

Michelle D. Wenz

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EDUCATION

Ph.D. Candidate, expected 2019: Northwestern University, Dept. Earth and Planetary Sciences
M.S. Experimental Geosciences, 2015: Bayerisches Geoinstitut, Univ. of Bayreuth, Germany
B.S. Geosciences, 2013: University of Arizona

RESEARCH AND PROFESSIONAL EXPERIENCE

Research Statement: I study the physics and chemistry of minerals (mineral physics) to understand geological and geophysical processes from atomic to global scales. My research focuses on studying mineral inclusions encapsulated in diamonds, the only natural samples from Earth's deep mantle, to gain a better understanding of the composition of Earth's mantle. I promote the non-destructive characterization of mineral inclusions encapsulated in diamonds to preserve high-pressure phases, oxidation states, and volatile contents. I hope to shed light on the origin of Earth's water and the extent of mantle heterogeneity through studying such mineral inclusions. Much of my research is conducted at the GeoSoilEnviro Center for Advanced Radiation Sources at the Advanced Photon Source at Argonne National Laboratory where I use X-ray microtomography and X-ray diffraction to characterize diamond inclusions. My masters in experimental geoscience equipped me with the technical skills necessary to study minerals at high-pressure and high-temperatures relevant to Earth's interior. This allows me to recreate the conditions that mineral inclusions are under in the diamond to gain a better understanding of how they survive the ascent to the surface shedding light on on both mantle and kimberlitic processes. I have experience with Raman spectroscopy, Fourier Transform Infrared Spectroscopy, photoluminescence spectroscopy, X-ray diffraction, X-ray microtomography, X-ray fluorescence and electron microprobe analysis.

June 2018 to August 2018, Gemological Institute of America Summer Intern, GIA Ident Research, New York City Lab. Supervisor: Senior Research Scientist Dr. Ulrika D'Haenens-Johansson. Photoluminescent signatures of super-deep diamonds.

Jan 2015 to present, Research Assistant, Department of Earth and Planetary Sciences, Northwestern University. Advisor: Prof. Steven D. Jacobsen. Diamond inclusions and the kinetics of retrograde phase transformations in high-pressure silicate minerals during kimberlite eruption ascents.

October 2014 to October 2015, Research Assistant, Bavarian Geoinstitute (Bayerisches Geoinstitut), University of Bayreuth, Germany. For the M.S. degree in Experimental Geosciences, four research projects with five different mentors were completed:

Project 1: Blue-olivine inclusion in diamond. Advisors, Dr. Tiziana Boffa Ballaran and Prof. Steven D. Jacobsen, Bayerisches Geoinstitut, University of Bayreuth. Training: single-crystal X-ray diffraction, UV-VIS, and FTIR absorption spectroscopy.

Project 2: Iron oxidation states during mid-ocean ridge basalt petrogenesis. Advisor: Dr. Fanny Sorbadere. Training: preparation of experimental starting oxides, sol gel methods, multi-anvil press, gas-mixing furnace, piston cylinder apparatus, electron microprobe analysis (EMPA), powder X-ray diffraction, Mössbauer spectroscopy, and X-ray Absorption Near Edge Structure (XANES) conducted at the European Synchrotron Radiation Facility (ESRF).

Project 3: The B1-B2 transition in MgO self-consistent phonon calculations. Advisor: Dr. Gerd Steinle Neumann. Training: Ab initio calculations using Vienna Ab-Initio Software Package (VASP).

Project 4: Structural and vibrational properties of single crystals of Scandia, Sc_2O_3 under high pressure. Advisor: Dr. Sergey Ovsyannikov. Training: Diamond-Anvil Cell (DAC), high-pressure Raman and FTIR spectroscopy.

October 2011 to May 2013, Research Assistant, University of Arizona. Advisor: Dr. Robert T. Downs. Contributor to the RRUFF Project: integrated database of Raman spectra, X-ray diffraction and chemistry data for minerals (<http://rruff.info/>). Training: Statistical mineral crystal-chemical data analysis, single-crystal and powder X-ray diffraction, Raman spectroscopy, scanning electron microscopy (SEM), electron microprobe sample preparation.

AWARDS, FELLOWSHIPS & GRANTS

2017, *Science in Society*, Northwestern Scientific Images Contest: Honorable Mention. Image of deep-mantle diamond selected for the image exhibition to be featured in galleries, museums, libraries and community spaces across Evanston and Chicago. This award comes with opportunities to design and implement science outreach events related to the image.

2017, Conference Travel Grant Award, COMPRES, student travel grant awarded for the COMPRES annual meeting.

2013, College of Science Honors Convocation Dean's List Award, based on 15 regularly graded units/semester and a grade point average of 3.500-3.999.

2012, Field Camp Scholarship, scholarship awarded for field camp at the University of Arizona.

2011, Writing Program Award, second place in the Student's Guide cover art contest which was a university wide contest at the University of Arizona to design a cover for the first year English Composition Text book.

2009, Arizona Excellence Scholarship, University of Arizona merit tuition for incoming non-Arizona residents.

2009, Society of Exploration Geophysicists Merit Award, monetary award given at the Intel International Science and Engineering Fair for the project "Optimization of CCD Parameters for High Resolution Lunar Imaging".

2009, Office of Naval Research on behalf of the United States Navy and Marine Corps Tuition Scholarship Award, monetary award given at the Intel International Science and Engineering Fair for the project "Optimization of CCD Parameters for High Resolution Lunar Imaging".

2009, Intel International Science and Engineering Fair Physics and Astronomy Fourth Place Award, for the project "Optimization of CCD Parameters for High Resolution Lunar Imaging".

2009, York County Science and Engineering Fair Senior Division Grand Champion Award, for the project "Optimization of CCD Parameters for High Resolution Lunar Imaging".

2009, U.S. Marine Scholastic Excellence Award, this monetary award enforces the tough and smart image of the Marine Corps by recognizing noteworthy academic achievements as well as leadership excellence.

2009, National Honor Society Scholarship, monetary award given by the national honor society.

2009, Red Lion Area Educational Foundation Scholarship, monetary award given by the Red Lion Area School district.

2009, Crabtree, Rohrbaugh & Associates Scholarship, monetary award from a local architecture business.

2009, Loyer's Pharmacy Science Scholarship, monetary award from a local pharmacy.

2009, Red Lion Area Senior High School Academic Excellence Award, award given for academic excellence maintaining a 4.0 GPA.

2009, Red Lion Rotary Club Leadership Award, leadership award for demonstrated leadership qualities in high school.

2009, York County Pennsylvania Chamber of Commerce Exemplary Academics & Leadership Award, award given to a York County distinguished high school graduate.

2009, WGAL Best in Class Award, The TV station, WGAL, gave a banquet, certificate and broadcast segment for the #1-ranked student from each graduating class in every high school in York County.

2008, York County Science and Engineering Fair First Place Award in Earth and Space, for the project "Hunting for Extra Solar Planets".

2007, York County Science and Engineering Fair First Place Award in Earth and Space, for the project "Light Pollution in York County".

2006, York County Science and Engineering Fair First Place Award in Earth and Space, for the project "Lunar Crater Formation".

2005, Space Exploration Video Festival sponsored by Lockheed Martin, second place in a nationwide contest to create a video demonstrating why space exploration is important.

COMMUNITY/VOLUNTEER SERVICE

May 5th 2018, volunteered for the Meet the Scientists event to share and inspire guests about Northwestern University's cutting-edge research in science and engineering, Museum of Science and Industry.

November 2nd 2017, volunteered for the Scientific Images Contest and Science-Inspired Student Art 2017 Exhibition Launch, Evanston Township High School.

October 30th 2017, Volunteered and spoke with high school students about science and careers in science, Evanston Township High School.

December 16th 2016, Earth science teacher for the day, Red Lion Area Junior High School.

April 23rd 2015, Volunteered at girl days teaching about science to middle school and elementary female students, Bayerisches Geoinstitut University of Bayreuth.

2006-2009, Various astronomy presentations to the public, York County Astronomical Society.

2006-2009, Taught introductory orienteering courses to the public, Susquehanna Valley Orienteering Club.

LEADERSHIP POSITIONS

2017- present, COMPRES graduate student/postdoc committee, communicating with graduate students and postdocs about what they would like to see in our annual meeting as well as resources and workshops they would like throughout the year. Other duties include working on the website and communicating with the executive committees.

HONORS, DISTINCTIONS

2013; College of Science Honors Convocation Academic Year Distinction; University of Arizona
2011; College of Science Honors Convocation Academic Year Distinction; University of Arizona
2009; Lions International Certificate of Scholastic Achievement, Red Lion Senior High School

PROFESSIONAL SOCIETY MEMBERSHIPS

2017- present; Mineralogical Society of America
2014- present; American Geophysical Union
2013 -present; International Dean's List Society
2012-present; Delta Phi Alpha (National German Honor Society)
2009-2010; Society of Exploration Geophysicists
2008-2009; National Honor Society
2008-present; National Society of High School Scholars
2008-present; Modern Music Masters Honor Society
2007-2009; Who's Who Among American High School Scholars

TEACHING

March 23rd-April 14th 2018, Earth 382: Cosmochemistry Lab, Northwestern University, 10 hours

September 20th- December 10th 2016, Earth-101: Earth Science for the 21st Century, Teaching Assistant, Northwestern University, 60 hours.

March 27th- June 10th 2016, Earth-300: Earth and Planetary Materials, Teaching Assistant, Northwestern University, 50 hours.

August 20th -December 5th 2012, GEOS-306: Mineralogy Laboratory, Preceptor, University of Arizona, 30 hours.

Workshops Attended

Teaching Assistant Workshop, Northwestern University, Evanston, IL, Sept. 20th, 2018.

Ab-Initio Tools for Hypothesis Testing, COMPRES pre-meeting workshop, Albuquerque, NM, June 9th, 2017.

Raman/AFM-Raman/TERS, Northwestern University, Evanston, IL, Sept. 27th, 2016.

International Diamond School, University of Alberta, Edmonton, Canada, June 9th, 2016.

Elasticity of Materials, Bayerisches Geoinstitut, Bayreuth, Germany, June 9th-11th, 2015.

High Pressure Experimental Techniques and Applications to the Earth's Interior, Bayerisches Geoinstitut, Bayreuth, Germany, Feb. 22-26th, 2014.

WORK IN PROGRESS

Meyer, N., **Wenz, M.D.**, Walsh, J.P.S., Jacobsen, S.D., Locock, A.J., Harris, J.W. (submitted) Goldschmidtite (K, REE,Sr)(Nb,Cr)KNbO₃: a new perovskite supergroup mineral found in diamond from Koffiefontein, South Africa.

Thompson, E., **Wenz, M.D.**, Jacobsen, S.D., Zhang, D. (in prep) Kinetics of ringwoodite to olivine back -transformation: application to ascending diamond inclusions.

Wenz, M.D., Jacobsen, S.D., Zhang, D., Boffa Ballaran, T., Basset, W. A., Skawold, E., and Koivula, J. (in prep) Blue-olivine inclusion in diamond: Evidence for reduced chromium (Cr²⁺) in the Earth's mantle.

Wenz, M.D., Jacobsen, S.D., Rivers, M., Pearson, G., Shirey, S. B., Zhao, D. (in prep) Synchrotron X-ray microtomography of 70 superdeep diamonds from Juina, Brazil: Frequency of cracking and metasomatism.

Wenz, M.D., D'Haenens-Johansson, U., Jacobsen, S.D., Wang, W., Smit, K., Smith, E., Pearson, G., Stachel, T., Shirey, S.B. (in prep) Photoluminescent signatures of super-deep diamonds.

Wenz, M.D., Jacobsen, S.D., Zhang, D., Regier, M., Bausch, H.J., Dera, P.K., Rivers M., Eng, P., Shirey, S.B., Pearson, G. (submitted) High-throughput identification of mineral inclusions in diamond at GSECARS using synchrotron X-ray microtomography, radiography, and diffraction.

PUBLICATIONS

Downs G.W., Yang, B.N., Thompson, R.M., **Wenz, M.D.**, Andrade, M.B. (2012) Redetermination of Durangite, NaAlAsO₄F. *Acta Crystallographica E*, 68, 86-87.

Halenius U., Hatert, F., Pasero, M.S., Mills, J. (2018) New Minerals and Nomenclature Modifications Approved in 2018. *European Journal of Mineralogy*, 30, 879-884.

Morrison S. M., Andrade, M.B., **Wenz, M.D.**, Domanik, K.J., Downs, R.T. (2013) Lanthanite(Nd) Nd₂(CO₃)₃·8H₂O. *Acta Crystallographica E* 69, 15-16.

Ovsyannikov S.V., Bykova, E., Bykov, M., **Wenz, M.D.**, Pakhomova, A.S., Glazyrin, K., Liermann, H., Dubrovinsky, L. (2015) Structural and vibrational properties of single crystals of Scandia, Sc₂O₃ under high pressure. *Journal of Applied Physics* 118, 165901-165901.8.

Sorbadere, F., Lauren, V., Frost, D.J., **Wenz, M.D.**, Rosenthal, A., McCammon, C.A., Rivard, C. (2018) The behavior of ferric iron during partial melting of peridotite. *Geochimica et Cosmochimica Acta* 239, 235-254.

RESEARCH REPORTS

Sorbadere F., Frost, D.J., **Wenz M.D.**, Rosenthal, A., Laurenz, V. and McCammon, C.A. (2014) The behavior of ferric iron (Fe^{3+}) during MORB Petrogenesis. *Bayerisches Geoinstitut Annual Report*, 42.

Wenz M.D. and Boffa Ballaran, T. (2015) Formation and evolution of diamonds constrained through the study of their inclusions (in collaboration with S.D. Jacobsen, Northwestern University) *Bayerisches Geoinstitut Annual Report*, 68.

Wenz M.D. and Steinle-Neumann, G. (2015) The B1-B2 phase transition in MgO from self-consistent phonon calculations. *Bayerisches Geoinstitut Annual Report*, 83.

CONFERENCE PRESENTATIONS

Wenz, M.D., Jacobsen, S.D., Zhang, D., Boffa Ballaran, T., Basset, W.A., Skawold, E. and Koivula, J. (2017) Mysterious Blue Olivine Inclusion in a Diamond. 2017 NSF-COMPRES Annual Meeting. Consortium for Materials Properties Research in Earth Sciences, poster, 9-12 July 2017, Albuquerque, NM.

Wenz, M.D., Jacobsen, S.D., Boffa Ballaran, T., Basset, W.A., Skawold, E. and Koivula, J. (2016) Formation and evolution of diamonds constrained through the study of their inclusions; International Diamond School, poster, 9 June 2016. Edmonton, Canada.

Wenz, M.D., Sorbadere, F., Rosenthal, A., Frost, D.J., McCammon, C.A. (2014) Experimental Spinel Standards for Ferric Iron (Fe^{3+}) Determination During Partial Melting, Abstract #V53B-4859 presented at the 2015 Fall Meeting, American Geophysical Union, poster, 19 December 2014, San Francisco, CA.

NEWS ARTICLES HIGHLIGHTING OUR RESEARCH

Woo, M. (2018) The Hunt for Earth's Deep Hidden Oceans. Quanta Magazine.