

# CURRICULUM VITAE

## MELINDA DARBY DYAR

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**Personal:** Two children: Duncan D. Crowley (b. 7/21/95) and Malinda C. Crowley (b. 3/3/97)

### Education:

Ph.D., Geochemistry, Massachusetts Institute of Technology, Cambridge, Mass. Thesis topic: Crystal chemistry and statistical analysis of iron in mineral standards, micas, and glasses.

Advisor: Roger G. Burns.

B.A., Geology and Art History<sup>1</sup>, Wellesley College, Wellesley, Mass. Thesis topic: Geology of the Broadmoor Wildlife Sanctuary, South Natick, MA: Structural and petrographic analysis.

Advisor: Margaret Thompson. Summer Field Camp, Indiana University, Cardwell, Montana.

### Employment:

Senior Scientist, Planetary Science Institute, 2015-present.

Kennedy-Schelkunoff Professor and Chair, Department of Astronomy, Mount Holyoke College and Five College Astronomy Department, 2011-present.

Associate Professor and Chair, Department of Astronomy, Mount Holyoke College and Five College Astronomy Department, 2002-2011.

Associate Professor Department of Earth and Environment, Mount Holyoke College and Five College Astronomy Department, 2002-2008.

Five College Graduate Faculty in Astronomy, University of Massachusetts, 2002-present.

Visiting Associate Professor, Department of Astronomy and Department of Earth and Environment, Mount Holyoke College and Five College Astronomy Department, 2001-2002.

Visiting Associate Professor, Department of Astronomy, University of Massachusetts (Amherst), 2001-2002.

Affiliated Staff, Department of Geological Sciences, University of Idaho, 2000-present.

Visiting Assistant Professor, Department of Astronomy and Department of Earth and Environment, Mount Holyoke, 1998-2001.

Assistant Professor, Department of Geology and Astronomy, West Chester University, 1993-1998.

Visiting Assistant Professor, Department of Geology, Smith College, 1995-1996.

Assistant Professor, Department of Geological Sciences, University of Oregon, 1986-1993.

Member, Materials Science Institute, 1987-1993.

Research Fellow, Division of Geological and Planetary Sciences, California Institute of Technology, 1985-1986 (G.R. Rossman, supervisor).

Post-Doctoral Fellow, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, 1985 (R.G. Burns, supervisor).

Research Assistant, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, 1980-1985.

Research Staff, Chevron Oil Field Research Company, La Habra, CA, summer, 1982.

Assistant Instructor, Indiana University Geologic Field Station, Cardwell, MO, summer, 1980.

### Professional Societies:

Association for Women Geoscientists  
Geological Society of America  
Mineralogical Society of America

American Geophysical Union  
North American Society for LIBS

<sup>1</sup> Course requirements for the art history major were completed while a graduate student at MIT.

**Honors:**

Sigma Xi, 1980  
1984 Mineralogical Society of America (M.S.A.) Grant for Research in Crystallography  
1990-1991 National Lecturer, Mineralogical Society of America  
Outstanding Service Award, Mineralogical Society of America, 1991  
Fellow, Mineralogical Society of America, 1995  
Girls' Incorporated, Holyoke, Massachusetts, Honoree, 1 April, 2004  
Meribeth E. Cameron Faculty Award for Scholarship, Mount Holyoke College, 2010  
Participating Scientist, Mars Science Laboratory Science Team, 2012-2014  
J.K. Gilbert award for outstanding contributions to planetary science, Geological Society of America, 2016

**Professional Service:**

M.S.A. Research Grants Committee, 1991  
M.S.A. Science Grants Committee, 1991  
The Geochemical Society Program Committee, 1991-1994  
National Science Foundation Instrumentation and Laboratory Instruction Panel, 1988 and 1992  
National Science Foundation Undergraduate Curriculum and Course Development Panel, 1991  
National Science Foundation Workshop: The Role of Faculty in the Disciplines in the Undergraduate Education of Future Teachers, invited participant, contributor to working paper, 1992  
Program Committee, Geological Society of America National Meetings, 1992-1994  
American Geophysical Union Workshop: Shaping the Future of Undergraduate Earth Science Education, invited participant and contributor to working paper, 1996  
M.S.A. Lecture Program Committee, 1998-2000; Chair 1999-2000  
M.S.A. Crystallography Research Grant Committee 1998-1999  
Council for Undergraduate Research (C.U.R.), Councillor, 1999-2000  
American Geological Institute (A.G.I.) Outreach Committee, 2000-2003  
Associate Editor, *American Mineralogist*, 2000-present  
Review Panel, NASA Cosmochemistry Program, 2001  
Review Panel, NSF/NATO Postdoctoral Fellowship Program, 2002-2003  
Judges Panel, Name the Rovers contest, 2003  
Review Panel, NSF, CCLI Program, 2003  
Instrument Selection Review Panel, Mars Science Lander 2009, NASA, 2004  
Review Panel, NSF, CCLI Program, 2004  
International Program Committee, Goldschmidt Conference, 2005  
Executive Committee, AWIS National Meeting, 2005  
Review Panel, NASA MESSENGER Mission Participating Scientists, 2006  
Review Panel, NASA Planetary Geology and Geophysics Program, 2007  
Review Panel, NASA Planetary Geology and Geophysics Program, 2008  
Review Panel, NASA Mars Data Analysis Program, 2008  
Review Panel, NSF, CCLI Program, 2008  
Review Panel, NASA Mars Data Analysis Program, 2009  
Review Panel, NSF, CCLI Program, 2009  
Review Panel, NASA Planetary Geology and Geophysics Program, 2009  
Review Panel, NASA, ASTID and PIDDP Programs, 2010  
Review Panel, NASA LASER program, 2011  
Review Panel, NASA LASER program, 2012  
Review Panel, NASA LASER program, 2013  
Review Panel, NASA mission instrumentation panel, 2015

Review Panel, NASA Emerging Worlds program, 2016  
Review Panel, NSF Planetary Astronomy program, 2017

**Invited Talks and Professional Presentations:**

University of California at Riverside, 1986 and 1991<sup>2</sup>  
University of Maine at Orono, 1987 and 1991<sup>1</sup>  
Oregon State University, 1986 and 1991  
Massachusetts Institute of Technology, 1987  
Wellesley College, 1987  
Smith College, 1988  
State University of New York at Albany, 1989  
Southern Methodist University, 1989  
University of Washington, 1990  
University of Saskatchewan, 1991<sup>1</sup>  
San Diego State University, 1991<sup>1</sup>  
University of California at Davis, 1991<sup>1</sup>  
Sonoma State University, 1991<sup>1</sup>  
University of Calgary, 1991<sup>1</sup>  
University of New Mexico, 1991<sup>1</sup>  
University of Houston, 1991<sup>1</sup>  
Louisiana State University, 1991<sup>1</sup>  
Texas Tech, 1991<sup>1</sup>  
University of Chicago, 1992  
Penn State University, 1992  
University of Kentucky, 1992  
University of Colorado at Boulder, 1993  
European Research Conference, Hydrogen-Containing Defects in Minerals and Ceramics, 1993  
Deep Continental Studies Workshop, Microknowledge and Megathinking, 1993  
Portland State University, 1993  
Hopi Buttes Workshop, invited participant, 1993  
Rutgers University, 1994  
University of North Carolina, 1994  
Southern Methodist University, 1994  
University of Massachusetts at Amherst, 1996  
Mount Holyoke College, 1997  
University of Western Ontario, 2000  
University of Idaho, 2001  
Eastern Washington University, 2001  
Wellesley College, 2001  
State University of New York at Stony Brook, 2003  
Lunar and Planetary Institute, 2003  
Brearley School, 2004  
Massachusetts Institute of Technology, 2004  
University of Massachusetts, 2004  
Wellesley College, 2004  
Rhode Island College, 2006  
SUNY Binghamton, 2007  
University of New Mexico, 2007

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<sup>2</sup>talk sponsored by Mineralogical Society of America Lecture Program.

Colby College, 2008  
Rutgers University, 2009  
NASA Summer Science Institute, Goddard Space Flight Center, 2009  
Hartwick College, 2010  
M.I.T., 2011  
Wellesley College, 2011  
Brown University, 2011  
Indiana University, 2011  
TED talk, 2012  
Texas Tech University, 2013  
Skidmore College, 2014  
University of Massachusetts Amherst, 2014  
Rutgers University, 2014  
Planetary Science Institute, 2015  
TED-X, Springfield, MA 2015  
University of Massachusetts, Amherst, 2015  
Brown University, 2015  
Amherst College, 2016  
Rensselaer Polytechnical Institute, 2017

**College and University Service:**

Structural Geologist Search Committee, University of Oregon (UO) 1987-1988  
Chair, Affirmative Action Search Committee, UO, 1988  
Chair, X-ray and Thin Section Committee, Dept. of Geological Sciences, UO, 1986-1987  
Faculty Advisor, Condon Undergraduate Society, UO, 1986-1988  
Affirmative Action Liaison, Dept. of Geological Sciences, UO, 1986-1989  
Materials Science Institute Budget Committee, UO, 1987-1992  
Treasurer, Materials Science Institute, UO, 1988-1992  
Director, Materials Science Institute Research for Undergraduates Program, UO, 1988 & 1989  
Physics Department Condensed Matter Search Committee, UO, 1988 and 1989  
Graduate Teaching Fellow Coordinator, Dept. of Geological Sciences, UO, 1988-1989  
Seismology Search Committee, Dept. of Geological Sciences, UO, 1988-1989  
Volcanologist Search Committee, Dept. of Geological Sciences, UO, 1989-1990, 1990-1991  
Telephone Counselor, Dept. of Geological Sciences, UO, 1990-1991  
Chair, Displays Committee for Cascade Hall, UO, 1990-1993  
Computer Coordinator, Dept. of Geological Sciences, UO, 1989-1993  
Member, President's Task Force on Campus Infrastructure and Technology, UO, 1990-1992  
Member, Committee on Campus Hazardous Waste Remediation, UO, 1988-1993  
Member, University Library Committee, UO, 1987-1989  
Member, Faculty Advisory to the Museum of Art, UO, 1989-1993  
Chair, Faculty Advisory to the Museum of Art, UO, 1990-1993  
Member, Departmental Computer Lab Managers, UO, 1989-1993  
Board Member, Faculty Club of the University of Oregon, 1988-1993  
Secretary-Treasurer, Faculty Club of the University of Oregon, 1989-1990  
Member, Docent Council, University of Oregon Museum of Art, 1988-1993  
Member, Board of Governors, University of Oregon Museum of Art, 1988-1993  
Member, Curriculum Committee, Dept. of Geology and Astronomy, WCU, 1993-1996

Member, College of Arts and Sciences Recruitment Committee, WCU, 1994-1995  
 Internship Coordinator, Dept. of Geology & Astronomy, WCU, 1993-1997<sup>3</sup>  
 Member, Undergraduate Review Committee, Dept. of Geology & Astronomy, WCU, 1993-1998<sup>2</sup>  
 Member, Graduate Review Committee, Dept. of Geology & Astronomy, WCU, 1994-1998<sup>2</sup>  
 Member, Fellowship Committee, Mount Holyoke College, 2002-2006  
 Member, Planning and Budget Committee, 2003-2004  
 Chair, Fellowship Committee, Mount Holyoke College, 2003-2006  
 Coordinator of Universal Application Funding, 2003-2012  
 Member, Search Committee for Fellowships and Pre-Graduate Advising, 2009-2010  
 Task Force on Curriculum to Career, 2011  
 Member, Curriculum Committee, Five College Astronomy Department, 1999-present  
 Member, Radiation Safety Committee, Mount Holyoke College, 1999-present  
 Chair, Astronomy Department, 1999-present  
 Senate member, Five College Astronomy Department, 1999-present

**Miscellaneous Presentations to the College Community and Beyond:**

Mathematics Department, MHC, 2000  
 Five College Geology Symposium, February 2001  
 Mount Holyoke Club of Bridgeport, CT, 2003  
 Lyon Lecture series, Denver, 25 Oct. 2003  
 Family Weekend, 31 Oct. 2003  
 Mathematics Department, MHC, February 2004  
 Five College Geology Symposium, February 2004  
 Mars lecture, AST 11, Amherst College, 5 March 2004  
 Fascinating Professor program, Francis Perkins scholars, 9 March, 2004  
 South Hadley Lions Club, 6 April 2004  
 East Longmeadow Library, 1 May, 2004  
 Dedication of Kendade Hall, 8 May, 2004  
 Class of 1959 reunion dinner, 28 May 2004  
 Mount Holyoke Club of South Hadley, 9 June, 2004  
 NOVA/WGBY fundraiser, Mount Holyoke College, 14 June, 2004  
 Summer math for high school students, summer Mars project, July, 2004  
 MHC Office of Admissions, summer staff training seminar, August, 2004  
 Family Weekend, 30 Oct. 2004  
 Hughes Symposium on Integrating Undergraduates into Research Programs, January 2005  
 Mount Holyoke Club of Houston, March, 2005  
 Springfield Star Club, April, 2005  
 Mount Holyoke Reunion, June 2005  
 Century Club, Springfield, MA, March 2006  
 Mount Holyoke Reunion, June 2006  
 Mid-Coast Maine Mount Holyoke Club, June, 2006  
 MacDuffie School, January 2007  
 Mount Holyoke Club of New York City, March, 2007  
 Stargazers Club, North Scituate, RI, April 2007  
 Mount Holyoke Gala, Washington D.C., April 2009  
 Mount Holyoke Club of Bridgeport, December 2011  
 Development Office function in New York City, May 2012

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<sup>3</sup>Maternity leave from West Chester University was taken during the academic years 1995-1996 and 1997-1998.

Development Office function in San Francisco, October 2012  
Development Office function in Los Angeles, October 2012  
Development Office function in Boston, November 2012  
Mount Holyoke Club of Cape Cod, May 2013  
Mount Holyoke Club of New Hampshire, June 2013  
Albany Area Amateur Astroomers, October, 2014  
New England Society of Economic Geologists, January, 2015  
Mount Holyoke Club of New Hampshire, October, 2015  
Mount Holyoke Club of Fairfield County, October, 2015

### **Courses Taught:**

Mineralogy I and II (advanced undergraduate)  
Igneous and Metamorphic Petrology (advanced undergraduate)  
Introduction to Earth History (introductory historical geology)  
Introduction to Geology (introductory physical geology)  
Planet Earth (introductory geology/planetary science)  
Geochemistry (graduate and undergraduate)  
Spectroscopy (graduate and undergraduate)  
Geometrics (applications of statistical methods) (graduate and undergraduate)  
Planetary Science (introductory and advanced undergraduate)  
Planetary Science seminar on Mars (advanced undergraduate)  
Spectroscopy of the Planets (advanced undergraduate)  
Meteorites (advanced undergraduate)

### **Books and Electronic Media:**

Dyar, M.D., and Gunter, M.C. (2013) *Mineral Database*. App for I-pad, Mac, I-Phone.  
McKillip, S. and Dyar, M.D. (2010) *Geostatistics Explained, An Introductory Guide for Earth Scientists*.  
Textbook. Cambridge University Press.  
Dyar, M.D., and Gunter, M.C. (2008) *Mineralogy and Optical Mineralogy: A Three-Dimensional  
Approach*. Textbook. Mineralogical Society of America.  
Dyar, M.D. (1999) *Hands-On Mineral Identification*. CD-ROM. Tasa Graphic Arts, Inc., Albuquerque,  
N.M.  
Dyar, M.D., Busch, R.M., and Wiswall, G. (1997, 1998) *The Study of Minerals*. CD-ROM. Tasa Graphic  
Arts, Inc., Albuquerque, N.M.  
Dyar, M.D., McCammon, C.A., and Schaefer, M.W., Eds. (1996) *Mineral Spectroscopy: A Tribute to  
Roger G. Burns*. Special Publication #5, The Geochemical Society, Washington, D.C., 400 pp.

### **Papers:**

1. Dyar, M.D., and Burns, R.G., (1981) Coordination chemistry of iron in glasses contributing to remote-sensed spectra of the moon. *Proc. Lunar and Planet. Sci. Conf.*, **12B**, 695-702.
2. Burns, R.G. and Dyar, M.D. (1983) Spectral chemistry of green glass-bearing 15426 regolith. *Proc. Lunar and Planet. Sci. Conf.*, 14, *J. Geophys. Res.*, **88**, B221-B228.
3. Dyar, M.D., and Birnie, D.P. (1984) The effects of quench media on iron partitioning and ordering in a lunar glass. *Proc. 1st Intl. Conf. on Glass in Planet. and Geolog. Phenomena, J. Non-Cryst. Sol.*, **67**, 397-412.
4. Stone, A.J., Parkin, K.M., and Dyar, M.D. (1984) STONE: a program for resolving Mössbauer spectra. *DEC Users Soc.* 11-720, Marlboro, Mass.
5. Dyar, M.D. (1984) Precision and interlaboratory reproducibility of measurements of the Mössbauer effect in minerals. *Amer. Mineral.*, **69**, 1127-1144.
6. Dyar, M.D. (1984) Experimental methods for quenching structures in lunar-analog silicate melts: variations as a function of quench media and composition. *Proc. Lunar and Planet. Sci. Conf.*, 15, *J. Geophys. Res.*, **84**, supplement, C233-C239.
7. Dyar, M.D. (1985) A review of Mössbauer data on inorganic glasses: the effects of composition on iron valency and coordination. *Amer. Mineral.*, **70**, 304-316.

8. Birnie, D.P., and Dyar, M.D. (1986) Cooling rate calculations for silicate glasses. Proc. Lunar and Planet. Sci. Conf., 16, *J. Geophys. Res.*, **91(B4)**, D509-D513.
9. DeGuire, M.R., Dyar, M.D., O'Handley, R.C., and Kalongi, G. (1986) Magnetic ordering in splat-quenched ferrite-silica compositions. *J. Magn. Magn. Mater.*, **54-57**, 1337-1338.
10. Dyar, M.D., and Burns, R.G. (1986) Mössbauer spectral study of ferruginous one-layer trioctahedral micas. *Amer. Mineral.*, **71**, 955-964.
11. Dyar, M.D. (1986) Practical application of Mössbauer goodness-of-fit parameters for evaluation of real experimental results: a reply. *Amer. Mineral.*, **71**, 1266-1267.
12. DeGuire, M.R., O'Handley, R.C., Kalongi, G., and Dyar, M.D. (1986) Spinel ferrite-silica glass obtained by splat quenching. *J. Non-Cryst. Sol.*, **81**, 351-364.
13. Dyar, M.D. (1986) Comment on ferrous/ferric Mössbauer analysis of simulated nuclear waste glass with and without computer fitting. *Commun., Am. Cer. Soc.*, **69(7)**, C-160-C-162.
14. Dyar, M.D. (1987) A review of Mössbauer data on trioctahedral micas: evidence for tetrahedral Fe<sup>3+</sup> and cation ordering. *Amer. Mineral.*, **72**, 102-112.
15. Dyar, M.D., Naney, M.T., and Swanson, S.E. (1987) Effects of quench methods on Fe<sup>3+</sup>/Fe<sup>2+</sup> ratios: a Mössbauer and wet chemical study. *Amer. Mineral.*, **72**, 792-800.
16. Fudali, R.F., Dyar, M.D., Griscom, D.L., and Schreiber, H.D. (1987) The oxidation state of iron in tektite glass. *Geochim. Cosmochim. Acta.*, **51(10)**, 2749-2756.
17. Dyar, M.D., and Naney, M.T. (1988) Effects of quench methods on Fe<sup>3+</sup>/Fe<sup>2+</sup> ratios: Reply. *Amer. Mineral.*, **73**, 1479.
18. Dyar, M.D. (1989) Application of Mössbauer goodness-of-fit parameters to experimental spectra: Further discussion. *Amer. Mineral.*, **74**, 688.
19. <sup>4</sup>McGuire, A.V., Dyar, M.D., and Ward, K.W. (1989) Neglected Fe<sup>3+</sup>/Fe<sup>2+</sup> ratios: a study of Fe<sup>3+</sup> contents of megacrysts from alkali basalts. *Geology*, **17**, 687-689.
20. Dyar, M.D., McGuire, A.V., and Ziegler, R.D. (1989) Redox equilibria and crystal chemistry of coexisting minerals from spinel lherzolite mantle xenoliths. *Amer. Mineral.*, **74**, 969-980.
21. Dyar, M.D. (1990) Mössbauer spectra of biotite from metapelites. *Amer. Mineral.*, **75**, 656-666.
22. Guidotti, C.V., and Dyar, M.D. (1991) Ferric iron in metamorphic biotite and its petrologic and crystallochemical implications. *Amer. Mineral.*, **76**, 161-175.
23. Dyar, M.D., Perry, C.P., Rebbert, C.R., Dutrow, B., Holdaway, M.J., and Lang, H. (1991) Mössbauer spectroscopy of synthetic and naturally occurring staurolites. *Amer. Mineral.*, **76**, 27-41.
24. Burns, R.G., and Dyar, M.D. (1991) Crystal chemistry and Mössbauer spectra of babingtonite. *Amer. Mineral.*, **76**, 892-899.
25. Dyar, M.D., Colucci, M.T., and Guidotti, C.V. (1991) Forgotten major elements: Hydrogen and oxygen variation in biotite from metapelite. *Geology*, **19**, 1029-1032.
26. Holdaway, M.J., Mukhopadhyay, B., Dyar, M.D., Dutrow, B.L., Rumble, D. III., and Grambling, J. (1991) A new perspective on staurolite crystal chemistry: Use of stoichiometric and chemical end-members for a mole fraction model. *Amer. Mineral.*, **76**, 1910-1919.
27. McGuire, A.V., Dyar, M.D., and Nielson, J.E. (1991) Metasomatic oxidation of upper mantle peridotite. *Contrib. Min. Petrol.*, **109**, 252-264.
28. Dyar, M.D., McGuire, A.V., and Mackwell, S.M. (1992) Fe<sup>3+</sup>/H<sup>+</sup> and D/H in mantle kaersutites - Misleading indicators of mantle source fugacities. *Geology*, **20**, 565-568.
29. Dyar, M.D., McGuire, A.V., and Harrell, M.D. (1992) Crystal chemistry of iron in two styles of metasomatism in the upper mantle. *Geochim. Cosmochim. Acta.*, **56**, 2579-2586.
30. Banfield, J.M., Dyar, M.D., and McGuire, A.V. (1992) The defect microstructure of oxidized mantle olivine from Dish Hill, California. *Amer. Mineral.*, **77**, 959-975.
31. McGuire, A.V., Francis, C.A., and Dyar, M.D. (1992) Mineral standards for electron microprobe analysis of oxygen. *Amer. Mineral.*, **77**, 1087-1091.
32. Holdaway, M.J., Gunst, R.F., Mukhopadhyay, B., and Dyar, M.D. (1993) Staurolite end member molar volumes determined from unit-cell measurements of natural specimens. *Amer. Mineral.*, **78**, 56-67.
33. O'Handley, D.S., and Dyar, M.D. (1993) The crystal chemistry of lizardite 1T and the formation of magnetite in serpentines. *Amer. Mineral.*, **78**, 391-404.

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<sup>4</sup>Names of undergraduate coauthors are underlined.

34. Dyar, M.D. (1993) Mössbauer spectroscopy of tetrahedral Fe<sup>3+</sup> in trioctahedral micas - Discussion. *Amer. Mineral.*, **78**, 665-668.
35. Dyar, M.D., Guidotti, C.V., Holdaway, M.J., and Colucci, M. (1993) Nonstoichiometric hydrogen contents in common rock-forming hydroxyl silicates. *Geochim. Cosmochim. Acta.*, **57**, 2913-2918.
36. Dyar, M.D., Mackwell, S.M., McGuire, A.V., Cross, L.R., and Robertson, J.D. (1993) Crystal chemistry of Fe<sup>3+</sup> and H<sup>+</sup> in mantle kaersutites: Implications for mantle metasomatism. *Amer. Mineral.*, **78**, 968-979.
37. Dyar, M.D. (1993) Instructional innovation. In The role of geosciences faculty in the undergraduate education of science and mathematics teachers. In *Proceedings, National Science Foundation Workshop, Role of Faculty from the Science Disciplines in the Undergraduate Education of Future Sciences and Mathematics Teachers*, 208-210.
38. Guidotti, C.V., Yates, M.G., Dyar, M.D., and Taylor, M. (1994) Petrogenetic implications of Fe<sup>3+</sup> content of muscovite in pelitic schists. *Amer. Mineral.*, **79**, 793-795.
39. Earley, D., Dyar, M.D., Ilton, E.S., and Grantham, A.A. (1995) The influence of structural fluorine on biotite oxidation in copper-bearing, aqueous solutions at low temperatures and pressures. *Geochim. Cosmochim. Acta.*, **59**, 2423-2433.
40. Hower, J.C., Graham, U.M., Dyar, M. D., Taylor, M.E., and Rathbone, R.F. (1995) Approaches to the study of iron distribution among phases in high- and low-sulfur coal fly ash. In *Coal - Energy and the Environment*, S.-H. Chiang, ed., Proceedings 12th Ann. Pittsburgh Coal Conference, 1138-1143.
41. Dyar, M.D., Treiman, A.H., Beauchamp, P.M., Blaney, D.L., Kim, S.S., Klingelhoefer, G., Mehall, G., Morris, R.V., Ninkov, Z., Sprague, A.L., Zolensky, M., and Pieters, C. (1995) Mineralogy. In Morris, C. and Treiman, A. H., eds., *Planetary Surface Instrumentation Workshop, Lunar and Planetary Institute, Tech. Rep.* 95-05, 65-84.
42. Dyar, M.D., Martin, S.V., Mackwell, S.J., Carpenter, S., Grant, C.A., and McGuire, A.V. (1996) Crystal chemistry of Fe<sup>3+</sup>, H<sup>+</sup>, and D/H in mantle-derived augite from Dish Hill: Implications for alteration during transport. In: M.D. Dyar, C.A. McCammon, and M. Schaefer, eds., *Mineral Spectroscopy: A Tribute to Roger G. Burns*, Special Publication #5, The Geochemical Society, 273-289.
43. Delaney, J.S., Bajt, S., Sutton, S.R., and Dyar, M.D. (1996) *In situ* microanalysis of Fe<sup>3+</sup>/ΣFe ratios in amphibole by X-ray Absorption Near Edge Structure (XANES) spectroscopy. In: M.D. Dyar, C.A. McCammon, and M. Schaefer, eds., *Mineral Spectroscopy: A Tribute to Roger G. Burns*, Special Publication #5, The Geochemical Society, 170-177.
44. Robertson, J.D., and Dyar, M.D. (1996) Nuclear methods for analysis of boron in minerals. In: E.S. Grew and L.M. Anovitz, eds., *Boron: Mineralogy, Petrology, and Geochemistry in the Earth's Crust. Reviews in Mineralogy*, vol. 32, Mineralogical Society of America, 805-820.
45. Holdaway, M.J., Mukhopadhyay, B., Dyar, M.D., Guidotti, C.V., and Dutrow, B.L. (1997) Garnet-biotite geothermometry revised: New Margules parameters and a natural specimen data set from Maine. *Amer. Mineral.*, **82**, 582-595.
46. Bettison-Varga, L., Burger, R., Creasy, J., Dyar, D., Knight, P., Shapiro Ledley, T., and McManus, D. (1996) How should we integrate research and education? In: M.F.W. Ireton, C.A. Manduca, and D.A. Mogk, Eds., *Shaping the Future of Undergraduate Earth Science Education*, American Geophysical Union, 29-32.
47. Dyar, M.D. (1997) Color in minerals. In: J.B. Brady, Mogk, D.W., and Perkins, D., eds., *Teaching Mineralogy*, Mineralogical Society of America, 323-348.
48. Smyth, J.R., Dyar, M.D., May, H.M., Bricker, O.P., and Acker, J.G. (1997) Crystal structure refinement and Mössbauer spectroscopy of an ordered, triclinic clinocllore. *Clays Clay Mins.*, **45**, 544-550.
49. Delaney, J.S., Dyar, M.D., Sutton, S.R., and Bajt, S. (1998) Redox ratios with relevant resolution: Solving an old problem using the Synchrotron microXANES probe. *Geology*, **26**, 139-142.
50. Dyar, M.D., Taylor, M.E., Lutz, T.M., Francis, C.A., Robertson, J.D., Cross, L.M., Guidotti, C.V., and Wise, M. (1998) Inclusive chemical characterization of tourmaline: Mössbauer study of Fe valence and site occupancy. *Amer. Mineral.*, **83**, 848-864.
51. O'Hanley, D.S., and Dyar, M.D. (1998) The composition of chrysotile: integration of Mössbauer and electron microprobe data and the relationship between chrysotile and lizardite. *Canad. Mineral.*, **36**, 727-739.
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490. Leight, C., Fassett, C.I., Crowley, M.C., and Dyar, M.D. (2017) Crater morphometry and degradation on Mercury: Mercury Laser Altimeter (MLA) measurements and comparison to stereo-DTM derived results. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #2809.
491. Wendler, D., Helbert, J., Walter, I., Widemann, T., Guignan, G., Marcq, E., Maturilli, A., Ferrari, S., D'Amore, M., Meller, N., Dyar, M., and Smrekar, S. (2017) The Venus Emissivity Mapper (VEM) prototype. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #2645.

492. Berlanga, G., Dyar, M.D., Breitenfeld, L., Wagoner, C., Hanlon, A., Bartholomew, P., Dharma, S.K., and Misra, A.K. (2017) Detection limits for silicates in Raman spectra of mixtures with volcanic glass. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #2255.
493. Mueller, N., Tsang, C.C., Smrekar, S., Helbert, J., and Dyar, M.D. (2017) Derivation of thermal emission from VIRTIS on Venus Express 1000–1400 nm spectra. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #2200.
494. Gregerson, J., Rogers, A.D., Sklute, E.C., Reeder, R.J., and Dyar, M.D. (2017) Phase transitions of amorphous iron(III) sulfates at an intermediate humidity. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #2100.
495. Breitenfeld, L.B., Dyar, M.D., Carey, C., Tague, T.J., and Wang, P. (2017) Predicting olivine composition using Raman spectroscopy through band shift and multivariate analysis. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1898.
496. Gemp, I., Durughar, I., Parente, M., Dyar, M.D., and Mahadevan, S. (2017) *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1696.
497. Lanzirotti, A., Dyar, M.D., Sutton, S.R., Newville, M., Head, E., Carey, C., McCanta, M., and Jones, J. (2017) Preliminary calibration for accurate predictions of microscale oxygen barometry in silicate glasses using vanadium X-ray absorption spectroscopy: A multivariate approach. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1650.
498. Helbert, J., Maturilli, A., Dyar, M.D., Ferrari, S., Mueller, N., and Smrekar, S. (2017) First set of laboratory Venus analog spectra for all atmospheric windows. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1512.
499. McCanta, M.C., and Dyar, M.D. (2017) Visible/near-infrared spectra of Ca-pyroxene: Effects of Fe<sup>3+</sup> and shock. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1431.
500. Rader, L.X., Fassett, C.I., Levy, J.S., King, I.R., Chaffey, P., Wagoner, C., Hanlon, Watters, J.L., Kreslavsky, M.A., Holt, J.W., and Dyar, M.D. (2017) The geographic distribution of boulder halo craters at mid-to-high latitudes on Mars. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1294.
501. Lepore, K.H., Mackie, J., Dyar, M.D., Ytsma, C., and Fassett, C.I. (2017) Unreported emission lines of Ce, La, Pb, Rb, Se, Sr, Y, and Zr detected using laser-induced breakdown spectroscopy. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1293.
502. Mackie, J., Dyar, M.D., Ytsma, C., Lepore, K., Fassett, C.I., Hanlon, A., Wagoner, C., and Treiman, A. (2017) Standards for analysis of Ce, La, Pb, Rb, Se, Sr, Y, and Zr in rock samples using laser-Induced breakdown spectroscopy and X-ray fluorescence. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1292.
503. Lepore, K.H., Breves, E.A., Dyar, M.D., Bender, S.C., and Tokar, R.L. (2017) Laser-induced breakdown spectroscopy of rock powders performed at variable angles of ablation and collection. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1122.
504. Sklute, E.C., Carey, C., Dyar, M.D., and Glotch, T.G. (2017) Web-based, open-source, visible and near-infrared optical constant determination of geological materials. *Lunar Planet. Sci. XLVIII*, Lunar Planet. Inst., Houston, (abstr.) #1071.

### Theses Supervised:

- Reich, D.R. (M.S., University of Oregon, 1989) Geology and Petrology of the Mt. Emily Volcanic Center.
- Hull, C.D. (Ph.D., University of Oregon, 1990) Multicomponent Chemical Equilibrium Modeling of Fluids and U-Th Geochronology of Minerals in Geothermal Systems.
- Harrell, M.D. (Honors College, B.A., University of Oregon, 1991) *In situ* Alteration of a Rock from the Earth's Mantle
- Moeller, K. J. (M.S., University of Oregon, 1991) Crystal Chemistry of Chlorites from Metapelites.
- Grant, C. G. (Ph.D., 1995, Chemistry, University of Oregon) Sources of Experimental and Analytical Error in Measurements of the Mössbauer Effect in Amphibole.
- Taylor, M.E. (M.A., West Chester University, 1996) Crystal Chemistry of Iron in Tourmaline.
- Voci, Christopher (M.A., West Chester University, 1996) Pb Stability in Pyromorphite from Landfills.

- Stefanis, M. (B.A., Mount Holyoke College, 1999) An Interpretation of the Rocks at the Mars Pathfinder Landing Site.
- Polyak, D.E. (B.A., Mount Holyoke College, 1999) Crystal Chemistry of Iron in Plagioclase from Four Heavenly Bodies.
- Blackwell, M.A. (B.A., Mount Holyoke College, 2000) Recoil-free Fraction Effects in Amphibole.
- Lowe, E.W. (B.A., Mount Holyoke College, 2000) Distribution Coefficients for  $\text{Fe}^{3+}$  and  $\text{Fe}^{2+}$  in Metapelites from Western Maine.
- Cartwright, B.M. (M.S., University of Massachusetts, 2003) Plagioclase  $\text{Fe}^{3+}/\text{Fe}^{2+}$  Correlation with Magma Oxygen Fugacity in a Volcanic Succession: The Atascosa Mountains, South-central Arizona. Co-supervised with Sheila Seaman.
- Makuch, L.B. (B.A., University of Massachusetts, 2002) The Ares Project. Honors College.
- Therkelsen, J.B. (B.A., Amherst College, 2002) Shock-induced changes in redox state of experimentally shocked plagioclase, pyroxene, and olivine.
- Peek, K.M. (B.A., Mount Holyoke College, 2002) The disruption of an icy satellite and the evolution of the resulting debris ring. A formation scenario for Saturn's rings.
- Dickson, J. (B.A., Hampshire College, 2002) Water on Mars: A synthesis of hydrologic features on the surface of Mars.
- Daane, A.R. (B.A., Mount Holyoke College, 2004) Brightness and color variations in the hot pulsating horizontal branch star PG1627+017.
- Hunter, M.O. (B.A., Mount Holyoke College, 2004) Pacific Equatorial Current systems during the waning of the 2002-2003 El Niño.
- O'Connor, V. (B.A., Smith College, 2005) Comparative crystal chemistry of hydrous iron sulfates from different terrestrial environments.
- Dopfel, E. (B.A., Mount Holyoke College, 2006) The chemical activators of cathodoluminescence in jadeite.
- Sklute, E.C. (B.A., Mount Holyoke College, 2006) Mössbauer spectroscopy of synthetic olivine across the Fe-Mg solid solution.
- Rothstein, Y. (B.A., Mount Holyoke College, 2006) Spectroscopy of jarosite and implications for the mineralogy of Mars.
- Howenstine, J. (B.A., University of Massachusetts, 2006) Analysis of depth-diameter relationship of martian craters.
- Bendersky, C. (B.A., Mount Holyoke College, 2007) The onset of thermal metamorphism in enstatite chondrites.
- Walker, C.A. (B.A., Mount Holyoke College, 2007) Variations of solar wind parameters over a solar cycle: Expectations for NASA's Solar Terrestrial Relations Observatory (STEREO) Mission.
- Graham, S. (B.A., Mount Holyoke College, 2007) GPS geodetic constraints on the November 21, 2004 Mw 6.3 earthquake off the northwest coast of Dominica: implications for in situ volatile solubilities and eruptions dynamics.
- Barkley, M. (B.A., Mount Holyoke College, 2007) The effects of  $\text{F-OH}^-$  substitution on the crystal structure of pegmatitic topaz.
- Cadieux, Sarah Beth (B.A., Mount Holyoke College, 2008) Carbon-isotope stratigraphy of Upper Cretaceous deposits of the Dalmatian Island of Brač, Croatia.
- Langford, Amy (B.A., Mount Holyoke College, 2008) Unbiased search for molecular outflows in the Taurus Molecular Cloud.
- Emerson, Erica (B.A., Mount Holyoke College, 2008) Analysis of iron oxidation in garnets.
- Tucker, Jonathan (B.A., Amherst College, 2009) Calibrating ChemCam: Preparing to Probe the Red Planet.
- Knutson, J.K. (B.A., Mount Holyoke College, 2010) Exploring biotite iron transformation by the hyperthermophilic archaeon *Pyrobaculum Islandicum*.
- Barbieri, Lindsay (B.A., Hampshire College, 2010) Deciphering Late-Amazonian climate change on Mars using evidence preserved in gully fan stratigraphy.

- Bell, S. (B.A., Amherst College, 2011) Fresh lunar crater ejecta as revealed by the Miniature radio Frequency (Mini-RF) instrument on the Lunar Reconnaissance Orbiter.
- Ozanne, M.V. (B.A. Mount Holyoke College, 2012) Comparison of shrunken regression methods for major elemental analysis of rocks using laser-induced breakdown spectroscopy (LIBS).
- DeVeaux, M.L. (B.A. Mount Holyoke College, 2012) Evaluation of statistical methods for classification of laser-induced breakdown spectroscopy (LIBS) data.
- Williams, Molly (B.A., Mount Holyoke College, 2012) Characterizing Fe(III) transformation in a deep-sea hyperthermophilic archaeon.
- Kashyap, Srishti (B.A., Mount Holyoke College, 2013) Isolating and characterizing an Fe(III) transforming deep sea thermophilic archaeon.

**Graduate Committees:**

- McCanta, Molly (Ph.D., Brown University, 2004)
- Buczowski, Debra (Ph.D., University of Massachusetts, 2006)
- Keskula-Snyder, Anna (Ph.D., University of Massachusetts, 2006)
- Klima, Rachel (Ph.D., Brown University, 2007)
- Amy Stander (MS, URI, 2013)
- Tommy Boucher (Ph.D., UMass, current student, Computer Science)
- C.J. Carey (Ph.D., UMass, current student, Computer Science)
- S. Giguere (Ph.D., UMass, current student, Computer Science)
- S. Kashyap (Ph.D., UMass, current student, Microbiology)

**EXTERNAL GRANT:**

**PREVIOUS FUNDING:**

**American Chemical Society, Petroleum Research Fund:**

- "Cation Ordering in Synthetic Trioctahedral Micas"  
 \$18,000 funded, 7/1/87-8/31/89  
 \$4,500 supplement, 5/1/88-9/30/88  
 \$2,500 supplement, 5/1/89-7/1/89
- "Detailed Crystal Chemistry of Iron-Bearing Phyllosilicates"  
 \$40,000 funded, 5/1/91-8/31/93  
 \$3,000 supplement, 6/1/91-9/30/91

**National Science Foundation, Earth Sciences Division:**

- "Crystal Chemistry and Petrogenesis of Biotites from Pelitic Schists"  
 \$60,000 funded, 7/1/87-6/30/90
- "Crystal Chemistry of Metapelitic Minerals in a Petrologic Context"  
 \$50,226 funded, 1/1/89-12/31/90
- "Crystal Chemistry of Hydrogen and Oxygen in Common Phyllosilicate Minerals"  
 \$61,774 funded, 1/1/92-12/31/93
- "Development of Standards for Light Element Analysis in Geological Materials: Collaborative Research"  
 \$ 21,639 funded, 6/1/93-12/31/95
- "The Boron Budget in High-Grade Pelitic Metamorphic Rocks: How, When, and Where does the Boron Go?" (Joint with C.V. Guidotti and E.S. Grew)  
 \$56,333 funded for period 1/1/96-12/31/97
- "Hydrogen Partitioning and Fe<sup>3+</sup> Exchange in Mantle Minerals: Effects on Mechanical Behavior - Collaborative Research" (Joint with S.J. Mackwell)  
 \$142,997 funded for period 11/1/93 to 5/31/98  
 \$5,000 supplement funded for 5/1/94 to 9/1/94

"Redox Processes in Rio Grande Rift and Colorado Plateau Xenoliths: Collaborative Research"  
 (Joint with A.V. McGuire)  
 \$55,598 funded for period 6/1/94-5/31/98  
 \$7,000 supplement funded for 5/1/95 to 9/1/95

"Synchrotron MicroXANES Study of Iron Redox in Mantle Phases"  
 \$60,000 funded for period 8/15/98 - 2/28/01

"R.U.I.: Acquisition of a New Mössbauer spectrometer"  
 \$49,840 funded for period from 3/1/99 - 2/28/01

"R.U.I.: Collaborative Research: Chemical Equilibria Involving Iron and Hydrogen in Metapelites from Western Maine"  
 \$27,468 funded for period from 8/1/99 - 7/31/01

"RUI: Acquisition of a Scanning Electron Microscope at Mount Holyoke College"  
 \$226,560 funded for period from 6/1/02-5/30/03

"RUI: Collaborative Research: Hydrogen and Ferric Iron in Felsic Melts"  
 (collaborative with Sheila Seaman, University of Massachusetts)  
 \$86,000 funded for period from 1/1/03-12/31/06

"RUI: Collaborative Research: Improvements in the Application of the Mössbauer Effect to Studies of Minerals"  
 (collaborative with Martha Schaefer, LSU)  
 \$76,939 funded for period from 1/1/05-12/31/08

"Redox Ratios by Fe-XANES"  
 (collaborative with M. Gunter and A. Lanzirotti)  
 \$104,897 funded for period from 6/1/08-5/31/11

"Effects of Composition and Cooling Rate on Fe XANES Glass Calibrations"  
 (Collaborative with Molly McCanta at Tufts University)  
 \$115,363 funded to MHC for period from 8/1/12 – 7/31/15

**National Science Foundation, Division of Computation and Data-Enabled Science and Engineering:**

"Transfer Learning for Chemical Analyses from Laser-Induced Breakdown Spectroscopy"  
 (Sridhar Mahadevan, UMass, Co-I)  
 \$141,129 to MHC for period from 9/1/13 – 8/31/15

**National Science Foundation, Division of Undergraduate Education:**

"Undergraduate Research Program in Materials Science"  
 \$14,500 funded, 5/1/88-9/30/88

"Undergraduate Research Program in Materials Science"  
 \$36,600 funded, 5/1/89-12/31/89

"Equipment for Program Improvement in Mineralogy/Petrology"  
 \$45,000 funded, 1/1/89-12/31/89  
 \$40,000 match from University of Oregon  
 \$7,500 match from I.B.M. and Novell

"Support for Development of Minerals and Mineralogy: A Three-Dimensional Approach"  
 \$75,000 funded for period from 3/1/00 - 2/28/02

"A Modular, Inquiry-Based Regional Approach to Introductory Laboratories"  
 (S. Good, C.G. Fisher, R.M. Busch, T.M. Lutz, L. Srogi, and C.G. Wiswall, Co-I's) NSF grant  
 DUE-9850923, \$40,800 funded, 6/1/98-5/31/2000.

"An Integrative Curriculum in Earth, Human, and Environmental Sciences  
 (Joint with L. Savoy, M.J. Markley, A. Werner, M.A. McMenamain, S. Dunn, and T. Millete)  
 \$170,000 funded for period from 1/1/00 - 6/30/05

"Support for Development of Minerals and Mineralogy: A Three-Dimensional Approach"  
 \$417,244 funded for period from 3/1/02 – 2/28/08



“An Integrative Curriculum in Planetary Science”

(C.M. Hamilton, T. Burbine, co-Is)

\$91,900 funded for period from 9/1/05 – 8/31/07

“Scaffolding Effective Practice for Use of Animations in Teaching Mineralogy and Physical Geology”

(M. Gunter and L. Wenk, Co-I's)

\$150,000 funded for period from 1/1/09 -12/31/10

“Building Analytical Competence for Geoscience Students through use of Spectroscopic Tools”

(Collaborative with John B. Brady and Eileen McGowan)

\$73,375 funded to MHC for period 8/15/12-7/31/15

### **National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics**

“Improving Recruitment and Retention of Transfer Students to STEM Majors at Mount Holyoke College”

(Sarah Bacon and Becky Packard, Co-Is)

\$600,000 for period from 1/1/12-12/31/16

### **Packard Foundation**

“Earth and Environmental Sciences in California and the Southwest” (Joint with A. Ellison, L. Savoy, and T. Millette)

\$200,000 funded for period from 1/1/00 - 12/31/02

### **Tektronix Foundation:**

"Request for Upgrade to Mössbauer Spectroscopy Laboratory"

\$4,000, 1987; \$6,000, 1988; \$10,000, 1989

### **NASA, Cosmochemistry Division:**

“Synchrotron microFTIR characterization of hydrogen in nominally anhydrous minerals in martian materials.”

\$68,000 funded for period from 1/1/01 - 12/31/02

“Ferric Iron and Hydrogen in Mars Minerals”

\$45,000 funded for period from 1/1/03 - 12/31/03

“Acquisition of a 4.5K Mössbauer Spectrometer”

\$35,345 funded for period from 1/1/05 to 12/31/06

### **NASA, Mars Fundamental Research Program:**

“Temperature Dependence and Resolution of Fundamental Mössbauer Parameters in Mars-Analog Minerals”

\$150,000 funded for period from 10/1/02 – 9/30/06

“Taking Apart the Rocks of Mars” (C. Pieters, P.I., J. Bishop, J. Sunshine, T. Hiroi, Co-Is)

NNG04GB53G

\$60,000 funded for period from 12/31/03 – 11/30/06

“Analysis and Characterization of Sulfates and Sulfides Using Multiple Spectral Techniques (M. Lane, P.I., J.L. Bishop, Co-I)

\$31,000 funded for period from 1/1/05-12/31/06

“Temperature Dependence and Resolution of Fundamental Mössbauer Parameters in Mars-Analog Minerals”

(collaborative with M. Schaefer, LSU)

\$90,000 funded for period from 3/1/06-2/28/09

“Mineral Standards and Technique Development for Laser-Induced Breakdown Spectroscopy”

\$375,000 funded for period from 3/1/06-2/28/09

“Formation of Magnetic Minerals on Mars by Alteration of Nanophase Ferric Oxides/Oxyhydroxides” (Janice Bishop, SETI/Ames, PI)

- \$30,000 funded for period from 3/1/06-2/28/09  
 “Further Analysis and Characterization of Sulfates and Sulfides Using Multiple Spectral Techniques”  
 (collaborative with Melissa Lane, Planetary Science Institute (PI), and Janice Bishop, SETI)  
 \$32,000 funded for period from 3/1/06-2/28/09
- “Characterizing the Rocks of Mars through Integrated Spectroscopy”  
 (collaborative with C. Pieters (PI), J. Bishop, M. Lane, T. Hiroi, J. Sunshine)  
 \$60,000 to MHC for period from 3/1/07 – 2/28/11
- “Analysis and Characterization of Phosphates Using Multiple Spectral Techniques”  
 (collaborative with Melissa Lane (PI), Planetary Science Institute, and Janice Bishop, SETI)  
 \$45,947 funded for period from 3/1/08-2/28/12
- “The State of Sulfur on Mars: Understanding the Interrelationships Among the Crystal Structure,  
 Chemistry, and Spectroscopy of Sulfates and Sulfides “  
 (collaborative with Melissa Lane (PI), Planetary Science Institute, and Janice Bishop, SETI)  
 \$97,754 funded to MHC for period from 6/1/10-5/31/13
- “Technique Development for Laser-Induced Breakdown Spectroscopy: Calibration, Classification, and  
 Light Element Analysis”  
 (collaborative with Sam Clegg and Roger Wiens, LANL, and Martha Schaefer)  
 \$719,000 funded for period from 3/1/09 – 5/30/14
- “Effects of Shock Metamorphism on Phyllosilicate Spectroscopy”  
 (Joseph Michalski, P.I.)  
 \$67,941 funded to MHC for period from 6/1/10-5/31/14

**NASA, Lunar Advanced Science and Exploration Research Program:**

- “Thermodynamics, VIS-IR Spectroscopy, and Mapping of Adsorbed Water on the Moon”  
 (K. Hibbitts, PI)  
 \$33,920 to MHC for period from 6/1/08 – 5/31/09
- “Pyroxene Spectroscopy as a Tool to Probe the Composition and Thermal History of the Lunar Surface”  
 (Rachel Klima, PI)  
 \$104,914 to MHC for period from 1/1/10 – 5/31/13
- “The Stability and Transport of Water on the Moon”  
 (Karl Hibbitts, P.I.)  
 \$106,614 funded to MHC for period from 9/1/11-6/30/15
- “Solar Wind Induced Production of Hydroxyl and Water on the Moon”  
 (Thomas Orlando, PI)  
 \$9,313 to MHC for period from 9/1/11-6/30/15

**NASA, Mars Science Laboratory Participating Scientist Program:**

- “Enhancing Science Return from ChemCam through Laboratory and Statistical Analyses and Integration  
 with APXS”  
 \$476,885 for period from 2/15/12-12/31/16

**NASA, Lunar Science Institute Program:**

- “The Moon as Cornerstone to the Terrestrial Planets: The Formative Years”  
 C.M. Pieters, PI, Brown University  
 \$135,000 funded to MHC for period from 4/9/09 – 4/8/14

**NASA Planetary Geology and Geophysics Program:**

- “Integrated Spectroscopy of Pyroxenes: Composition, Structure, and Thermal History”  
 (Rachel Klima, PI)  
 \$32,711 to MHC for period from 8/5/11-8/4/14
- “Pyroxene Spectroscopy, Composition, Structure, and Thermal History”

(Rachel Klima, PI)  
\$91,313 to MHC for period from 6/1/13 – 5/31/16

**CURRENT FUNDING:**

**NASA, Solar System Exploration and Research Virtual Institute Program:**

“Remote, In Situ, and Synchrotron Studies for Science and Exploration”

Tim Glotch, Stony Brook Univ., PI (**Dyar is Deputy PI**)

\$777,256 to MHC for period from 1/1/14-12/31/18

“Volatiles, Regolith and Thermal Investigations Consortium for Exploration and Science (VORTICES)”

Ben Bussey, APL, PI

\$51,998 to MHC for period from 1/1/14-12/31/18

“Environment and Evolution of Exploration Destinations: Science and Engineering Synergism”

Carle Pieters, Brown Univ., PI

\$135,600 to MHC for period from 1/1/14-12/31/18

**NASA, Exobiology Program:**

"Biogenic iron oxide transformations by thermophilic and mesophilic iron-reducing microbes"

James Holden, University of Massachusetts, PI

\$208,316 to MHC for period from 4/1/14-3/31/18

**NASA, Mars Fundamental Research Program:**

“Transfer learning for chemical analyses from laser-induced breakdown spectroscopy on the surface of Mars”

(collaborative with Sridhar Mahadavean)

\$445,093 funded to MHC for period 11/29-14-11/30/17

“Impact History and Meteoritic Contributions to the Martian Upper Crust”

(collaborative with Caleb Fassett, PI)

\$261,888 funded to MHC for period 6/1/14-5/31/18

**NASA Emerging Worlds Program:**

“Volatile Adsorption onto Primitive Grains for Understanding the Formation of the Early Solar System”

(Karl Hibbitts, PI)

\$76,000 to MHC for period from 3/1/15-2/28/18

**NASA Solar System Workings Program:**

“Oxidation State of Lunar Glasses: Implications for Surface and Eruptive Processes on the Moon”

(Molly McCanta, PI)

\$136,530 to PSI for period from 10/1/16-3/30/19

“SuperCam-Analog Laser-induced Breakdown Spectrometer at Mount Holyoke College”

\$445,095 for period 10/1/16-9/30/18

**NASA Planetary Data Archiving, Restoration, and Tools:**

“Advanced XAS Calibration Tools for In Situ Analysis of Redox States of Fe, Ti, Mn, Cr, V, and Eu in Extraterrestrial Glasses”

\$208,997 to PSI for period from 1/15/17-1/14/20

**NSF Information Integration and Informatics**

“Collaborative Research: Deep Learning for Spectroscopy”

Collaborative with Sridhar Mahadevan and Mario Parente

\$373,793 to MHC for period from 4/1/16-3/31/20