

Neil R. Bennett, PhD

Curriculum Vitae

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Employment

2021 (start date July 2nd): Assistant Professor, Department of Earth Sciences, University of Toronto.

2020 – Present: Consultant, Saildrone.

2019 – 2020: Adjunct Faculty, Department of Chemistry and Biochemistry, CSU East Bay.

2018: Earth Science Curriculum Designer, IXL Learning.

2017: Postdoctoral Associate, Geophysical Lab, Carnegie Institution of Washington.

2013 – 2016: Postdoctoral Fellow, Geophysical Lab, Carnegie Institution of Washington.

2007: Junior Geologist, Nunaminerals, Nuuk, Greenland.

Education

2008 – 2013: PhD in Geology, University of Toronto. Thesis title: The solubility and metal-silicate partitioning of some highly siderophile elements: Implications for core-formation and planetary accretion.

2004 – 2008: MSci, Hons, 1st class (undergraduate masters) in Geology, University of Birmingham, UK. Thesis title: The magnetic fabric of the W. Mourne Granite, N. Ireland and its implications for shallow crustal level magma emplacement.

Research Interests

Trace element speciation and partitioning, igneous and metamorphic petrology, planetary accretion and differentiation, materials synthesis.

Equipment Experience

Solid media high-pressure apparatus (piston-cylinder and multi-anvil press); laser-heated diamond anvil cell; controlled atmosphere furnace; muffle furnace; electron probe micro-analysis (WDS); scanning electron microscopy (imaging and EDS); laser-ablation inductively coupled plasma mass spectrometry; focused ion beam milling; X-ray diffraction.

Scholarships, Grants and Awards

2013 – 2015: Barbara McClintock Postdoctoral Fellowship, Carnegie Institution of Washington.

2008 – 2013: Connaught Scholarship, University of Toronto School of Graduate Studies.

2011: GSA Graduate Student Research Grant; Soret Diffusion at the Core-Mantle Boundary.

2010: MSA Student Grant for Research in Mineralogy and Petrology; The Metal-Silicate Partitioning Behaviour of Re and Pt: Implications for Terrestrial Accretion and Core Formation.

2008: Undergraduate Science Award, University of Birmingham.

2008: Undergraduate Award for Single Honours Geology, University of Birmingham.

2006: Undergraduate Student Award in Mineral Science, Mineralogical Society of Great Britain & Ireland.

2006: Palaeontological Association Undergraduate Award.

Teaching Experience

Courses Taught (CSU East Bay)

2019, 2020: Introductory Chemistry

Teaching Assistantships (University of Toronto)

2012: Capstone Field Course – Newfoundland & Labrador

2009 - 2012: Introduction to Field Mapping – Ontario

2008, 2009, 2011: Igneous and Metamorphic Petrology

2010: Structural Geology

2010: Introductory Geology

2008, 2009: Introduction to Mineralogy

Supervisory Roles (University of Toronto)

2012: NSERC Summer Research Student: Co-Supervisor.

Manuscripts in Preparation

Bennett, N. R., Jackson, C. R. M., Du, Z., Fei, Y. *In Prep.* The metal-silicate partitioning of tungsten at high-pressure: Implications for the tungsten isotope heterogeneity of plume mantle.

Zapata, T., Liang, J., Friebel, J., Ender, C. P., Qi, H., Struzhkin, V., Fei, Y., **Bennett, N. R.**, Alkahtani, M., Wrachtrup, J., Kaiser, U., Ermakova, A., Jelezko, F., Wagner, M., Hemmer, P., Weil, T. *In Prep.* Fluorescent nanodiamond growth from molecular precursors.

Submitted and Peer-Reviewed Publications

Sio, C. K., **Bennett, N. R.**, Schauble, E., Edwards, P., Lesher, C. E., Wimpenny, J., Shahar, A. *Submitted.* An impact origin for main group pallasites revealed by iron isotopes.

Bennett, N. R. 2020. Controls on Element Partitioning. *Encyclopedia of Geology, 2nd Edition.* Elias, S. & Alderton, D. (Eds.) Amsterdam: Elsevier Academic. (Invited Submission).

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

Sio, C. K., Parsons-Davis, T., Lee, E., Pascall, A., Kuntz, J. D., Wimpenny, J., Goodell, J., Roberts, K. E., Bandong, B. B., **Bennett, N. R.** 2020. Additive manufacturing of platinum group element (PGE) reference materials with a silica matrix. *Rapid Communications in Mass Spectrometry*, **34**, e8627,1-9.

Brenan, J. M., Mungall, J. E., **Bennett, N. R.** 2019. Control of the highly siderophile elements in lunar basalts by iron sulfide melt. *Nature Geoscience*. **12**, 701-706.

Rizo, H., Andrault, D., **Bennett, N. R.**, Humayun, M., Brandon, A., Vlastelic, I., Moine, B., Poirier, A., Bouhifd, M., Murphy, D. T. 2019. ^{182}W evidence for core-mantle interaction in the source of mantle plumes. *Geochemical Perspectives Letters*, **11**, 6-11.

Sio, C. K., Roskosz, M., Dauphas, N., **Bennett, N. R.**, Mock, T., Shahar, A. 2018. The isotope effect for Mg-Fe interdiffusion in olivine and its dependence on crystal orientation, composition and temperature. *Geochimica et Cosmochimica Acta*, **239**, 463-480.

Bennett, N. R. & Fei, Y. 2018. Pressure, sulfur and metal-silicate partitioning: The effect of sulfur species on the parameterization of experimental results. *American Mineralogist*, **103**, 1068-1079.

Jackson, C. R. M., **Bennett, N. R.**, Du, Z., Cottrell, E., Fei, Y. 2018. Early episodes of high-pressure core formation preserved in plume mantle. *Nature*, **553**, 491-495.

Du, Z., Jackson, C. R. M., **Bennett, N. R.**, Driscoll, P., Fei, Y., Deng, J., Lee, K., Greenberg, E., Prakapenka, V. 2017. Insufficient energy from MgO exsolution to power early geodynamo. *Geophysical Research Letters*, **44**, 1-6.

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

Brenan, J. M., **Bennett, N. R.**, Zaczajcz, Z. 2016. 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*, **81**. (Invited Submission)

Bennett, N. R., Brenan, J. M., Fei, Y. 2015. Metal-silicate partitioning experiments at high pressure and temperature: experimental methods and a procedure for the highly siderophile elements, *Journal of Visualized Experiments*, **100**. (Invited Submission)

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

Smythe, D. J., Brenan, J. M., **Bennett, N. R.**, Regier, T., Henderson, G. S. 2013. Quantitative determination of cerium oxidation states in alkali-aluminosilicate glasses using $\text{M}_{4,5}$ -edge XANES, *Journal of Non-Crystalline Solids*, **378**, 258-264.

Bennett, N. R. & Brenan, J. M. 2013. 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**, 320-332.

Stevenson, C. T. E. & **Bennett, N. R.** 2011. The emplacement of the Palaeogene Mourne Granite Centres, Northern Ireland: new results from the Western Mourne Centre. *Journal of the Geological Society*, **168**, 831-836.

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

Invited Talks

Bennett, N. R., Noble metal logistics: Distributing highly siderophile elements between the core and mantle, *Bayerisches Geoinstitut (BGI)*, 2019.

Bennett, N. R., Experimental results on fractionation of the highly siderophile elements (HSE) at variable pressures and temperatures during planetary and magmatic differentiation, *RiMG Short Course, Scripps Institution of Oceanography*, 2016.

Bennett, N. R., Magma ocean thermometry: experiments on the metal-silicate partitioning of Au, *University of Maryland*, 2016.

Bennett, N. R., Terrestrial accretion and core formation: insights from the highly siderophile elements, *Smithsonian Museum of Natural History*, 2014.

Bennett, N. R., Metal-silicate partitioning: consequences for the late-veener and conditions of core metal segregation, *University of Maryland*, 2014.

Bennett, N. R., Lateral emplacement of the Western Mourne Granite, N.Ireland, from AMS fabric data, *AGU Joint Assembly*, 2009.

Selected Conference Abstracts

Bennett, N. R. & Fei, Y. Pressure, Sulfur and Metal-Silicate Partitioning: Does the Formation of Metal-Sulphur Species in Silicate Melt Affect the Parameterisation of Experimental Results? *American Geophysical Union - Fall Meeting*, 2016.

Bennett, N. R., Jackson, C. R. M., Du, Z., Fei, Z. Planetary Differentiation in the Laboratory: Methods for Metal-Silicate Partitioning Experiments in the Diamond Anvil Cell and their Application to Tungsten. *Geological Society of America Annual Meeting*, 2016.

Bennett, N. R. & Fei, Y. Element Redistribution in Fe-Ni-O Melts by a Thermal Gradient: Implications for Siderophile Element Partitioning During Core Formation and Crystallization, *American Geophysical Union - Fall Meeting*, 2014.

Bennett, N. R. & Brenan, J. M. Equilibrium Core Formation Loses its Lustre: High Pressure and Temperature Partitioning of Gold, *Goldschmidt Conference*, 2012.

Bennett, N. R. & Brenan, J. M. Suppression of Metal Inclusions and the Effect of Carbon on Pt Solubility in Haplobasalt at High Pressure and Temperature, *American Geophysical Union Fall Meeting*, 2011.

Bennett, N. R. & Brenan, J. M. The Metal-Silicate Partitioning of Re & Pt: Constraining Mantle Os Isotope Systematics, *Geological Association of Canada and Mineralogical Association of Canada Meeting*, 2011.

Community Service

Reviewer for: Earth and Planetary Science Letters, *Geochimica et Cosmochimica Acta*, *American Mineralogist*, NERC Research Fellowship Program, German Science Foundation (DFG).

2019: Meritus Scholarship Interviewer.

2015: Goldschmidt Conference, Session chair.

2011 – 2012: Association of Geology Graduate Students, President; University of Toronto.

2010 – 2011: 'Rockfest' seminar series organiser; University of Toronto.

2010 – 2011: Society of Economic Geologists, University of Toronto Chapter, committee member.

2009 – 2010: Prospectors and Developers Assoc. of Canada, conference volunteer.

Referees

2009: American Geophysical Union Joint Assembly, conference volunteer.

2005 – 2006: Lapworth Society, committee member; University of Birmingham.

2004 – 2008: UCAS Prospective Student Visits, volunteer; University of Birmingham.

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