of manganese in igneous systems", completed, April, 2016.

Corin Jorgenson, B.Sc. thesis title: "Solubility of sulfur in molten carbonate with implications for mantle metasomatism", completed April, 2017.

Kate Woods, B.Sc. thesis title: "An experimental study of the effect of water on chromite saturation in komatiite", completed April, 2018.

Juan Chavez, B.Sc. thesis title: "Investigation of the redox state of the South Mountain Batholith using Ce-in-zircon oxygen barometry", completed April, 2019.

M.Sc.

Parisa Sattari, M.Sc. thesis title: "Experimental constraints on the role of chromite in PGE fractionation in magmatic systems", Completed May, 2000.

Lesley Rose, M.Sc. thesis title: "Wetting properties of Fe-Ni-Co-Cu-O-S melts against olivine: Implications for sulphide melt mobility", Completed Sept, 2000.

David Andrews, M.Sc. thesis title: "The effects of intensive parameters on the geochemical behaviour of ruthenium, osmium and iridium in sulfide saturated and undersaturated systems: Implications for IPGE alloy stability in mafic magmas", Completed Sept, 2002.

Fransesco Turchario, M.Sc. thesis title: "The effect of melt composition on the behaviour of platinum in magmatic systems", completed August, 2013.

Damoun Pourbazargan M.Sc. provisional thesis title: "Melt Inclusions in Chromite", began Fall, 2010 (co-supervised with J. Mungall), withdrew.

Caitlin Beland M.A.Sc. thesis title: "Phase Equilibria in Peralkaline melts", completed January, 2013 (co-supervised with J. Mungall).

Shawn Vandekerkhove M.Sc. thesis title: "Wetting properties of sulfide liquids in crustal lithologies", completed August, 2014 (co-supervised with J. Mungall).

Neal Sullivan M.Sc. thesis title: "The role of tellurium as a complexing agent for precious metals in porphyry deposits", completed August, 2015 (co-supervised with Zoltan Zajacz).

Erin Keltie M.Sc. thesis title: “An experimental study of factors that affect chromitite formation in the Ring of Fire, James Bay Lowland, Ontario”, completed December, 2018 (co-supervised with J. Mungall).

Natashia Drage, M.Sc. thesis title: The effect of pressure on the solubility of chromite with applications to the origin of stratiform chromitites”, began September 2019.

Ph.D.

Craig Finnigan, Ph.D. thesis title: "The role of chromite in PGE fractionation in mafic igneous systems", Completed June, 2006.

Lesley Rose, Ph.D. thesis title: "Solution behaviour of the siderophile elements during Earth differentiation: An experimental study", Completed April, 2007.

Natalie Caciagli, Ph.D thesis title: "Experimental constraints on Li isotope fractionation during subduction zone dehydration", Completed December, 2009.

Duane Smythe, Ph.D. thesis title: “An experimental study of zircon-silicate melt partitioning with geochemical applications”, completed August, 2013. **Gelinas Gold Medal***

Neil Bennett, Ph.D. thesis title: “The behaviour of siderophile elements in high temperature geochemical systems”, completed August, 2013

Yanan Liu, Ph.D. thesis title: “Arsenic and other semi-metals in igneous ore-forming systems”, completed September, 2015.

Neva Fowler-Gerace, Ph.D. provisional thesis title: “Controls on the behaviour of chalcogens during slab dehydration and mantle melting”, began Fall, 2014, withdrew.

Neal Sullivan, Ph.D. provisional thesis title: “Mobilization of Platinum, Palladium and Gold by Magmatic Brines: An Experimental Study”, completed Sept, 2020. (co-supervised with Zoltan Zajacz).

Bryan Maciag, Ph.D. provisional thesis title: “Behaviour of redox-sensitive chalcogenides in magmatic systems”, began Fall 2016.

Department, Faculty and University Service (last 6 years)

2015/16 (Toronto)
Director, Duncan Derry Microprobe Laboratory (Department)
Director, LA-ICPMS Laboratory (Department)
Chair, Analytical Services Committee (Department)

2016/17 (Dalhousie)
Chair, Department of Earth Sciences
Member, Faculty of Science Council

2017/18 (Dalhousie)
Chair, Department of Earth Sciences

Member, Faculty of Science Council
Member, Certificate in Academic Leadership Development Committee
Director, McKay Electron Microprobe Laboratory
Director, Laser Ablation ICP-MS Laboratory

2018/19 (Dalhousie)
Chair, Department of Earth Sciences
Member, Faculty of Science Council
Advisory Board Clean Technologies Research Institute
Director, McKay Electron Microprobe Laboratory
Director, Laser Ablation ICP-MS Laboratory

2019-20 (Dalhousie)
Chair, Department of Earth and Environmental Sciences
Member, Faculty of Science Council
Advisory Board Clean Technologies Research Institute
Director, McKay Electron Microprobe Laboratory
Director, Laser Ablation ICP-MS Laboratory

2020-21 (Dalhousie)
Chair, Department of Earth and Environmental Sciences
Member, Faculty of Science Council
Director, McKay Electron Microprobe Laboratory
Director, Laser Ablation ICP-MS Laboratory
On leave Jan 1 2021-Dec 31 2021