

Curriculum Vitae
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John F. Rakovan

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Research Interests:

My research interests involve the integration of mineralogy and low temperature geochemistry in the study of crystal surfaces and water-rock interactions found in natural systems. In particular, I am interested in environmentally significant processes such as crystal growth, metal sorption, trace element partitioning and other surface mediated reactions. My research also addresses the structural response of minerals to substituent elements, especially lanthanides and actinides in apatite group minerals.

Professional Experience:

- Associate Professor of geochemistry and mineralogy, Department of Geology, Miami University (6/1/04-present)
- Assistant professor of geochemistry and mineralogy, Department of Geology, Miami University (1/1/98-6/1/04)
- Postdoctoral research faculty in mineral-water interface geochemistry, Virginia Polytechnic Institute (4/1/96-12/1/97)

Selected Appointments and Activities

- IMA Commission on New Minerals, Nomenclature and Classification Subgroup on Apatite Nomenclature (3/08-present).
- Fellow of the Mineralogical Society of America (elected 10/27/2007).
- National Science Foundation panel member in lead of the Advanced Photon Source Facility Review and funding (Spring/2006).
- Visiting Professor, Graduate School of Human and Environmental Studies, Kyoto University, Japan (1/05-8/05)
- Invited Associate Member of the Stony Brook NSF/DOE Center for Environmental Molecular Science (8/02-present)
- Secretary of the International Mineralogical Association (IMA) Commission on Mineral Growth and Interface Processes 2002-2006).
- Executive Editor of *Rocks and Minerals* (5/01 – present)
- Associate Editor, *American Mineralogist* (5/99-5/02)
- Research Associate, Research and Collections Division, New York State Museum (7/02-present)
- Adjunct professor, Department of Chemistry, Miami University (11/99-present)
- Guest researcher, Advanced Photon Source, Argonne National Laboratory (1998-present)
- Guest researcher, National Synchrotron Light Source, Brookhaven National Laboratory (1991-present)

Education:

- Ph.D. in geochemistry/mineralogy, State University of New York at Stony Brook (1/91-3/96)
- M.S. in clay mineralogy/crystallography, University of Illinois at Chicago (5/88-12/90)
- B.S. in geology, University of Illinois at Urbana-Champaign (9/86-5/88)
- Boston University (9/83-5/86)

Professional Affiliations:

- Mineralogical Society of America
- Geochemical Society
- Clay Mineral Society

Organized Short Courses/Workshops/Conference Sessions:

- 4) Co-organized and taught (with PHD student Olaf Borkiewicz) a 2-day workshop “Powder Diffraction Rietveld Refinement methods” at the 2nd Central-European Mineralogical Conference (CEMC) co-organized by the Mineralogical Society of Poland. September 10-11, 2008 Szklarska Poręba, South Western Poland.
- 3) Co-organized and convened a Technical Session “T100. Whet your Apatite: Advances in Research of Natural and Biological Apatite” at the National Geological Society of America Meeting, Philadelphia, PA 10/22/2006. (Doreena Patrick, H. Catherine W. Skinner and John Rakovan)
- 2) Co-organized and convened a two-day workshop on Phosphate Minerals sponsored by the Mineralogical Society of America and the US Department of Energy, Golden, CO 10/26-27/2002.
- 1) Co-organized and convened a two-day Special Session on Phosphate Mineralogy, Petrology, and Materials

RESEARCH

Publications: (student authors indicated by *)

Ph.D. Dissertation

Rakovan, J. (1996) The role of crystal surface structure during growth: Trace element incorporation and epitaxy. Ph.D. dissertation, SUNY-Stony Brook.

M.S. Thesis

Rakovan, J. (1992) Rietveld Refinement of a I1b-2 clinocllore. M.S. thesis, UI-Chicago.

Edited Books:

Kohn, M., **Rakovan, J.**, and Hughes, J.M. Eds. (2002) Phosphates: Geochemical, Geobiological and Materials Importance. Reviews in Mineralogy and Geochemistry. Mineralogical Society of America. Washington, DC. 742 p.

Chapters in Edited books:

- 6) **Rakovan, J.**, and Partey*, F. (2009) Mineralization of the Hansonburg mining District, Bingham, New Mexico. *In:* Lueth ed. New Mexico Geological Society Guidebook, 60th field conference, Chupadera Mesa Region. p. 121-131.
- 5) Dark, J.P*, Currie, B.S., McPherson, M.L., **Rakovan, J.**, and Marchlewski, T.A*. (2008) Structural, lithological and diagenetic controls on Dakota Formation economic gas production within the greater San Arroyo gas field, Utah. *In:* Longman, M.A., and Morgan, C.D. eds., *Hydrocarbon systems and production in the Uinta Basin*, Utah, Rocky Mountain Association of Geologists and Utah Geologic Association Publication 37, p. 179-208
- 4) **Rakovan, J.** (2002) Growth and Surface Structure of Apatite. *In:* Phosphates: Geochemical, Geobiological and Materials Importance, Kohn, M., Rakovan, J., Hughes, J.M. (eds). Reviews in Mineralogy and Geochemistry. Mineralogical Society of America. Washington, DC. p. 51-86.
- 3) Hughes, J.M. and **Rakovan, J.** (2002) The Crystal Structure of Apatite: $\text{Ca}_5(\text{PO}_4)_3(\text{F},\text{OH},\text{Cl})$. *In:* Phosphates: Geochemical, Geobiological and Materials Importance, Kohn, M., Rakovan, J., Hughes, J.M. (eds). Reviews in Mineralogy and Geochemistry. Mineralogical Society of America. Washington, DC. p. 1-12.
- 2) Reeder, R.J. and **Rakovan, J.** (1999) Surface structural controls on trace element incorporation during crystal growth. *In: Growth, Dissolution and Pattern-formation in Geosystems*, B. Jamtveit and P. Meakin (eds.) p. 143-162. Kluwer Academic Publishers.
- 1) Hochella, M.F. Jr., **Rakovan, J.**, Rosso, K.M., Bickmore, B.R., and Rufe, E. (1998) New Directions in Mineral Surface Geochemical Research Using Scanning Probe Microscopes. *In: Mineral-Water Interfacial Reactions, Kinetics and Mechanisms* (D. Sparks and T. Grundl Eds.). American Chemical Society Symposium Series 715. p. 37-56.

Papers in press in refereed journals:

- 3) **Rakovan, J.**, Ono, M. and Francis, C. (In press 2009). Tanakamiyama: A Classic Japanese Pegmatite District. *Rocks & Minerals*.
- 2) Bosze*, S., **Rakovan, J.**, and Lueth, V.W. (In revision with provisional acceptance) Intra-deposit Rare Earth Element chemistry and paragenesis of fluorite from the Hansonburg Mining District, Bingham, New Mexico. *Economic Geology*.
- 1) Hughes, J. M., Ertl, A., Bernhardt, H. J., **Rakovan, J.** and Rossman, G. R. (In revision with provisional acceptance) Vanadium-rich muscovite from Austria: Crystal structure, chemical analysis, and spectroscopic investigations. *Canadian Mineralogist*

Papers in review in refereed journals:

- 3) Borkiewicz*, O., Cahill, C. and **Rakovan, J.** (In review) Time resolved in-situ studies of apatite formation pathways in aqueous solutions. *American Mineralogist*.
- 2) Kleszczewska, A.; Manecki, M.; Bajda, T.; Mozgawa, W.; **Rakovan, J.**; Borkiewicz*, O. (in review) Mimetite formation from goethite adsorbed ions. *Environmental Science and Technology*.
- 1) Luo*, Y., **Rakovan, J.**, Elzinga, E., Pan, Y., Lupulescu, M.V., and Hughes, J. (In review). Crystal chemistry of Th in natural and synthetic fluorapatite. *American Mineralogist*.

Papers published in refereed journals:

- 41) Lupulescu, M.V., **Rakovan, J.**, Robinson, and Hughes, J. (In press) Fluoropotassichastingsite from the Greenwood

- Mine, Orange County, New York: A new end-member calcic amphiboles. *Canadian Mineralogist*. 47: 909-916.
- 40) Deshpande, R., Jiang, L., Schmidt*, G., **Rakovan, J.**, Wang, X., Wheeler, K. and Wang, H. (2009) A concise approach to the synthesis of oppdibenzoporphyrins through the Heck reaction. *Organic Letters*.
 - 39) Partey*, F., Lev, S., Casey, E., Widom, E., Lueth, V. and **Rakovan, J.** (2009) Source of fluorine and petrogenesis of the Rio Grande Rift type barite-fluorite-galena deposits. *Economic Geology*. 104: 505-520
 - 38) Luo*, Y., **Rakovan, J.**, Hughes, J. Pan, Y., (2009). Site preference of U and Th in Cl, F, Sr apatites. *American Mineralogist*, 94: 345–351.
 - 37) **Rakovan, J.**, Gasbarro*, N., Nakotte, H., Kothapalli, K. and Vogel, S. C. (2009) Characterization of Gold Crystallinity by Diffraction Methods. *Rocks & Minerals*, 84:54-61.
 - 36) Hughes, J.M., Wise, W.S., Gunter, M.E., Morton, J.P. and **Rakovan, J.** (2008) Lasalite, $\text{Na}_2\text{Mg}_2(\text{V}_{10}\text{O}_{28}) \cdot 20\text{H}_2\text{O}$, a new decavanadate mineral from the Vanadium Queen Mine, la sal District, Utah: mineral description, atomic arrangement, and relationship to the pascoite group of minerals. *Canadian Mineralogist*. 46:1365-1372.
 - 35) **Rakovan, J.** Luo*, Y and Borkiewicz, O. (2008) Synchrotron Microanalytical Methods in the Study of Trace and Minor Elements in Apatite. *Mineralogia*, 39:31-40.
 - 34) Hughes, J.M., Jolliff, B. L., and **Rakovan, J.** (2008) The crystal chemistry of whitlockite and merrillite and the dehydrogenation of whitlockite to merrillite. *American Mineralogist*, 93:1300-1305.
 - 33) Wajima*, T., Haga, M., Kuzawa*, K., Ishimoto, H., Tamada, O., Ito, K., Nishiyama, T., and **Rakovan, J.** (2007) Material conversion from paper sludge ash in NaOH, KOH, and LiOH solutions. *American Mineralogist*, 92, 1105-1111.
 - 32) Ikuta*, D., Kawame*, N., Banno, S., Hirajima, T., Ito, K., **Rakovan, J.**, Downs, R. T. and Tamada, O. (2007) First in situ X-ray identification of coesite and retrogressed quartz on a glass thin section of ultrahigh-pressure metamorphic rock and their crystal structure details. *American Mineralogist*. 92, 57-63.
 - 31) Wajima*, T., Haga, M., Kuzawa*, K., Ishimoto, H., Tamada, O., Ito, K., Nishiyama, T., Downs, R., and **Rakovan, J.** (2006) Zeolite synthesis from paper sludge ash at low temperature (90°C): Addition of diatomite for SiO₂. *Journal of Hazardous Materials*, B132, 244–252
 - 30) **Rakovan, J.**, M. Kitamura, and O. Tamada (2006) *Sakura Ishi*: Mica pseudomorphs of complex cordierite-indialite intergrowths from Kameoka, Kyoto Prefecture, Japan. *Rocks & Minerals*, 81, 284-292. (peer reviewed).
 - 29) Lupulescu, M.V., **Rakovan, J.**, Robinson, and Hughes, J. (2005) Fluoropargasite, a new member of the calcic amphiboles, from Edenville, Orange County, New York. *Canadian Mineralogist*. 43, 1439-1444.
 - 28) Chakhmouradian, A.R. Hughes, J.M. and **Rakovan, J.** (2005) Fluorcaphite, A second occurrence and detailed structural analysis: simultaneous accommodation of Ca, Sr, Na, and LREE in the apatite atomic arrangement. *Canadian Mineralogist*, 43, 735-746.
 - 27) Krekeler*, K., Hammerly*, E., **Rakovan, J.** and Guggenheim, S. (2005) Microscopy Studies of the Palygorskite to Smectite Transformation. *Clay and Clay Minerals*, 53, 92-99.
 - 26) Cherniak, D., Pyle, J., and **Rakovan, J.** (2004) Synthesis of REE and Y phosphates by Pb-free flux methods for electron microprobe analysis standards and aids in designing monazite chemical U-Th-Pb dating protocols. *American Mineralogist*, 89, 1533-1539.
 - 25) Losey*, A., **Rakovan, J.**, Hughes, J.M., Francis, C.A. and Dyar, M.D. (2004) Structural Variation in the lithiophilite-triophyllite series and other olivine-group structures. *Canadian Mineralogist*, 42, 1105-1115.
 - 24) Krekeler*, M., Guggenheim, S., and **Rakovan, J.** (2004) A microtexture study of palygorskite-rich sediments from the Hawthorne Formation, southern Georgia, by transmission electron microscopy (TEM) and atomic force microscopy (AFM). *Clays and Clay Minerals*, 52, 263-274.
 - 23) Hughes, J.M., Ertl, A., Bernhardt H.J., Rossman, G.R. and **Rakovan J.** (2004) Mn-rich fluorapatite from Austria: Crystal structure, chemical analysis, and spectroscopic investigations. *American Mineralogist*. 89. 629-632
 - 22) Meng, Y., Newville, M., Sutton, S., **Rakovan, J.**, and Mao, H.K. (2003) Fe and Ni impurities in synthetic diamond. *American Mineralogist*. 88, 1555-1559.
 - 21) Hughes, J.M, **Rakovan, J.** and Bracco, R., Gunter, M. (2003) The atomic arrangement of the ganophyllite-group modulated layer silicates as determined from the orthorhombic dimorph of tamaite, with the elusive 16.8 Å ganophyllite-group superstructure revealed. *American Mineralogist*. 88, 1324-1330.
 - 20) Wolf*, A., **Rakovan, J.** and Cahill, C. (2003) Ferroaxinite From Lime Crest Quarry, Sparta, New Jersey. *Rocks and Minerals*. 78, 252-256.) (peer reviewed)
 - 19) Hughes, J.M., Schindler, M., **Rakovan, J.**, and Cureton, F. (2002) The crystal structure of Hummerite, $\text{KMg}(\text{V}_5\text{O}_{14}) \cdot 8\text{H}_2\text{O}$: Bonding between the $[\text{V}_{10}\text{O}_{28}]^{6-}$ structural unit and the $\{\text{K}_2\text{Mg}_2(\text{H}_2\text{O})_{16}\}^{6+}$ interstitial complex. *Canadian Mineralogist*. 40, 1429-1435.
 - 18) **Rakovan, J.**, Reeder, R.J., Elzinga, E.J., Cherniak, D. Tait, C.D. and Morris, D.E. (2002) Structural Characterization of U(VI) in the apatite structure by X-ray absorption spectroscopy. *Environmental Science and Technology*. 36, 3114-3117.
 - 17) Bosze*, S. and **Rakovan, J.** (2002) Surface structure controlled sectoral zoning of the Rare Earth Elements in fluorite from Long Lake, N.Y. and Bingham, N.M. *Geochim. Cosmochim. Acta*. 66, 997-1009.
 - 16) **Rakovan, J.**, and Jaszczak, J.A. (2002) Multiple length scale growth spirals on metamorphic graphite {001} surfaces studied by atomic force microscopy. *American Mineralogist*. 87, 17-24.
 - 14) Hughes, J.M., Cureton, F., Marty, J., Gault, R., Gunter, M.E., Campana, C.F., Sommer, A., **Rakovan, J.** and

- Brueseke*, M.E. (2001) Dickthomssenite, Mg(V₂O₆)₇H₂O, a new mineral from the Firefly-Pigmy Mine, Utah: Descriptive mineralogy and crystal structure. *Canadian Mineralogist*, 39, 1691-1700.
- 13) **Rakovan, J.**, M. Newville and S. Sutton (2001) Evidence of heterovalent europium in zoned Llallagua apatite using wavelength dispersive. *American Mineralogist*, 86, 697-700.
 - 12) Fouke, B.W. and **Rakovan, J.** (2001) An integrated cathodoluminescence video-capture microsampling system. *Journal of Sedimentary Research*, 71, 509-513.
 - 11) Brown, C.J., **Rakovan, J.**, and Schoonen, M.A.A. (2000) Heavy minerals and sedimentary organic matter in Pleistocene and Cretaceous sediments on Long Island, New York, with emphasis on pyrite and marcasite in the Magothy aquifer: U.S. Geological Survey Water-Resources Investigations Report 99-4216, 22 p.
 - 10) **Rakovan, J.** and Hughes, J.M. (2000) Strontium in the apatite structure: structure and chemistry of belovite-(Ce) and Sr-rich apatite. *Canadian Mineralogist*, 38, 839-845.
 - 9) Mayer, L. **Rakovan, J.** and Rufe, E. (2000) Microtopographic Evolution of Mineral Surfaces as a Tool to Identify and Date Young Fault Scarps in Bedrock. *Journal of Geodynamics*, 29, 393-406.
 - 8) **Rakovan, J.**, Becker, U. and Hochella, M.F. Jr., (1999) Aspects of Goethite Surface Microtopography, Structure, Chemistry, and Reactivity. *American Mineralogist*, 84, 884-894.
 - 7) **Rakovan, J.**, McDaniel, D.K., and Reeder R.J. (1997) Use of surface-controlled REE sectoral zoning in apatite from Llallagua, Bolivia, to determine a single-crystal Sm-Nd age. *Earth and Planetary Science Letters*, 146, 329-336.
 - 6) **Rakovan, J.**, and Reeder, R.J. (1996) Intracrystalline Rare Earth Element distributions in apatite: Surface structural influences on zoning during Growth. *Geochim. Cosmochim. Acta*, 60, 4435-4445.
 - 5) **Rakovan, J.**, and Waychunas, G. (1996) Luminescence in Minerals. *Mineralogical Record*, 27, 7-19.
 - 4) **Rakovan, J.**, Schoonen, M., Tyrna, P., Nelson, D.O., and Reeder, R.J. (1995) Epitaxial Overgrowths of Marcasite on Pyrite from the Tunnel and Reservoir Project Chicago, Illinois: Implications for Marcasite Growth. *Geochim. Cosmochim. Acta*, 59, 343-346.
 - 3) **Rakovan, J.**, Mitcheltree, D.B., Benton, L., and Avella, S. (1995) Amethyst on milky quartz from Hopkinton, Rhode Island. *Mineralogical Record*, 26, 83-89.
 - 2) **Rakovan, J.**, and Reeder, R.J. (1994) Differential incorporation of trace elements and dissymmetrization in apatite: The role of surface structure during growth. *American Mineralogist*, 79, 892-903.
 - 1) Parise, J.B., Corbin, D.R., Abrams, L., Northrup, P., **Rakovan, J.**, Nenoff, T.M., and Stucky, G.D. (1994) Structural relationships between some BePO₄, BeAsO₄, and AlSiO-RHO frameworks. *Zeolites*, 14, 25- 34.

Published Abstracts from Presentations at National/International meetings:

- 63) Luo*, Y., **Rakovan, J.**, Wright, S. (2009) Orientation Dependent Polarized Micro-XAS Study of U, Th and Sr in Single Crystal Apatites. Annual American Geophysical Union Spring meeting, Abstracts with Program, Toronto.
- 62) **Rakovan, J.**, Gasbarro*, N., Nakotte, H., Kothapalli, K. and Vogel, S. C. (2009) Natural Cold Working of Gold and Testing the Authenticity of Large Gold Crystals. Annual American Geophysical Union Spring meeting, Abstracts with Program, Toronto.
- 61) **Rakovan, J.** (2009) *Sakura Ishi* (Cherry Blossom Stones) from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. FM-MSA-TGMS Mineralogical Symposium, Tucson.
- 60) Lupulescu, M., and **Rakovan, J.** 2008. A new occurrence of tourmaline with tetrahedrally coordinated boron: Rossmannite and associated minerals from Newcomb, Essex County, NY. Rochester Mineralogical Symposium Technical Session. *Rocks & Minerals*.
- 59) Medici, J. and **Rakovan, J.** (2008) XIRidescent and other Fluorites from the Findlay Arch, Ohio. Tucson Mineralogical Symposium. *Mineralogical Record*.
- 58) **Rakovan, J.** and Avella, S.(2008) Amethyst Scepters, Ashaway Village, Hopkinton, Rhode Island. Tucson Mineralogical Symposium. *Mineralogical Record*.
- 57) **Rakovan, J.** (2007) *Sakura Ishi* from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. 28th Annual New Mexico Mineral Symposium, New Mexico Tech. *New Mexico Geology* V.29 #4 p.133
- 56) **Rakovan, J.** (2007) Key Note Speaker; Mineralogical Meanderings in Japan, 28th Annual New Mexico Mineral Symposium, New Mexico Tech. *New Mexico Geology* V.29 #4 p.135
- 55) **Rakovan, J.** Luo*, Y and Borkiewicz*, O. (2007) Synchrotron Microanalytical Methods in the Study of Trace and Minor Elements in Apatite. *Mineralogia Polonica*, V.30 p. 88.
- 54) Huerta*, M. and **Rakovan, J.** (2007) Growth induced dissymmetrization of fluorapatite from Llallagua, Bolivia: The relationship between compositional and optical zoning. 2004 Rochester Mineralogical Symposium Program and Abstracts and *Rocks & Minerals*, 82,143.
- 53) Borkiewicz*, O., **Rakovan, J.** and Cahill, C. L. (2006) Kinetics and pathways of apatite formation - In-situ time resolved studies. Annual Geological Society of America meeting, Abstracts with program.
- 52) **Rakovan, J.**, Luo*, Y., Elzinga, E.J., Pan, Y., Lupulescu, M., and Hughes, J.M. (2006) Site distribution and structural state of Th in fluoroapatite determined by single crystal XRD and EXAFS. International Mineralogical Association meeting in Kobe Japan, Abstracts with Program.

- 51) Luo*, Y., **Rakovan, J.**, Elzinga, E.J., Pan, Y., and Hughes, J.M. (2006) Crystal chemistry of Th in apatite: Geochemistry and environmental implications. American Geophysical Union annual Spring meeting, Abstracts with Program.
- 50) Borkiewicz*, O., **Rakovan, J.** and Cahill, C. L. (2006) In-situ time resolved studies of apatite formation pathways – implications for biological and environmental systems. American Geophysical Union annual Spring meeting, Abstracts with Program.
- 49) Lupulescu, M., **Rakovan, J.**, Dyar, D., and Pyle J. (2006) F-, Cl- and K-rich Amphiboles in iron Deposits of the Hudson Highlands, New York. Geological Society of America Northeastern Section 41st Annual Meeting Abstracts with Program.
- 48) **Rakovan, J.** (2006) Mineralogy of the Hansonburg Mining District, Bingham New Mexico and related Rio Grande Rift Barite-Fluorite-Galena Deposits. Rochester Mineralogical Symposium. Abstracts published in Rocks & Minerals.
- 47) **Rakovan, J.** (2006) Sakura Ishi from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. Rochester Mineralogical Symposium. Rochester, NY. Abstracts published in Rocks & Minerals
- 46) **Rakovan, J.**, Luo*, Y., Elzinga, E.J., Pan, Y., Lupulescu, M., and Hughes, J.M. (2005) Structural state of Th in fluoroapatite determined by single crystal XRD and EXAFS. Goldschmidt Conference Abstracts with Program.
- 45) Lev, S., Partey*, F., Casey, E., Widom, E., Lueth, V. and **Rakovan, J.** (2005) Source of fluorine and petrogenesis of the Rio Grande Rift type barite-fluorite-galena deposits. Goldschmidt Conference Abstracts with Program.
- 44) Luo*, Y., **Rakovan, J.**, Hughes, J.M., and Pan, Y. (2005) Investigating the site preference of U and Th in Cl, F, Sr apatites using single crystal X-ray diffraction. Goldschmidt Conference Abstracts with Program.
- 43) Krekeler*, K., **Rakovan, J.** and Guggenheim, S. (2004) Polysome-width variation in palygorskite-sepiolite minerals: A TEM and AFM investigation of structural variation and transformation. Annual Geological Society of America meeting, Abstracts with program.
- 42) Partey*, F., Widom, E., Lueth, V., Lev, S. **Rakovan, J.** (2004) Tracing the Source of Fluorine in the Fluorite Mineralization of the Southern Rio Grande Rift. NW Regional Geological Society of America meeting, Abstracts with program.
- 41) **Rakovan, J.** (2004) Apatite: Truly an interdisciplinary mineral. Rochester Mineralogical Symposium Program and Abstracts and Rocks & Minerals,
- 40) **Rakovan, J.** (2003) Lanthanides in Fluorite (REE:CaF₂): Probes of Crystal Surface Structure and Association in Color Centers. Materials Research Society National Meeting Program and Abstracts.
- 39) **Rakovan, J.** (2003) Exceptional Apatites from the Siglo XX mine, Llallagua Bolivia. Tucson Mineralogical Symposium. Mineralogical Record 34, 117-118.
- 38) Hughes, J.M., **Rakovan, J.** and Bracco, R., (2002) The atomic arrangement of ganophyllite with the 16.8 Å superstructure revealed. Annual Geological Society of America meeting, Abstracts with program.
- 37) **Rakovan, J.**, Reeder, R.J., Elzinga, E.J., Cherniak, D. Tait, C.D. and Morris, D.E. (2002) Crystal Chemistry of U(VI) in Apatite Determined by X-ray Absorption Spectroscopy. Annual Geological Society of America meeting, Abstracts with program.
- 36) Evensen, J.M., London, D., Hughes, J.M., **Rakovan, J.**, Hervig, R.L., Kaszuba, J.P. (2002) Crystal chemistry, crystallography, and petrogenesis of the beryllium micas. International Mineralogical Association Program with Abstracts.
- 35) Krekeler*, M., Guggenheim, S., and **Rakovan, J.** (2002) TEM Investigation of Apatite and oxide Minerals in Palygorskite deposits from the Hawthorne formation. Annual Clay Minerals Society meeting, Abstracts with program.
- 34) **Rakovan, J.** and Jaszczak, J. (2002) Constraints on graphite growth conditions and mechanisms during carbonate metamorphism from crystal surface microtopography. International Mineralogical Association Program with Abstracts,. P. 100
- 33) Tait, C.D., Reeder, R.J., **Rakovan, J.**, Morris, D.E., Nugent, M., Lamble, G.M., Elzinga, E.J., and Cherniak, D.J. (2002) Incorporation of Uranium (VI) into Calcium Carbonates and Apatite. American Chemical Society annual meeting, Abstracts with program.
- 32) **Rakovan, J.** and Jaszczak, J. (2002) Graphite with growth spirals from Arises River Marbles, Wlotzkas Baken, western Namibia. Tucson Mineralogical Symposium. Mineralogical Record, 33, 79.
- 31) **Rakovan, J.**, Sutton, S. Newville, M. and Lanzirotti, A. (2002) The use of WDS in Synchrotron X-ray Fluorescence and Spectroscopy: Case studies involving heterogeneous reactivity at the Mineral-Water Interface. The Synchrotron Environmental Science II Conference, Advanced Photon Source, 2002.
- 30) Krekeler*, M., Guggenheim, S., and **Rakovan, J.** (2001) Palygorskite deposits from the Hawthorne Formation, Southern Georgia: A complex history of sedimentation and authigenesis. Annual Geological Society of America meeting, Abstracts with program. p
- 29) Bosze*, S.L and **Rakovan, J.** (2001) Surface structurally controlled sectoral zoning of REE in fluorite from Long Lake, NY and Bingham, NM: Implications for trace element heterogeneity in minerals from hydrothermal deposits. 2001 Goldschmidt Conference Abstracts with Program.
- 28) Hammerly*, E., **Rakovan, J.** and Guggenheim, S. (2001) An AFM study of the palygorskite/sepiolite to smectite transformation in the Meigs-Attapulgas-Quincy District. 2001 Goldschmidt Conference Abstracts with Program.

- 27) **Rakovan, J.**, Sutton, S. Newville, M. and Lanzirotti, A. (2001) The use of WDS in Synchrotron X-ray Fluorescence and Spectroscopy: Case studies involving heterogeneous reactivity at the Mineral-Water Interface. 2001 Goldschmidt Conference Abstracts with Program.
- 26) Wright*, C.L. and **Rakovan, J.** (2001) Color, its cause, and relation to REE chemistry and paragenesis of fluorites from the Hansonburg Mining District in Bingham, NM. 2001 Goldschmidt Conference Abstracts with Program.
- 25) Sauerbeck*, S.A., Hammerly*, E.C., Morton, J.P., Hughes, J.M., and **Rakovan, J.** (2001) The Mineralogy of the Pitcher's Mounds of the National League. Annual Butler University Undergraduate Research Conference, Abstracts with Program, p. 30
- 24) Hammerly*, E. and **Rakovan, J.** (2001) An Atomic Force Microscopy study of the palygorskite/sepiolite to smectite transformation. Annual Butler University Undergraduate Research Conference, Abstracts with Program, p. 30
- 23) Richards, R.P. and **Rakovan, J.** (2000) The first occurrence of apatite crystals in Ohio. Rochester Mineralogical Symposium. Rocks and Minerals, 75, 255.
- 22) McCall*, K., Jaszczak, J., **Rakovan, J.** (2000) Crystal growth mechanisms evidenced by growth spirals on natural graphite {001} surfaces. Annual Butler University Undergraduate Research Conference, Abstracts with Program, p. 22.
- 21) Spansky*, M., Bosze*, S. and **Rakovan, J.** (2000) Fluorite mineralogy and trace element chemistry in the Hansonburg District, NM. Annual Butler University Undergraduate Research Conference, Abstracts with Program, p. 21.
- 20) **Rakovan, J.**, Newville, M., and Sutton, S. (1999) Wavelength-dispersive XANES reveals mixed europium valence state in Llalagua apatite. Annual Geological Society of America meeting, Abstracts with program. p.A-358.
- 19) Bosze*, S. and **Rakovan, J.** (1999) Surface Controlled Heterogeneous Incorporation of REE, Sr and Y in Fluorite. Annual Geological Society of America meeting, Abstracts with program. p.A-358.
- 18) McCall*, K., **Rakovan, J.**, and Jaszczak, J. A. (1999) Multiple length scale growth spirals on natural graphite {001} surfaces. Annual Geological Society of America meeting, Abstracts with program. p.A-169.
- 17) Mayer, L. and **Rakovan, J.** (1998) Microtopographic of mineral surfaces as a tool to identify and date young fault ruptures in bedrock scarps. Annual Geological Society of America meeting, Abstracts with program, A-237.
- 16) **Rakovan, J.** (1998) Cathodoluminescence as a probe of heterogeneous reactivity at the mineral-water interface. Annual Geological Society of America meeting, Abstracts with program, A-59.
- 15) **Rakovan, J.** and Mayer L. (1998) Microscopic to macroscopic morphology: the exposure and evolution of mineral surface microtopography as an indicator of fault rupture ages. In the proceedings from Resolution of Geological Analysis and models for Earthquake Faulting Studies, Camerino, Italy.
- 14) **Rakovan, J.** and Hochella, M.F. Jr., (1998) Heterogeneous oxidation and precipitation of aqueous Mn(II) at the goethite surface: An SPM study. Microscopy and Microanalysis. 4, supplement 2, 600-601.
- 13) **Rakovan, J.** (1998) Sectoral zoning (SZ) of REEs in fluorite: Indication of the heterogeneous nature and distribution of surface protosites. International Mineralogical Association Program with Abstracts. A83.
- 12) **Rakovan, J.** and Schmidt, C. (1998) Fluorite from Akchatau and Karaoba Kazakhstan. Tucson Mineralogical Symposium. Mineralogical Record, 29, S2.
- 11) **Rakovan, J.**, and Hochella, M.F. Jr. (1997) In situ microscopic observations of Mn(II) sorption/oxidation on goethite in aqueous solution. American Chemical Society Geochemistry Division abstract 070, annual meeting.
- 10) **Rakovan, J.**, McDaniel, D.K., and Reeder R.J. (1996) Single-crystal Sm-Nd dating of sectorally zoned Llalagua apatite yields a age of 43.8 +/- 4.7 Ma . Annual American Geophysical Society Spring meeting, Abstracts with Program, p. S278.
- 9) **Rakovan, J.**, and Reeder, R.J. (1996) Luminescence Zoning in Minerals: A Phenomenon of Beauty and Illumination. Tucson Mineralogical Symposium. Mineralogical Record, 27, 22-23.
- 8) **Rakovan, J.**, and Reeder, R.J. (1995) Spatially resolved REE heterogeneities (intrasectoral zoning) in apatite using synchrotron X-ray fluorescence microanalysis. V.M. Goldschmidt Conference, Program and Abstracts, p.82.
- 7) **Rakovan, J.**, and Reeder, R.J. (1994) Constraints on intrasectoral zoning and dissymmetrization in minerals: The case of Grossular Garnet. Annual Geological Society of America meeting, Abstracts with program, p.A-481.
- 6) **Rakovan, J.**, and Reeder, R.J. (1994) Sectoral and Intrasectoral Zoning in Apatite. Rochester Mineralogical Symposium. Rocks and Minerals, 69, 133.
- 5) **Rakovan, J.**, and Reeder, R.J. (1993) Dissymmetrization and trace element partitioning in apatite: Considerations of surface symmetry and structure. Annual American Geophysical Society Spring meeting, Abstracts with Program, p. 342.
- 4) **Rakovan, J.**, Schoonen, M., and Reeder, R.J. (1993) Marcasite epitaxy on pyrite, Deep Tunnel project, Chicago, Illinois. Annual Geological Society of America meeting, Abstracts with program, p.A-439.
- 3) **Rakovan, J.**, and Reeder, R.J. (1992) Differential Distribution of REE and Mn in apatite as controlled by crystal surface structure. Annual Geological Society of America meeting, Abstracts with program, p. A175.
- 2) **Rakovan, J.**, Mitcheltree, D.B., and Benton, L (1992) Preliminary Investigation of the Origin of Amethyst Sceptered Quartz from Hopkinton, Rhode Island. Rochester Mineralogical Symposium. Rocks and Minerals, 67, 118.
- 1) **Rakovan, J.**, and Guggenheim, S. (1992) Rietveld Refinement of a I1b-2 clinocllore. Annual Clay Mineral Society meeting, Program and Abstracts, p. 132.

Other Abstracts:

- 13) **Rakovan, J.** (2002) How and why minerals form faceted crystals. Friends of Mineralogy 5th Midwest Mineral Symposium, Symposium Program and Abstracts.
- 12) **Rakovan, J.**, Reeder, R.J., Elzinga, E.J., Cherniak, D. (2001) XAS Characterization of U in Fluorapatite. National Synchrotron Light Source 2001 Activity Report.
- 11) **Rakovan, J.**, Newville, M. and Sutton, S. (2000) Evaluation of Europium Oxidation State and Anomalous Partitioning Behavior in Intrasectorally Zoned Apatite Using Wavelength Dispersive Micro-XANES. Advanced Photon Source Activity Report 2000.
- 10) Bosze*, S., **Rakovan, J.**, Shea, G. and Lanzirotti, A. (1999) Wavelength dispersive SXRFMA of sectorally distributed REE heterogeneities in fluorite. National Synchrotron Light Source 1999 Activity Report.
- 9) **Rakovan, J.** and Shea, G. (1998) SXRFMA of Sectoral Zoning of Trace Elements in Hydrothermal Fluorite Crystals. National Synchrotron Light Source 1998 Activity Report.
- 8) **Rakovan, J.** and Reeder, R. J. (1996) Spatially Resolved Trace Element Heterogeneities in Apatite Measured via Synchrotron X-ray Fluorescence Microanalysis. National Synchrotron Light Source 1996 Activity Report. B-299.
- 7) **Rakovan, J.** and Reeder, R. J. (1996) Single Crystal Neutron Diffraction Study of Apatite Exhibiting Growth Related Sectoral and Intrasectoral Dissymmetrization. IPNS 1991-1996 Progress Report, 273.
- 6) **Rakovan, J.** and Reeder, R. J. (1994) Differential incorporation of trace elements during growth of grossular and apatite: intrasectoral zoning vs. dissymmetrization. National Synchrotron Light Source 1994 Activity Report. B-185.
- 5) **Rakovan, J.** and Reeder, R. J. (1994) Single Crystal Neutron Diffraction Study of Apatite Exhibiting Growth Related Sectoral and Intrasectoral Dissymmetrization. LANSCE Progress Report, 165-166
- 4) **Rakovan, J.**, and Leinenweber, K. (1993) Dehydroxylation of Mg-rich chlorite at 2.5 and 4.1 Gpa. National Synchrotron Light Source Annual Report, p.B-131.
- 3) **Rakovan, J.**, Northrup, P., and Reeder, R. J. (1993) Surface structural controls on trace element incorporation during growth of minerals. National Synchrotron Light Source Activity Report, p.B-225.
- 2) Lanzirotti, A., Hanson G.N., Northrup, P., Reeder, R.J. and **Rakovan, J.** (1993) Monazite breakdown in chlorite schists National Synchrotron Light Source Activity Report.
- 1) Parise, J.B., Leinenweber, K. Weidner, D.J., **Rakovan, J.** Vaughan, M., Gwanmesia, G., and Liebermann, R.C. (1991) Preliminary studies of the potential for structure refinement at high pressures using the DIA apparatus: SiO₂, stishovite, at high pressure. National Synchrotron Light Source Annual Report, p221.

Educational Column in Rocks and Minerals

As part of my goal to help increase the scientific literacy of the general public, targeting specifically the focused audience of the mineral enthusiast community, I have contributed a regular educational column to *Rocks & Minerals* magazine called "A Word to The Wise" since 1/1/03.

- 1) Pegmatite (2003) V.78 #3, p. 201
- 2) Skarn (2003) V.78 #4, p. 271
- 3) Manto (2003) V.78 #5, p. 351
- 4) Hypogene and Supergene (2003) V.78 #6, p. 419
- 5) Hydrothermal (2004) V.79 #1, p. 64-65
- 6) Placer (2004) V.79 #2, p. 133-134
- 7) EDS (2004) V.79 #3, p. 194-195
- 8) Zeolite (2004) V.79 #4, p. 171-173
- 9) XRD (2004) V.79 #5, p. 351-353
- 10) Growth Hillock (2004) V.79 #6, 415-417
- 11) Metasomatism (2005) V.80 #1, p. 63-64
- 12) Amygdale (2005) V.80 #3, p. 287
- 13) Pillow Basalt (2005) V.80 #4, p. 202-203
- 14) Gangue (2005) V.80 #5, p. 365-366
- 15) Solid Solution (2005) V.80 #6, p. 449-450
- 16) Mississippi Valley Type Deposit: MVT (2006) V.81 #1, p. 69-71
- 17) Diatreme (2006) V.81 #2, p. 153-154
- 18) A-Mica (2006) V.81 #3, p. 235
- 19) Epitaxy (2006) V.81 #4, p. 317-320
- 20) Desert Varnish (2006) V.81 #5, p. 393-394
- 21) Phase Transition (2006) V.81 #6, p.467-469
- 22) Greisen (2007) V.82 #2, p.157-159.
- 23) Nelsonite and Kiruna-type deposit (2007) V.82 #3, p.249-251
- 24) Hemimorphism (2007) V.82 #4, p.329-333
- 25) 4000+ (Mineral nomenclature) (2007) V.82 #5, p.423-424
- 26) Environmental Mineralogy (2008) V.83 #2, p.172-175
- 27) Kimberlite (2008) V.83 #3, p.267-268.

- 28) NYF pegmatite (2008) V.83 #4, p.351-353
- 29) Greenstone (2008) V.83 #6, p.553-554
- 30) Sectoral Zoning (2009) V.84 #2 p. 171-176.

Other Publications

- 12) **Rakovan, J.** (2008) Parting Shots – Unusual apatite composites from the Sapó Pegmatite, Minas Gerais Brazil. *ELEMENTS*. V.3 p. 1445.
- 11) **Rakovan, J.** (2007) Presentation of the Distinguished Public Service Medal of the Mineralogical Society of America for 2007 to Marie Huizing. *American Mineralogist*. 92:983.
- 10) Dong, H., Heaney, P., and **Rakovan, J.** (2007) Who's Who in Mineral Names: Donald R. Peacor. *Rocks & Minerals*. V. 82, p. 516-518.
- 9) **Rakovan, J.** (2006) Parting Shots – The Tucson Show. *ELEMENTS*. V.2 p. 255.
- 8) McDonald, J.* (2006) Iridescent Fluorites from Ohio's Findlay Arch District. *FLUORITE The Collectors Choice*, p66-68. (Invited paper for undergraduate student advisee. Only student name allowed as author but research and paper were collaborative efforts).
- 7) **Rakovan, J.** (2006) News from Japan Part 4. *Rocks & Minerals*. V.81, p. 188-198
- 6) **Rakovan, J.** (2005) News from Japan Part 3. *Rocks & Minerals*. V.80, p. 440-445
- 5) **Rakovan, J.** (2005) News from Japan Part 2. *Rocks & Minerals*. V.80, p. 350-355
- 4) **Rakovan, J.** (2005) News from Japan Part 1. *Rocks & Minerals*. V.80, p. 270-273
- 3) **Rakovan, J.** (2005) Li-phosphate minerals and storage batteries. *Mineral Matters Column in ELEMENTS*. V.1, #2. p. 125.
- 2) Hughes, J.M. and **Rakovan, J.** (2001) Monazite. *McGraw-Hill Encyclopedia of Science and Technology*, 9th Edition.
- 1) Jaszczak, J.A., and **Rakovan, J.** (2002) Growth Spirals on Graphite Crystals from the Trotter Mine Dump, Franklin, New Jersey. *The Picking Table*, 43, 11-13.

Reviewed Reports

- 2) **Rakovan, J.**, Newville M. and Sutton, S. (2001) Evaluation of europium oxidation state and anomalous partitioning behavior in intrasectorally zoned apatite using wavelength dispersive micro-XANES. *Advanced Photon Source 2000 Activity Report*.
- 1) **Rakovan, J.**, Bosze*, S., and Lanzirrotti, A. (2001) Evaluating Heterogeneous Reactivity at the Mineral-Water Interface from Sectoral Zoning of REEs, Sr and Y in Fluorite. *Research Highlights, National Synchrotron Light Source 2000 Activity Report*, 2-53 – 2-56.

Published Data Images

- Thin section Dress. Thin section image used by clothing designer Jeremy Laing as a print for several dresses and a blouse (Winter 2007 collection). Image and picture of dress published in *Rocks & Minerals* V.82 #4, p. 273.
- CL and DIC photomicrographs of intrasectorally zoned apatite: in the "Handbook of Microscopy" (section on Cathodoluminescence Microscopy). Amelinckx et al. Editors. VCH, Berlin.
- AFM image of goethite cleavage surface: Cover of "Mineral-Water Interfacial Reactions, Kinetics and Mechanisms" (D. Sparks and T. Grundl Eds.). *American Chemical Society Symposium Series* 715
- AFM image of a growth spiral on the of graphite: In "Mineralogy: A Geologist's Point of View" by Malcolm Hibbard. McGraw-Hill Higher Education; ISBN: 0072345721
- CL, DIC, fluorescence and plain light images of apatites from Llallagua, Bolivia. In *Geonieuws* V. 29(8), 2004.

Grants:

External:

Total: \$2,402,220.00

Total External: \$2,059,215.00

Total Since Tenure (9/2003)

External:

\$1,619,400.00

Internal:

\$1,441,100.00

\$178,300.00

- NSF EAR/IF MRI-0722807 additional funding. : "MRI: Acquisition of a High Resolution Analytical Transmission Electron Microscope for the Miami University Electron Microscope Facility" (with H. Dong(PI), R. Edelmann, S. Zou, and G. Pacey (PI),) Received 4/2009. \$22,368.00

For brevity synchrotron general user proposal grants listed 1-19 are in a different format than those below them.

1	NSLS X7B	10/25/08-10/29/08	4	\$6720
2	APS 11-ID-C	11/7/07-11/11/07	4	\$19200
3	NSLS X19A	11/13/07-11/16/07	4	\$6720
4	APS 13-IDC	11/25/07-11/27/07	2	\$9600
5	NSLS X11A	3/26/08-3/30/08	4	\$6720

6	APS 11-ID-B	2/15/08-2/19/08	4	\$19200
7	APS 5-BM-D	3/3/08-3/8/08	3	\$14400
8	NLS X6A	2/27/08-3/2/08	5	\$8400
9	APS 15-ID	3/29/08-4/1/08	2.5	\$12000
10	NLS X6B	6/22/08-6/24/08	3	\$5040
11	NLS X10C	6/18/08-6/22/08	5	\$8400
12	APS 12-BMB	7/15/08-7/20/08	5	\$24000
13	APS 15-ID	7/30/08-8/1/08	2.25	\$10800
14	NLS X10C	11/6/08-11/10/08	4	\$6720
15	NLS X6B	11/4/08-11/8/08	4	\$6720
16	APS 5-BMD	12/1/08-12/5/08	3	\$14400
17	APS 12-BM	10/15/08-10/20/08	5	\$24000
18	NLS X27A	12/5/08-12/7/08	3	\$5040
19	NLS X27A	Spring 2009	4	\$6720

- Apex Companies “further evaluation of Phosphate Induced Metal Stabilization on Former Refined Metals Site, Jacksonville, Florida”. \$124,410 (starting date 11/21/08; index).
- Apex Companies “Arsenic Source, Speciation and Treatment Study, Former Refined Metals Site Jacksonville, Florida”. \$41,795 (starting date 7/1/08; index G01518).
- NSF EAR/IF MRI-0722807 : “MRI: Acquisition of a High Resolution Analytical Transmission Electron Microscope for the Miami University Electron Microscope Facility” (with H. Dong(PI), R. Edelmann, S. Zou, and G. Pacey (PI),) \$593,687 (notification 6/8/07, starting date 8/1/07).
- Ohio Board of Regents Action Fund “MRI: Acquisition of a High Resolution Analytical Transmission Electron Microscope for the Miami University Electron Microscope Facility” (with H. Dong(PI), R. Edelmann, S. Zou, and G. Pacey (PI),) NSF matching: \$125,000 (notification 6/8/07, starting date 8/1/07).
- National Synchrotron Light Source General user proposal. Micro-EXAFS of U and Th Doped Apatite. PASS # 6045 4 days requested 1/31/2007 (6 days granted on 4/15/07, used 6/19-6/25/07). Value 10,080.
- National Synchrotron Light Source General user proposal. EXAFS analysis of doped apatites. Pass # 9372. 4 days requested 1/31/2007 (4 days granted on X10C, used 6/14-6/25/08). Value \$6720.
- National Synchrotron Light Source General user proposal. Micro-EXAFS of U and Th Doped Apatite. PASS # 6045 4 days requested 9/30/2006 (6 days granted 12/11/06, used 2/13-2/19/2007). Value \$10,080.
- National Synchrotron Light Source General user proposal. Micro-EXAFS of U and Th Doped Apatite. PASS # 6045 4 days requested. 5/31/2006 (4 days granted on 6/15/06, used X27A 9/1-9/4/06). Value \$6720.
- National Synchrotron Light Source General user proposal. Micro-EXAFS of U and Th Doped Apatite. PASS # 6045 4 days requested. 1/30/2006 (3 days granted on 3/24/06, used X27A 6/18-6/24/06). Value \$5040.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested 9/30/2006 (4 days granted on X7B, used 2/16-2/20/07). Value \$6720.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested 5/31/2006 (4 days granted on X7B, used 9/8-9/13/06). Value \$6720.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested 1/30/2006 (3 days granted on X7B 3/24/06, used 6/15-6/20/06). Value \$5040.
- GSECARS Advanced Photon Source General user proposal (GUP-5839). Micro-EXAFS of U and Th in Apatite. 2-year program requested. 2 days requested 11/5/2006 (2 days granted Sector 13-BM , used 4/4 -4/6/07). Value \$9600.
- GSECARS Advanced Photon Source General user proposal (GUP-5839). Micro-EXAFS of U and Th in Apatite. 2-year program requested. 3 days requested 3/10/2006 (3 days granted Sector 13-BM, used Aug. 11-13). Value \$14,400.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested. 1/2005 (3 days granted 9/2005). Value \$5040.
- GSECARS Advanced Photon Source General user proposal. Micro-EXAFS of U and Th Doped Apatite. 3-days requested. 3/23/2005 (3 days granted in Oct 2005). Value \$14,400.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested. 5/2005 (3 days granted 10/2005). Value \$5040
- National Synchrotron Light Source General user proposal . Micro-EXAFS of U and Th Doped Apatite. PASS # 6045 4 days requested. 9/30/2005 (5 days granted for March 2006). Value \$8400.
- National Synchrotron Light Source General user proposal. In-situ, Time-Resolved Studies of Apatite Formation Pathways. Pass # 3955. 4 days requested. 9/2005 (3 days granted 4/2006). Value \$5040.
- NSF EAR-0409435: (with John Hughes). Crystal chemistry of U, Th and other Radionuclides in Apatite: Environmental and Geochemical Implications. \$200,000.00 (5/11/04).

- NSF EAR-0320872: “Acquisition of a Scanning Electron Microscope for Nanotechnology Investigations” (with G. Pacey (PI), H. Dong and R. Edlmann) \$191,388.00 (6/24/03).
- Ohio Board of Regents: “Acquisition of a Scanning Electron Microscope for Nanotechnology Investigations.” Matching funds against an NSF-IF proposal (pending). (with G. Pacey (PI), H. Dong and R. Edlmann). \$51,898 (01/03).
- National Synchrotron Light Source General user proposal “Crystal Chemistry of U and Th in apatite”. 15 days of experimental time granted to proposal #4782. (5/2002). Value: \$25,200.
- GSECARS Advanced Photon Source Beamtime Grant #G000216 “Distribution, composition and oxidation state of Fe and Ni impurities in a synthetic diamond crystal.” One day experimental time granted 6/2001. \$4800.
- NSF REU supplement to Grant EAR-0001215. \$5000. (6/2001).
- NSF-IF: Hughes, J.M., Rakovan, J., and Dong, H. “Acquisition of a CCD-detector Single Crystal X-ray Diffractometer.” \$140,288. (5/1/2000).
- Ohio Board of Regents: Rakovan, J., Dong, H., and Hughes, J.M. “Acquisition of a CCD-detector Single Crystal X-ray Diffractometer.” Matching funds against an NSF-IF proposal. \$70,144. (3/22/2000).
- National Synchrotron Light Source General user Grant #4405 “Determination of the site occupancy of Zn in the apatite structure”. 3 days of experimental time granted 11/2000. Value: \$5040.
- NSF: Grant EAR -0001215 “The palygorskite-sepiolite to smectite transformation and the influence on reactive surface sites”. \$154,941, Miami component \$26,954. (6/2000).
- GSECARS Advanced Photon Source Beamtime Grant #G000052 “XAS analysis of differential $\text{Eu}^{2+}/\text{Eu}^{3+}$ incorporation in apatite: the role of crystal surface structure during growth”. 3 days of experimental time granted 7/1999. Value: \$ 14,200
- GSECARS Advanced Photon Source Beamtime Proposal #G000067 “Differential incorporation of REE into multiple fluorite sectors: Surface structural controls on heterogeneous reactivity at the mineral water interface”. 2 days of experimental time granted 7/1999. Value: \$9600.
- NSF REU supplement to Grant EAR-9814691 for field work in Bingham, NM. \$9225. (4/1999),.
- NSF Grant EAR-9814691 "Probing the Structure and Energetics of Reactive Sites at the Mineral-Water Interface: Implications for Element Partitioning and Geochronology". \$61,546.00. (12/1998).
- National Synchrotron Light Source General user Grant #3538 “Determination of trace element heterogeneities in fluorite: Incorporation mechanism and potential geochronologic tool”. 15 days of experimental time granted 12/1998. Value: \$25,200.

Internal:

Total Internal: \$ 342,985.00

- Miami University “MRI: Acquisition of a High Resolution Analytical Transmission Electron Microscope for the Miami University Electron Microscope Facility” (with H. Dong(PI), R. Edlmann, S. Zou, and G. Pacey (PI),) NSF matching: \$125,000. (notification 6/8/07, starting date 8/1/07)
- Formation of joint degree programs with AGH, Poland and CUGS, China. \$10,000.00. (3/15/06)
- CAS Small Teaching Grant: “Teaching Materials for Mineralogy (GLG 201)”. \$700 (10/2005)
- CAS Small Teaching Grant: “Teaching Materials for Mineralogy (GLG 201)”. \$700 (10/2004)
- CAS Small Research Grant: “Acquisition of Analog Controller for new SEM”. \$700 (12/2004)
- CAS Small Teaching Grant: “Teaching Materials for Mineralogy (GLG 201)”. \$700 (12/2004) split among Rakovan, Hughes, and Hart proposals (we gave it all to Bill).
- Shoupp Award: Design of novel apatite lasers by engineered site distribution of REE activators. \$5000.00 (5/7/04).
- Hampton Fund: “Collaborative Research in Japan: Crystal Chemistry of Radionuclide Doped Apatites”. \$3500.00. (3/10/04).
- The 10x Postdoctoral Fellow Program. \$32,000.00 (2/11/04).
- CRF Faculty Research Grant “The Behavior and Fate of Aqueous Radionuclides During Calcium Phosphate Precipitation and Evolution in the Environment.” \$22,507 (11/02)
- President’s Academic Enrichment Award: “Enhancing the Role of Miami University in the Nanotechnology Revolution.” G.E. Pacey PI, J. Rakovan et al. coPIs. \$137,000.00. (2002).
- CAS Small Research Grant: “Workshop on Extended X-ray Absorption Fine Structure (EXAFS) Spectroscopy.” \$500 (10/23/02).
- CAS Small Teaching Grant: Teaching EXAFS in mineralogy and geochemistry. \$400 (10/23/02).
- CAS Small Instructional Grant: “Acquisition of WinXAS, a program for X-ray absorption spectroscopy data analysis”. \$250 (11/2001).
- CAS Small Research Grant: “Zeolite and Scarn Mineralogy”. \$500 (11/2001).
- CELT small grant to improve teaching: “Polariscope for a new course: The Geology of Gemstones”. \$285 (10/2000).
- CAS Small Instructional Grant: “Refractometer for a new course: The Geology of Gemstones”. \$500 (10/2000).
- CAS Small Research Grant: “Acquisition of a short wave ultraviolet illumination system for studies of mineral

luminescence”. \$470 (10/2000).

- CELT small grant to improve teaching: “New Computers for the Geology Computer Laboratory”. \$300 (10/1999).
- CAS Small Instructional Grant: “New Computers for the Geology Computer Laboratory”. \$500 (Fall 1999).
- CAS Small Research Grant: “Uranium: Minerals, Chemistry, and the Environment””. \$500 (Fall 1999).
- CAS Small Instructional Grant: “Teaching computational methods in geochemistry (GLG430/530)” \$500 (Fall 1998).
- CAS Small Research Grant: “Computational methods in geochemical research” \$500 (Fall 1998).

Teaching and Advising

Graduate student Committees:

Thesis/Dissertation Advisor to:

- 1) Stephanie Bosze (M.S. 2001) Thesis: Surface structurally controlled sectoral zoning in fluorite: Implications to understanding heterogeneous reactivity at the mineral-water interface. Two submitted papers. One Goldschmidt poster, 2000 GSA talk. Awards: Society for Luminescence Microscopy and Spectroscopy (SLMS) Research Grant \$400.
- 2) Steve Adams (M.A. 1999)
- 3) Art Losey (M.S. 2001) Thesis: Structural variation in the phosphate olivine lithiophilite-triophyllite series and characterization of light element (Li, Be, and B) mineral standards. Awards: MSA Grant to Attend workshop on U mineralogy and geochemistry \$300
- 4) Carrie Wright (M.S. 2003) Thesis: Spectroscopic characterization of fluorite: Relationships between trace element zoning, defects and color. Two papers and Goldschmidt abstract. Awards: American Federation of Mineral Societies (AFMS) Research Award \$4000
- 5) Frederick Partey (M.S. 2004) Thesis: Source of fluorine and petrogenesis of the Rio Grande Rift type barite-fluorite-galena deposits. Awards: Awarded GSA Research Grant. 4/03. \$1600, Awarded Society of Economic Geologists (SEG) Research Grant. 6/03. \$1000, Awarded Sigma Xi Research Grant. 1/04. \$350.
- 6) Ziming Yue (M.S. not completed) Thesis: Heterogeneous Mn-oxide formation and the sequestration of trace metals
- 7) Yun Liu (Ph.D. in progress) Dissertation: Crystal Chemistry of U, Th and other radionuclides in apatite. Awards: Geology Department Doctoral Award for excellence in research and academic achievement.
- 8) Olaf Borkiewicz (Ph.D. in progress) The role of precursor formation on apatite growth at low temperatures. Awards: Recipient of the 2008 Mineralogical Society of America Mineralogy/ Petrology Research Fund. \$5000; The International Centre for Diffraction Data (ICDD) 2009 Ludo Frevel Crystallography Scholarship Award. \$2500; 2008 Geological Society of America Student Research grant. \$3400. 2009 AAPG Jay M. McMurray Memorial Grant: \$2250
- 9) Gregory Schmidt (M.S. in progress) Metal-metal bonding in ionic minerals and the structure of decavanadate minerals. Awards: International Association for Mathematical Geology (IAMG) Student Grant, 2009. \$1000
- 10) Tomasz Marchlewski (Ph.D. in progress) Dissertation: Coprecipitation of Pb and As in apatite and applications to environmental remediation.
- 11) Cynthia Tselepis (M.S.) Co-advisor with Mark Krekeler. Heterogeneous oxidation of Mn(II) at the goethite-water interface.

Thesis/Dissertation Committee Member:

Geology

- 1) Mike Bishop (M.S.)
- 2) Junjie Yang (M.S.)
- 3) Genxing Zhou (Ph.D.) Geology
- 4) Jackie Smith (M.S.) Geology
- 5) Deb Jaisi (Ph.D.) Geology
- 6) Shizuko Watanabe (Ph.D.) Geology
- 7) Alicja Wypych (Ph.D.) Geology
- 8) Darin Snyder (Ph.D.) Geology
- 9) Jeffrey Foley (Ph.D.) Geology
- 10) Sun Kerang (Ph.D.) Geology
- 11) Ann Olson (Ph.D.) Geology
- 12) Allison Croley (M.S.) Geology

Chemistry

- 1) Daka Philius (Ph.D.)
- 2) Heather Gulley-Stahl (Ph.D.)
- 3) Jennifer Anderson (M.S. and Ph.D.)
- 4) Luis Lavalle (Ph.D.)

- 5) Zhiqing Yan (Ph.D.)
- 6) Brian Patterson (Ph.D.)
- 7) Gopal Periyannan (Ph.D.)
- 8) Jian Xie (Ph.D.)
- 9) Lue Tisinger (Ph.D.)
- 10) Scott Holmstrom (Ph.D.)
- 11) Jeff Brandt (Ph.D.)

Other Departments

- 1) Jennifer Seabaugh (Ph.D.) Microbiology
- 2) Mirabai McCarthy (Ph.D.) Botany
- 3) Mathias E Lindstrom (M.S.) Paper Science

Courses and Seminars Taken, Programs, Workshops & Other Activities Attended:

- Mineralogical Society of America Short Course on uranium mineralogy and geochemistry
- Geochemical Society and Mineralogical Society of America Short Course: Molecular Modeling Theory and Applications in the Geosciences
- Introduction to X-ray Absorption Spectroscopy. 3-day workshop at the National Synchrotron Light Source, Brookhaven National Laboratory.
- Advanced X-ray Absorption Spectroscopy. 3-day workshop at the National Synchrotron Light Source, Brookhaven National Laboratory. 9/2005

Courses Developed and Taught:

- GLG 111: Introductory Geology (S 98, F 98, F 00, F 01, F 04)
- GLG 131: Geology and Gemstones (S 03)
- GLG 201: Mineralogy (F 04, 05, 06, 07, 08, 09)
- GLG 211: Geochemical Systems of the Earth (F 99, F 00, F 01, F 02, F03)
- GLG 280: Gems and Gem Formation (F 06, S 06, F 07, F08)
- GLG 430/530 and 630: Mineral-Water Interface Geochemistry (S 99, S 00, S 03, S 09)
- GLG 432/532: Clays and Clay Mineralogy (S 01) (Revised): Clay Mineralogy & Powder X-ray Diffraction(S 07)
- GLG 499/599: Geology and Mineral Deposits of the Rio Grande Rift. Field workshop (Su 99, S 03)
- GLG 699: Scanning Probe Microscopy. Summer workshop (Su 98, Su 00, Su 03, Su 08)
- GLG 720: Advanced Mineralogy Seminar: Spectroscopic Methods (S 06)
- GLG 499/599: Geology of Big Bend National Park and the Trans Pecos. Field workshop (S 04)
- GLG 632: X-ray methods in crystal structure analysis (S 2008)

Selected Student Comments from Teacher/Course Evaluation

GLG 201 2008: "John is a great and very enthusiastic instructor. Tests can be a little on the intense side as well as home works. He is very engaging and keeps it interesting. I truly enjoyed our fieldtrip to Sterling Hill, NJ. It was a great opportunity to get some hand on experience. I took a lot from the trip and look forward to future ones"

GLG 201 2008: "Cares whether or not students are learning the subject and is always willing to go out of his way if anyone needs any further help. The fieldtrip was great! Great opportunity for hand on experience."

GLG 280 2008: "John Rakovan is THE best teacher I've had – ever! His enthusiasm for the subject matter is contagious, and his ability to break down complex topics into palatable material only makes his class that much better. He reaches students on their level while simultaneously pulling them to a higher one."

GLG 280 2007: "Overall I feel that John is a wonderful teacher who challenges his students. I have been challenged more in this class compared to any other course this semester. Ironically enough, I have learned the most in this class due to its level of difficulty."

GLG 280 2007: "This has been one of my favorite classes all semester. I look forward to it every Tuesday and Thursday. Professor Rakovan is a great instructor and really made the course comprehensible. The testing style is great. It really tests your ability to apply what you have learned instead of just finding out what you have learned."

GLG 201 2007: "He is probably the best professor that I have had so far at Miami! He is very approachable and you never have to hesitate to ask him a question. He does a great job at explaining information in a clear and understandable manner. He challenges you to really learn the concepts and that is what I have loved about his class."

GLG 201 2007: “Excellent lecture style. Really communicates well with students and is very approachable. Makes class both fun and interesting. I really like how the powerpoint is not used other than for showing complex structures or clarifying a point. One of my favorite classes☺”

GLG 201 2007: “John is a great teacher. Very energetic and gets me excited for class. Sometimes I feel he sometimes explains things as if we should already know them, but it doesn’t really take away from my learning. Overall – great teacher, great class...(hard exams)”

GLG 201 2006: “Dr. Rakovan is an exceptional teacher. He has an encyclopedic knowledge of his subject & is able to clearly convey what he knows in an understandable fashion. He also made class interesting & went out of his way for students.”

GLG 280 Fall 2006: “I liked how open the class was in terms of asking questions. A great atmosphere for learning.”

GLG 280 Fall 2006: “Everything. The professor's love for this course and topic cleared shown and I learned more in this class than I did for any other this semester.”

Field Trips Conducted

- 1) 9/09 Sweet water and Pea Ridge mines Viburnum Trend and St. Francois igneous complex, MO for GLG 201.
- 2) 9/08 Sterling Hill Mine, NJ for GLG 201 and 280.
- 3) 10/07 Buick Mine, Viburnum Trend, and St. Francois igneous complex, MO for GLG 201 and 280.
- 4) 11/06 Smithsonian Institution for GLG 280.
- 5) 4/06 Cleveland Museum of Natural History for GLG 280.
- 6) 10/05 Brushy Creek Mine, Viburnum Trend, MO for GLG 201.
- 7) 10/04 Sterling Hill Mine, NJ for GLG 201.
- 8) 3/2004 Big Bend, TX Geology Department Spring Break Trip
- 9) 3/2003 Grande Rift, New Mexico, Geology Department Spring Break
- 10) 1999 Rio Grande Rift, New Mexico Workshop
- 11) 1998 Smithsonian Institution MUGS trip

Undergraduate Research Advised (GLG 177,277, 377 and 477)

- Fall 2007 - Spring 2008: (3 hrs GLG 177) Nina Marie Gasbarro: The effects of compressional and shear stresses on the surface atomic structure of gold crystals: applications to materials behavior and placer deposits. This work has resulted in Nina being awarded experimental spallation neutron time at Oakridge and Los Alamos National Laboratories in 2008. This work was presented at the 2007 and 2008 Miami Undergraduate Research Conference and at the Spring 2009 American Geophysical union meeting. It also resulted in the publication: *Rakovan, J., Gasbarro*, N., Nakotte, H., Kothapalli, K. and Vogel, S. C. (2009) Characterization of Gold Crystallinity by Diffraction Methods. Rocks & Minerals, 84:54-61.*
Funding Source: Undergraduate Research Fund in Mineralogy. Cincinnati Mineral Society.
- Spring 2008 (1 hrs GLG 477) Kati Feldman: Advanced studies in Gemology: GIA colored stones and diamonds courses.
- Fall 2004: Jason McDonald: Origin of iridescence on fluorites from the Findley Arch, Ohio, and As-Pb contamination of sediments from Jacksonville, FL. Laboratory based study utilizing several advanced analytical techniques including X-ray photoelectron spectroscopy at Ohio State University. This work resulted in an invited publication in ExtraLapis special issue on fluorite.
McDonald, J. (2006) Iridescent Fluorites from Ohio’s Findlay Arch District. FLUORITE. Lithographie, LLC Natural History Publications. East Hamton, CT. p66-68.*
- Spring 2004: Mariana Huerta: Optical and structural study of dissymmetrised apatites from Llallagua, Bolivia. Research presented at the Rochester Mineralogical Symposium. Abstract published in *Rocks & Minerals*. Given the Mandarin Award for best student talk at the meeting (\$100).
Huerta, M. and Rakovan, J. (2007) Growth induced dissymmetrization of fluorapatite from Llallagua, Bolivia: The relationship between compositional and optical zoning. 2004 Rochester Mineralogical Symposium Program and Abstracts and Rocks & Minerals, 82,143.*
- Fall 2003: Mariana Huerta: Optical and structural study of dissymmetrised apatites from Llallagua, Bolivia.
- Spring 2003: Mariana Huerta: Optical and structural study of dissymmetrised apatites from Llallagua, Bolivia. Awarded Miami CAS Deans Scholar grant for this work (\$1500).
- Spring 2003: George-Paul Richmann: Single crystal X-ray diffraction study of the ganophyllite group minerals.
- Fall 2002: Amanda Klingensmith: Structural response of fluorite to trivalent REE substituents.
This work has lead to a poster presentation “Lanthanide Doped Fluorite crystal Structures: Placement of Fluorine in REE/Ca Substituted Fluorite” at the Miami Undergraduate Summer Scholars Research Symposium. Coadvised with John Hughes.
- Fall 2002: Amanda Klingensmith: Structural response of fluorite to trivalent REE substituents. Summer Scholars

- Award (\$2500) Coadvised with John Hughes.
- Spring 2002: Adam Wolf: Crystal chemistry and structure of axinite, Limecrest Quarry, NJ. GLG 477, 3hrs.
This study has lead to a peer reviewed publication of which Adam is first author.
Wolf, A., Rakovan, J. and Cahill, C. (2003) Ferroaxinite From Lime Crest Quarry, Sparta, New Jersey. Rocks and Minerals. 78, 252-256*
 - Fall 2001: Adam Wolf: Crystal chemistry and structure of axinite, Limecrest Quarry, NJ. GLG 477, 3hrs.
 - Spring 2001: Eric Hammerly: AFM of clay minerals. 477, 3hrs.
AFM study of the palygorskite-sepiolite to smectite transformation.
This work has lead to the submission of an abstract to and presentation at the 2001 Goldschmidt Conference and a paper in a leading journal in the field of mineralogy.
Krekeler, K., Hammerly, E., Rakovan, J. and Guggenheim, S. (2005) Microscopy Studies of the Palygorskite to Smectite Transformation. Clay and Clay Minerals, 53, 92-99.
 - Fall 2000: Eric Hammerly: AFM of clay minerals. 477, 3hrs.
 - Fall 2000: Matt Spansky: Trace element chemistry of fluorites from the Hansonburg Mining district, Bingham, NM. 377, 3 hrs. This work lead to an abstract and talk at the 2000 Butler University Undergraduate Research Conference.
 - Fall 2000: Rebecca Witherow: Trace element chemistry of fluorites from the Hansonburg Mining district, Bingham, NM. 377, 3 hrs. This work lead to an abstract and talk at the 2000 Butler University Undergraduate Research Conference
 - Spring 2000 : Matt Spansky: Trace element chemistry of fluorites from the Hansonburg Mining district, Bingham, NM. 377, 3 hrs.
 - Fall 1999: Kasey McCall: AFM study of the surface microtopography and growth mechanisms of graphite. 377, 3hrs. This work led to the Mineralogical Society Undergraduate Research Award, a poster presentation at the 1999 annual Geological Society of America meeting, and an abstract and talk at the 2000 Butler University Undergraduate Research Conference.
 - Fall 1999: Kasey McCall: AFM study of the surface microtopography and growth mechanisms of graphite. 377, 3hrs.
 - Fall 1998: Seth Horstmeyer: Development of dissolution rate experiments and AFM study of calcite surface microtopography.

Advised NSF funded Research Experience for Undergraduates (REU)

- Spring 2001: Eric Hammerly: AFM study of the palygorskite-sepiolite to smectite transformation.
- Summer 1999 Rebecca Witherow: Use of the trace element chemistry of fluorites from the Hansonburg Mining district in the study of its hydrothermal genesis.
- Summer 1999: Matt Spansky: Use of the trace element chemistry of fluorites from the Hansonburg Mining district in the study of its hydrothermal genesis.

Awards and Honors:

- 1999. Cincinnati Mineral Society educator of the year award. \$1000 stipend was used to establish an Undergraduate Research in Mineralogy fund.

Service Activities

Outreach and Community Education

Increasing scientific literacy through outreach to the mineral enthusiast community and the general public has been a very important part of my teaching activities. To this end I have been very active in outreach through the Mineralogical Society of America; in giving presentations (3-5 a year) to mineral clubs and sponsored Mineralogical symposia (i.e. Rochester, New Mexico, Tucson); and development of a Miami University sponsored mineral education center for the annual Cincinnati Mineral Society show. I also strive to bring modern mineralogical research and ideas to the collecting community through publications. This effort includes contributing articles on topics such as crystal growth, luminescence, environmental mineralogy, etc. to journals such as the *Mineralogical Record* and *Rocks & Minerals*. I also have made other major contributions to *Rocks & Minerals*.

Rocks & Minerals (Educational Journal)

- Executive Editor of *Rocks and Minerals* (5/01 – present)
- Regular columnist of: *Word to the Wise* (1/1/03 – present)
- While in Japan, 2005, wrote a series of four articles on Mineralogy in Japan for *Rocks & Minerals*. These are the first and only extensive articles on minerals and mineralogy of Japan in modern (20th and 21st century) popular western literature.
- Coordinated and help produce and market special reprint issue with my series of 5 articles on Japan including “sakura ishi”.

- Nominated Marie Huizing for and organized the presentation of the Mineralogical Society of America distinguished public service medal.
- Conceived of and initiated the Supplemental Materials webpage for *Rocks & Minerals*.
- Brokered and organized the scanning of *Rocks & Minerals* by Robert Downs and the RRUFF project.
- Regular contributor of articles, news stories, letters to the editor, etc.

Department and University

- Chief Departmental Advisor for the Geology Department 8/09-8/2010
- Organized 2006 Baldwin Frontiers in Geology Lecture and Hosted Speaker, Dr. Robert Hazen
- Compiled data and wrote summery letter on Geology Department Interdisciplinary/Interdepartmental activities for the Dean and provost 12/2008.
- Helped facilitate the Parr Mineral Collection donation to the Limper Museum.
- Organized and convened the Limper Museum and Friends of Mineralogy sponsored Fall Field Symposium “Microdiamonds and Meteorite Impacts” 9/2009
- Geology Department Promotion and Tenure Committee 9/2004-present.
- Miami University Radiation Safety Committee (2004-present; chair 8/1/08 – present)
- Geology Department International programs liaison 2005-2008
Made three trips to Krakow during which we formalized a joint degree mechanism.
- Co-led Geology Department/MUGS fieldtrip to Bloomington IN area with Mike Brudzinski, 4/2008.
- Hosted Miami Valley Mineral and Gem Club visit to Limper Museum and Miami University September 9, 2007.
Gave a talk on sakura ishi and designed and built two Special exhibits in the Limper Museum
1) Minerals of Tanakamiyama, Japan from the Harvard Mineral Museum Collection.
2) Sakura Ishi from Kameoka, Japan
- Prepared poster on *o-hanami* for Miami University’s Library *Ohanashi* program (Nov. 18, 2006):
<http://staff.lib.muohio.edu/ohanashi/index.html>
- Organized 2006 Baldwin Frontiers in Geology Lecture and Hosted Speaker, Dr. Jeffrey Post.
- Miami University Committee on Faculty Research. 8/04-8/07. Chair ANS subcommittee 2006-07.
- Miami University Natural and Applied Science Area Subcommittee of Graduate Council. 8/04-8/06.
- Geology Department Committee for TA allocations. 4/2004-4/2006.
- Miami Representative to the Central States Universities Inc. (10/03-2006)
- Moderator for the Miami University Undergraduate Research Conference (2002, 2004, 2007).
- Coordinator of the Miami University education center at the Cincinnati Mineral Society show (2000-2004).
- Geology Department Library Liaison (5/99-present)
- Geology Department Committee for Benchmarking, Chair (2000-2007)
- Geology Department Committee for Peer Evaluation of Teaching (2000-2007)
- Geology Department advisor to honors students and coordinator of special programs for honors students 9/99-present.
- Miami University Summer Reading Program Discussion Leader (1998-2003)
- Geology Department Curriculum Committee, 5/99-present
- Undergraduate student adviser (1998-2004)
- Museum Manager Search Committee (Fall 2005)
- Coorganized and cohosted the Miami University Nanotechnology Symposium (11/13-14/03)
- Miami Instrumentation Laboratory Advisory Committee member (2000-2004)
- Upgraded Geology Department’s Powder Diffraction System 2004-2005
- Organized and ran Minorities in Math and Science Education field trip (1998, 1999, 2000, 2001). Featured on Ch. 5 News 6/27/2000.
- Held Scanning Probe Microscopy Laboratory open house for Alumni Weekend (6/17/2000).
- Miami University Geology Society (MUGS) faculty representative, 5/99-2003.
- Developed and wrote a proposal for PhD enhancement “Mineral-Microbe Interactions in Environmental Geochemistry”
- Developed a presentation on the Department’s graduate program for recruiting talks. Fall 2000
- 1999 Faculty search committee for Sed/Strat position in Department of Geology
- 1999 Helped to organize the Geology Seminar Series. Organized visits by Dr. John Jaszczak, Dr. Steve Guggenheim, Dr. Don Weidener, and Laurie Benton.
- Guided a 4 day Geology department field trip to Washington, DC and the Smithsonian. 5/10/99.
- Graduate Recruitment: Helped develop and produce Geology department recruitment poster
- Gave Nov. 20, 1999 Geology Limper Lecture “Amethyst scepters from Hopkinton, RI.

Community

- National Science Foundation panel member in lead of the Advanced Photon Source Facility Review and funding (Spring/2006).

Mineralogical Society of America (MSA)

- Associate Editor of the American Mineralogist, 5/99-5/02
- MSA Arts Council, Chair, and MSA Outreach Committee: In charge of development and implementation of outreach program as well as other responsibilities (1993-present).
 - MSA liaison to the TGMS annual show 1995-1998
 - Developed and produced the MSA 25 and 50 year member commemorative pins
 - Developed and produced the MSA garnet necktie
 - Developed and produced the first MSA mineralogical calendar for 1998
- MSA Benefactors Committee, Chair (2008-present)
- MSA Outreach Committee, Chair (2004 – Present)
- MSA Nominating Committee for Officers (1999-2001).

International Mineralogical Association (IMA)

- IMA Commission on New Minerals, Nomenclature and Classification Subgroup on Apatite Nomenclature (3/08-present).
- Secretary of the International Mineralogical Association (IMA) Commission on Mineral Growth and Interface Processes (2002-2006).

Cincinnati Mineral Society (CMS)

- Vice President of the Cincinnati Mineral Society (2001 and 2002)
- Cincinnati Mineral Society Show Committee. 1999-2003.
- Judge of competitive displays in mineralogy Cincinnati Mineral Society show (1999-2005).
- Led a joint field trip of the Cincinnati, Dayton, and Fort Hamilton Mineral Societies in the Department of Geology and the Limper Museum at Miami University on Saturday, November 17, 2001. I gave a tour of the mineralogical research facilities housed in Shideler and Hughes Hall. Roughly 25 people attended the tour. This was repeated in 2006.
- Helped design and contributed educational displays Cincinnati Mineral Society show for Miami University Limper Geology Museum (1999 – present).

Invited Talks:

- 1) 1994: Battelle, North West Pacific Laboratory, Molecular Science Research Center. *Surface structural controls on trace element incorporation and ordering in apatite.*
- 2) 1994: Materials Science Research Center, Hong Kong University of Science and Technology . *Surface structural controls on trace element incorporation and ordering in apatite*
- 3) 1996: Chinese University of Hong Kong Department of Chemistry. *Mineralogic Applications of Surface Science.*
- 4) 1998: Arizona State University Departments of Geology and Chemistry. *Surface structural controls on trace element incorporation in apatite during growth.*
- 5) 1998: Microscopy Society of America Meeting, Atlanta, GA. *Heterogeneous oxidation and precipitation of aqueous Mn(II) at the goethite surface: An SPM study.*
- 6) 1998: Miami University Department of Chemistry. *Mineralogic Applications of Scanning Probe Microscopy.*
- 7) 2/3/99: Miami University Department of Physics: *Scanning Probe Microscopy and its applications in the Earth Sciences*
- 8) 1999 *Sceptered amethyst, Hopkinton, RI.* Miami University K.E. Limper Lecture.
- 9) 1999 *Sceptered amethyst, Hopkinton, RI.* Cincinnati Mineral Society
- 10) 4/5/2000 *Fluorite Mineralization of the Hansonburg Mining District, Bingham, NM.* Dept. Geology, Miami University.
- 11) 4/14/2000 *Fluorite Mineralization of the Hansonburg Mining District, Bingham, NM.* Cincinnati Mineral Society.
- 12) 5/5/2000 *Heterogeneous reactivity at the mineral-water interface.* Dept. of Geology, University of Cincinnati.
- 13) 5/20/2000 *Luminescence and Zoning in Minerals: Phenomena of Beauty and Illumination.* Dept. of Geology, Penn State.
- 14) 6/1/2000 *Sceptered amethyst, Hopkinton, RI.* Brukner Center Gem and Mineral Club, Troy, OH.
- 15) 2/2001 *Heterogeneous reactivity at the mineral-water interface.* Dept. of Geology, Indiana/Perdue University in Indianapolis.
- 16) 3/2001 *Surface structural controls on trace element incorporation into minerals during growth.* Dept. of Geology, Michigan Technological University.
- 17) 3/2001 *Fluorite Mineralization of the Hansonburg Mining District, Bingham, NM.* Seaman Mineralogical Museum, Michigan Technological University.
- 18) 5/2001 *Luminescence and Zoning in Minerals.* Society of Cosmetic Chemists, New York, New York.

- 19) 5/2001 *Calcite Luminescence*: Midwest Mineral Symposium. Cincinnati, OH.
- 20) 10/2001 *A Research Trip to Antarctica: Mineral-Microbe Interactions in the Dry Valleys*: Miami University K.E. Limper Lecture.
- 21) 12/2001 *A Research Trip to Antarctica: Mineral-Microbe Interactions in the Dry Valleys*: Cincinnati Mineral Society.
- 22) 4/5/2002 *Surface structural controls on trace element incorporation into minerals during growth*. Dept. of Geology and Geological Engineering, Notre Dame.
- 23) 6/6/02 *Fluorite Mineralization of the Hansonburg Mining District, Bingham, NM*. Brukner Center Gem and Mineral Club, Troy, OH.
- 24) 6/20/2002 *How and Why Minerals form Beautifully Faceted Crystals*. Midwest Friends of Mineralogy Mineral Symposium. Bloomington, IN.
- 25) 10/2/2002 *Heterogeneous reactivity at the mineral-water interface. Surface structural controls on trace element incorporation into minerals during growth*. Dept. of Geology, Oberline College.
- 26) 10/4/2002 *Heterogeneous reactivity at the mineral-water interface. Surface structural controls on trace element incorporation into minerals during growth*. Dept. of Geology, Ohio University.
- 27) 1/10/2003 *Luminescence and Zoning in Minerals*. Cincinnati Mineral Society.
- 28) 1/29/2003 *Reflections on Phosphates: Geochemical, Geobiological and Materials Importance* Invited speaker at the Miami University Authors' Reception.
- 29) 9/12/03 The causes of color in minerals and recent results from studies of fluorites from Bingham, NM. Cincinnati Mineral Society.
- 30) 11/8/03 The causes of color in minerals and recent results from studies of fluorites from Bingham, NM. Key Note Speaker, 24th Annual New Mexico Mineral Symposium, New Mexico Tech.
- 31) 12/2/03 Lanthanides in Fluorite (REE:CaF₂): Probes of Crystal Surface Structure and Association in Color Centers. Materials Research Society National Meeting, Boston, MA.
- 32) 1/9/04 Apatite: Ca₅(PO₄)₃(F,Cl,OH). Cincinnati Mineral Society.
- 33) 4/15/04 Apatite: Truly an interdisciplinary mineral. Rochester Mineralogical Symposium. Rochester. NY.
- 34) 4/13/04 Apatite: Geochemical, Geobiological and Materials Importance. Dayton Mineral Society.
- 35) 12/5/04 Luminescence and Zoning in Minerals. New York State Museum, Mineralogy Month Celebration.
- 36) 4/12/05 Apatite: Geochemical, Geobiological and Materials Importance. Kyoto University Graduate School of Human and Environmental Studies.
- 37) 4/19/05 Source of fluorine and petrogenesis of the RioGrande Rift type barite-fluorite-galena deposits. Kyoto University Department of Geology and Mineralogy.
- 38) 6/1/05 Tokyo University, Department of Chemistry,
- 39) 9/10/05 Mineralogical Meanderings in Japan. Friends of Mineralogy Midwest Chapter Meeting. Indiana
- 40) 10/15/05 Rio Grande Rift barite-fluorite-galena deposits of southern, New Mexico: An MVT subclass. Northwest Friends of Mineralogy Symposium.
- 41) 10/16/05 The Causes of color in Minerals. Northwest Friends of Mineralogy Symposium.
- 42) 12/12/05 Japan 2005: Mineral, Fossils and Cherry Blossoms. Cincinnati Mineral Society Christmas Dinner and Meeting.
- 43) 2/9/06 Advances in Mineral Identification Techniques. Society of Mineral Museum Professionals. Tucson, AZ.
- 44) 4/15/06 Mineralogy of the Hansonburg Mining District, Bingham New Mexico and related Rio Grande Rift Barite-Fluorite-Galena Deposits. Rochester Mineralogical Symposium. Rochester. NY.
- 45) 4/17/06 *Sakura Ishi* from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. Rochester Mineralogical Symposium. Rochester. NY.
- 46) 7/20/2006 Luminescence and Zoning in Minerals. Mineralogy Society of Hong Kong. Hong Kong.
- 47) 11/3/06 Mineralogical Meanderings in Japan. Cleveland Museum of Natural History.
- 48) 11/4/06 *Sakura Ishi* from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. Cleveland Micromineral Society and Cleveland Museum of Natural History Mineralogical Symposium.
- 49) 11/14/06 *Sakura Ishi* from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. Dayton Mineral Society.
- 50) 3/8/07 Environmental Mineralogy of Apatite. Department of Geology, University of Kentucky.
- 51) 3/22/07 REE incorporation in apatite: Surface structural controls and crystal chemistry Department of Geology, Michigan State University.
- 52) 9/15/07 Synchrotron Microanalytical Methods in the Study of Trace and Minor Elements in Apatite. At Jagiellonian University workshop: Accessory minerals in-situ: microanalytical methods and petrological applications Kraków, Poland, 15-16 September 2007
- 53) 11/8/07 Environmental Mineralogy of Apatite. University of Texas El Paso.
11/8/07 Source of fluorine and petrogenesis of the RioGrande Rift type barite-fluorite-galena deposits. University of Texas El Paso.
- 54) 11/10/07 *Sakura Ishi* from Kameoka Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. 28th Annual New Mexico Mineral Symposium, New Mexico Tech.
- 55) 11/07 Key Note Speaker; Mineralogical Meanderings in Japan, 28th Annual New Mexico Mineral Symposium, New

- Mexico Tech.
- 56) 1/9/09 Characterization of Gold Crystallinity by Diffraction methods. Cincinnati Mineral Society.
- 57) 2/14/09 Sakura Ishi from Kameoka, Japan: Mica pseudomorphs of complex cordierite-indialite intergrowths. The 30th Annual FM-MSA-TGMS Tucson Mineralogical Symposium.
- 58) 5/15/09 Source of fluorine and petrogenesis of the Rio Grande Rift type barite-fluorite-galena deposits. Hong Kong University, Department of Earth Sciences.
- 59) 5/15/09 Homoepitaxy: amethyst overgrowths on milky quartz Hopkinton, RI. Mineralogy Society of Hong Kong. Hong Kong.

Papers Reviewed for:

American Mineralogist
Canadian Mineralogist
Geochimica et Cosmochimica Acta
Chemical Geology
Journal of Sedimentary Research
Clays and Clay Minerals

Proposals Reviewed for:

National Science Foundation
American Chemical Society, Petroleum Research Fund
Canadian Natural Sciences and Engineering Research Council (NSERC)

Community Activism

- Organized a letter campaign to preserve the only known exposure of Cumberlandite, which resulted in the purchase of the site by the Town of Cumberland, Rhode Island and the formation of a Geologic Park.
- Organized a letter campaign among the Science faculty at Miami University to fight the inclusion of intelligent design in the Ohio State K-12 science curriculum. I was interviewed for a Ch. 15 news piece on this subject.