

Curriculum Vitae

Christopher Samuel Palenik

(current of March 1, 2009)

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Educational History

- 2002-2004 University of Michigan, Department of Geological Sciences
Ph.D. Geology
Dissertation Chair: Prof. Rodney C. Ewing
Dissertation Committee: Prof. Eric J. Essene, Prof. Ronald Fleming, Prof. Lumin Wang, Prof. Lynn Walter
DOE-OCRWM fellowship recipient
Horace H. Rackham 2004 Distinguished Dissertation Award
- 1999-2001 University of Michigan, Department of Geological Sciences
M.S. Geology
Prof. Rodney C. Ewing, Advisor
- 1995-1999 University of Chicago
B.S. Chemistry, B.S. Geology
- 1992-1995 Illinois Mathematics and Science Academy, Aurora, IL
- 1991-1992 Saint Edward's Catholic Central High School, Elgin, IL

Employment

- 2005 - present Vice President and Research Microscopist, Microtrace, a forensic laboratory specializing in small particle analysis using microchemistry and microscopy.
- 2004-2005 Federal Bureau of Investigation
Post-Doctoral Fellow in the Counter Terrorism and Forensic Science Research Institute.
- 1999-2004 Graduate Student Research Assistant in the Electron Microbeam Analysis Laboratory, University of Michigan. Duties include training and assistance to university scientists in TEM, EMPA, XRD, and SEM/EDS.
- 1999-2000 Graduate Student Instructor for Determinative Methods (GS-455).
Teaching responsibilities included XRD, SEM, Microprobe, Raman, FTIR.
- 1993-2004 Microscopist (consultant) at Microtrace, a forensic laboratory specializing in small particle analysis using microchemistry and microscopy.

Professional Affiliations

- Board of Directors, RQA Food Forensics LLC (2008-present)

- Alumni Board, University of Michigan Department of Geological Sciences (2005-present)
- American Academy of Forensic Sciences (2001-present)
- Midwestern Association of Forensic Scientists, Member (2007–present)
- Mineralogical Society of America (2000-present)
- Geological Society of America (2002-present)
- Sigma Xi – Scientific Research Society, Member (1998-present)
- American Chemical Society (1998-present)
- State Microscopical Society of Illinois (1998-2000, 2007-present)
- Materials Research Society (2002-2004)

Honors

- Horace H. Rackham 2004 Distinguished Dissertation Award (Highest honor given to dissertations produced under the auspices of the University), University of Michigan (2004)
- John Dorr Graduate Academic Achievement Award – Department of Geological Sciences, University of Michigan (2004)
- Geological Society of America, Travel Grant, (2004)
- Graduate Fellowship Recipient, Department of Energy - Office of Civilian Radioactive Waste Management, (2002-2004)
- Best Paper Award, C.S. Palenik and R.C. Ewing, "Microanalysis of Radiation Damage Across a Zoned Zircon Crystal" - Materials Research Society National Meeting (2001)
- Geological Society of America Travel Grant (2004)
- Scott Turner Research Grant in the Earth Sciences (2001, 2002)
- Member, Rackham Graduate Student Forum (2002)
- Co-President, University of Michigan Geology Club (2000-2002)
- Dean's List, University of Chicago (1995-96, 1997-98, 1998-99)

Additional Training and Experience

- Energy Dispersive X-ray Spectroscopy- Thermo Noran System 6. Workshop taught by Dr. Dave West, ThermoFisher Scientific at Microtrace (2009)
- Private workshop on SERS sample preparation and analysis with Dr. Marco Leona of the New York Metropolitan Museum of Art (2008)
- Fluorescence Microscopy Workshop, taught by Dr. Steve Ruzin of the University of California at Berkeley at McCrone Research Institute (2008)
- Cement and Concrete Microscopy, taught by Don Campbell of the Campbell Petrographic Services, Inc. Dodgeville, Wisconsin (2007)

- Heavy Mineral Identification, taught by Maria Mange of the University of California at Davis (2007)
- Forensic Paint Examination, taught by Scott Ryland of the Florida Department of Law Enforcement, Lansing, MI (2007)
- Hardwood Identification workshop, taught by Dr. Regis Miller of the Center of Wood Anatomy Research, Forest Products Laboratory (2007)
- Advances and Changes in Forensic Paint Examination Workshop, taught by Scott Ryland of the Florida Department of Law Enforcement at California Associate of Criminalists Semi-annual workshop (2006)
- Forensic Soil Examination Workshop, taught by Dr. Ray Murray, Dr. Robert Graham, Marianne Stam, Dr. Lynne Macdonald, Dr. George Sensabaugh, Skip Palenik and Chris Palenik, at California Associate of Criminalists Semi-annual workshop.
- Paper Fiber Identification Workshop, taught by Dr. Walter Rantanen of the Integrated Paper Service (2006)
- Wood Identification Workshop, taught by Dr. Walter Rantanen of the Integrated Paper Services (2006)
- Softwood Identification workshop, taught by Dr. Regis Miller of the Center of Wood Anatomy Research, Forest Products Laboratory (2006)
- Orientation Imaging Microscopy and Phase Identification EBSD workshop, taught by David Dingley and Matthew Nowell, TSL/EDAX, Draper, Utah, (2005)
- Forensic Analysis of Paint, taught by Ed Suzuki, Ed Bartick, FBI Academy, Quantico, VA (2004)
- FTIR Spectroscopy, taught by Edward Bartick, John Reffner, Edward Suzuki, FBI Academy, Quantico, VA (2004)
- Cathodoluminescence Microscopy Workshop, taught by V. Barbin, M. Schvoerer, K. Ramseyer, Florence, Italy (2004)
- Spent Nuclear Fuel workshop, Chicago, IL (2004)
- Lock and Security workshop, Folger-Adams Security, Lemont, IL (2004)
- Metal Working instruction workshop, taught by Julian Broad, Shop Supervisor, University of Michigan (2004)
- Scientific Glassblowing workshop, taught by Harald Eberhart, Master Glassblower, Ann Arbor, MI (2003)
- Secondary ionization mass spectroscopy (SIMS) of uraninite, under Prof. M. Fayek, Oak Ridge National Laboratory, TN (2003)
- Spindle Stage Methods workshop, Instructors: Prof. D. Bloss, Prof. M. Gunter, Dr. S. Su, McCrone Research Institute, Chicago, IL (July, 2003)

- Actinide Chemistry workshop, Institute for Transuranic Elements, Karlsruhe, Germany (June 2003)
- Micro-Raman spectroscopy research on radiation damage in zircon, under Prof. L. Nasdala, Universität Mainz, Germany (March 2002)
- Micro-XRF experimentation, Advanced Photon Source, Argonne, IL (2002)
- Engineering Mineralogy of Ceramic Materials workshop, University of Siena, Italy (June 2001)
- Forensic Fiber Examination, Instructor: S. Palenik, Department of Public Safety, Austin, TX (June, 2000)
- Synthesis of Hf-borosilicate glasses, under Prof. L.L. Davis, Pacific Northwest National Laboratory, Hanford, WA (February, 2000)
- Design and development of the "Microtrace Forensic Fiber Reference Collection", with S. Palenik, Microtrace, Elgin, IL (1998-1999)
- Study of automobile paint finish systems, under Dr. W. Stoecklein, Forensic Science Institute of the Bundeskriminalamt, Wiesbaden, Germany (Summer 1998)
- Study of inclusions in the Allende meteorite, Prof. L. Grossman and Dr. S. Simon, Department of Geophysical Sciences, University of Chicago (1996-1998)
- Mentorship study of Gel-based inks, under L. Olson, National Forensic Laboratory, Internal Revenue Service (1994-1995).
- Infrared Spectroscopy Interpretation, Bowdoin College, Maine, (June, 1996)
- Microchemical Methods, Instructor: S. Palenik, McCrone Research Institute, Chicago, IL (1996)
- Scanning Electron Microscopy, Instructor: Stevens, McCrone Research Institute, Chicago, IL (1994)
- NMR Spectroscopy use and interpretation, IMSA, Aurora, IL (1993-1995)
- Polarized Light Microscopy, Instructor: J. Delly, McCrone Research Institute, Chicago, IL (1992)

Analytical Techniques

Polarized light microscopy, thermal microscopy, scanning electron microscopy, electron microprobe, energy dispersive X-ray spectroscopy, high-resolution transmission electron microscopy, micro-Raman spectroscopy, micro-infrared spectroscopy, cathodoluminescence, UV/visible spectroscopy, scanning white light interferometry, UV/visible microspectrophotometry, powder x-ray diffraction

Publications and Teaching

Courses and Workshops Taught

#Methods in Stereomicroscopy (2009) Customized Class. Rockville, MD.

#Forensic Pigment Analysis (2009) National Institute of Justice (NIJ) Trace Evidence Symposium, Clearwater Beach, FL.

Special topics in Forensic Science (2008) taught with Skip Palenik and Jason Beckert at McCrone Research Institute, Chicago, IL.

#Palenik, C.S (2005-2008) Trace evidence in forensic science. Seminar presented at Northwestern University Forensic Science Series, Chicago, IL (presented annually)
Introductory workshop to Forensic Microscopy (2007) taught with Skip Palenik at the Federal Bureau of Investigation (FBI) / National Institute of Justice (NIJ) Trace Evidence Symposium, Clearwater Beach, FL.

Book Chapters

Palenik, C.S. and Buscaglia, J. (in press) Applications of cathodoluminescence in forensic science, in Forensic analysis on the cutting edge: new methods for trace evidence analysis, ed. R. Blackledge, Wiley.

Palenik, C.S. (2004) Isotopic and Neutronic Composition of the Okelobondo Natural Nuclear Reactor. Ph.D. Thesis, University of Michigan.

Palenik, S.J. and Palenik, C.S. (2004) Microscopy and microchemistry of physical evidence, in Forensic Science Handbook II, 2nd ed. Ed. R. Saferstien, Prentice Hall.

Journal Articles

Egan, J.M.; Mooney, K.; Palenik, C.S.; Mueller, K.T., and Golombeck, R. (2006) Synthesis, Isolation, and Characterization of Chlorinated Products of Bleached 1-(methylamino)anthraquinone. Journal of Forensic Sciences.

Reich, M., Kesler, S.E., Utsunomiya, S., Palenik, C.S., Chryssoulis, S.L., and Ewing, R.C. (2005) Solubility of gold in arsenian pyrite. Geochimica et Cosmochimica Acta, 69, 2781-2796.

Palenik, C.S. and Palenik, S.J. (2004) Forensic Science and Academic Science, Comment on Forensic Science: Oxymoron? Science, 303, 1136.

Utsunomiya, S., Palenik, C.S., Valley, J.W., Cavosi, A.J., Wilde, S.A. and Ewing, R.C. (2004) Nanoscale behavior of Pb in an Archean zircon. Geochimica et Cosmochimica Acta, 68, 4679-4686.

Ewing, R.C., Palenik, C.S. and Konikow, L. (2004) Comment on: "Probabilistic Risk Analysis for a High-Level Radioactive Waste Repository" by B. L. Cohen in Risk Analysis, vol. 23, 909-915, Risk Analysis, in press.

Palenik, C.S., Utsunomiya, S., Reich, M., Kesler, S.E. and Ewing, R.C. (2004) Invisible Gold Revealed: Direct imaging of gold nanoparticles from a Carlin-type deposit. American Mineralogist, 89, 1359-1366.

Davis, L.L., Darab, J.G., Qian, M., Zhao, D., Palenik, C.S., Li, H., Strachan, D.M. and Li, L. (2003) Hafnium in peralkaline and peraluminous boro-aluminosilicate glass and glass sub-components: a solubility study. *Journal of Non-Crystalline Solids*, 328, 101-122.

Palenik, C.S., Nasdala, L. and Ewing, R.C. (2003) Radiation damage in a zircon. *American Mineralogist*, 88, 770-781.

Jensen, K.A., Palenik, C.S. and Ewing, R.C. (2002) U⁶⁺-phases in the weathering zone of the Bangombe U-deposit: Observed and predicted mineralogy. *Radiochimica Acta*, 90, 1-9.

Palenik, C.S. (2000) The role of the forensic scientist in the new millennium. *Academy News (American Academy of Forensic Sciences)*, 23-24.

Palenik, C.S. (1989) The microscopical differentiation of dog and cat hairs, *The Microscope*, 38(4), 415-421.

Conference Proceedings

Palenik, C.S., Jensen, K.A. and Ewing, R.C. (2004) The impact of uncertainties in geochemical modeling on performance assessments: Lessons from natural analogues. *Materials Research Society Spring Meeting, San Francisco, CA.*

Palenik, C.S. and Ewing, R.C. (2002) Microanalysis of radiation damage across a zoned zircon crystal. *Proceedings of the Materials Research Society*, 713, JJ8.8.1-JJ8.8.6.

Zhao, D., Davis, L.L., Li, L., Palenik, C.S., Wang, L.M, Strachan, D.M. and Ewing, R.C. (2000) Gadolinium and hafnium alumino-borosilicate glasses: Gd and Hf solubilities. *Proceedings of the Materials Research Society*, vol. 608, 683-689.

Other Publications

Palenik, C. (2005) Big "I" in Owens. *Letter to the Editor, New York Times*, November 13.

Utsunomiya, S., Palenik, C.S., and Ewing, R.C. (2004) Nano- to Atomic Scale Imaging of Heavy Trace Metals Utilizing Advanced Microscopy Techniques in *The Dekker Encyclopedia of Nanoscience and Nanotechnology*. Marcel Dekker Pub., NY

Palenik, C.S. and Palenik, S.J. (2004) *Forensic Microscopy*, in *Encyclopedia of Analytical Sciences*, 2nd Ed., eds. Worsfold, P., Townshend, A and Poole, C. Elsevier, NY.

Palenik, C.S. and Palenik, S.J. (1999) *Forensic Fiber Reference Collection Manual*. Microtrace: Elgin, IL 46p.

Palenik, S.J. and Palenik, C.S. (1999) *Forensic Fiber Identification Course Guide*. Microtrace: Elgin, IL, 32p.

Abstracts and Talks

*Keynote address; #Invited talk

Palenik, CS, Nytes, B.N., Beckert, J., Bonta, H, and Palenik, S (2009) Raman spectroscopy of Forensic Evidence. *Trace Evidence Symposium (National Institute of Justice (NIJ), Clearwater Beach, FL.*

Palenik, CS, Bonta, H, and Palenik, S (2009) Microanalysis of Architectural Tinting Pigments. American Academy of Forensic Sciences National Meeting. Denver, CO.

#Palenik, CS (2008) Food Forensics: Applications of microscopy and microchemistry to contamination issues in the food industry. Presented to the Griffith Laboratory Global Summit Meeting, Lombard, IL.

#Palenik, CS (2008) Big Picture Clues from Microscopic Particles: Applications of Geology to Forensic Science. Colgate University, NY.

Peaslee, GF, Buscaglia, J, Palenik, CS (2008) Cathodoluminescence as a Forensic Tool. 2008 Joint Meeting of The Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, Gulf Coast Association of Geological Societies with the Gulf Coast Section of SEPM. Houston, TX.

Bales, H. and Palenik, CS (2008) Planar Section of Multilayer Paint Chips. Inter/Micro 2008, Chicago, IL.

Palenik, S. and Palenik, CS (2008) A Practical Technique for the Recognition of Modern Sculptures Proffered as Ancient Works of Art. Inter/Micro 2008, Chicago, IL.

Palenik, CS and Bonta, H. (2008) Microanalytical Characterization of Architectural Paint Pigments. Inter/Micro 2008, Chicago, IL.

#Palenik, CS (2008) Workshop on Raman Spectroscopy of Forensic Evidence. International Association of Forensic Sciences Conference Proceedings. New Orleans, LA.

Peaslee, GF, Palenik, CS, and Buscaglia, J (2008) Application of Cathodoluminescence Microspectrophotometry for Forensic Comparison of Concrete Samples. International Association of Forensic Sciences Conference Proceedings.

Palenik, CS, Palenik, S., and Nytes, B. (2008) An introduction to the in situ identification of pigments in automobile and architectural paints by Raman microspectroscopy. Proceedings of the American Academy of Forensic Sciences National Meeting, Washington DC.

Palenik, CS and Nytes B (2007) The *in situ* identification of pigments in CMYK printing inks. Inter/Micro 2007, Chicago, IL.

Palenik, CS and Palenik, SJ (2007) Ensuring the Continued Role of Science in the Forensic Examination of Trace Evidence. Proceedings of the 2007 American Academy of Forensic Sciences National Meeting, San Antonio, TX.

Palenik, SJ and Palenik, CS (2007) Developing Investigative Leads through Trace Evidence. Proceedings of the 2007 American Academy of Forensic Sciences National Meeting, San Antonio, TX.

#Palenik, CS (2007) Forensic Trace Evidence: Big Picture Clues from Microscopic Particles. Saturday Science Fun Lecture Series, Freedom Hall, Park Forest, IL.

#Palenik, CS (2006) Trace Evidence for the Public Defender. Missouri State Public Defender Winter Workshop, St. Louis, MO.

#Palenik, CS (2006) Forensic Microscopy of Fibers. Presentation at Philadelphia University seminar series.

#Palenik, CS (2006) Cathodoluminescence in Forensic Science. Presentation Soil Analysis workshop at California Association of Criminalists Fall Seminar.

Palenik, S.J. and Palenik, C.S. (2006) Developing Forensic Investigative Leads through the Microscopical Examination of Trace Evidence. Geological Society of America National Meeting, Philadelphia, PA. GSA Abstracts with Programs 38 (7).

Palenik, C.S. (2006) Novel applications of cathodoluminescence microscopy. Inter/Micro-06, Chicago, IL.

Palenik, C.S. and Buscaglia, J. (2006) Cathodoluminescence in Forensic Science. American Academy of Forensic Sciences National Meeting, Seattle, WA.

Mooney, K.E., Koons, R.D., Buscaglia, J. and Palenik, C.S. (2006) Discrimination of Automobile Side Windows by Micro-XRF. American Academy of Forensic Sciences National Meeting, Seattle, WA.

Palenik, C.S. (2006) From PhD to Professional: Bridging the Gap. 3rd Annual Northwestern University PLU Career Forum.

#Palenik, C.S. (2005) Applications of microscopy and microchemistry in forensic science. Talk given at Chemistry Dept. seminar, University of Wisconsin Platteville.

Egan, J.M., Mooney, K.E., Palenik, C.S., Rickenback, M.P., Golombeck, R.A. and Mueller, K.T. (2005) Synthesis, Isolation, and Characterization of Chlorinated Products of Bank Security Dye Packs Upon Bleaching, Pittcon - 2005, August, 2005.

Palenik, C.S. and Buscaglia, J. (2005) Cathodoluminescence microscopy in forensic science. 2006 Annual meeting of the American Academy of Forensic Sciences. Seattle, WA.

#Palenik, C.S. and Buscaglia, J. (2005) Applications of cathodoluminescence in the forensic analysis of trace evidence. 2005 Annual meeting of SWGMAT (Scientific Working Group for Materials Analysis sponsored by the FBI), Washington, D.C.

*Palenik, C.S. and Buscaglia, J. (2005) Applications of cathodoluminescence in forensic geology. 2005 Goldschmidt Conference, Moscow, Idaho, *Geochimica et Cosmochimica Acta*.

Fayek, M., Palenik, C.S. and Ewing, R.C. (2005) Characterization of Nd, Te and U isotope ratios in UO₂ using SIMS. 2005 Goldschmidt Conference, Moscow, Idaho, *Geochimica et Cosmochimica Acta*.

Palenik, C.S., Fayek, M., Fleming, R. and Ewing, R.C. (2004) Isotopic composition and neutronics of the Okélobondo natural nuclear reactor. Geological Society of America, Fall National Meeting, Denver, CO.

Palenik, C.S. (2004) Microanalytical Characterization of a Natural Nuclear Reactor. Inter/Micro-04, Chicago, IL, *Microscope*, 52, 156.

*Ewing, K.A., Palenik, C.S. and Ewing, R.C. (2004) The natural fission reactors at Oklo, Gabon: Lessons for modeling the long-term behavior of a nuclear waste repository. International Geological Congress, Florence, Italy.

Palenik, C.S., Jensen, K.A and Ewing, R.C. (2004) The impact of uncertainties in geochemical modeling on performance assessments. Materials Research Society Spring Meeting, San Francisco, CA.

Jensen, K.A., Palenik, C.S., Fayek, M., Evins, L.Z., Janeczek, J., and Ewing, R.C. (2003) The spent nuclear fuel analogue of the Oklo-Okélobondo and Bangombé natural fission reactors. Nordic Geological Winter Meeting, Sweden.

Palenik, C.A., Fayek, M., Jensen, K.A., and Ewing, R.C. (2003) Analysis of Fission Products and Pu Migration in the Okelobondo Reactor Zone Using SIMS. Geological Society of America, Fall National Meeting, Seattle, WA, 35(6), 237.

Utsunomiya, S., Palenik, C.S., Ewing, R.C., Valley, J.W., Cavosie, A.J., and Wilde, S.A. (2003) Fate of Pb in an Archean Zircon. Geological Society of America, Fall National Meeting, Seattle, WA 35(6), 594.

Reich, M., Palenik, C.S., Utsunomiya, S., Becker, U, Stixrude, L. Kesler, S.E. and Ewing, R.C. (2003) Solubility Limit of Gold in Arsenian Pyrite from Carlin-Type and Epithermal Deposits: EMPA, SIMS, HRTEM and Quantum-Mechanical Constraints. Geological Society of America, Fall National Meeting, Seattle, WA 35(6), 358.

Palenik, C.S. and Stoecklein, W. (2003) Batch to batch differentiation of automobile paints. Inter/Micro-03, Chicago, IL

Jensen K.A., Palenik C.S., and Ewing R.C. (2003) Thermodynamic prediction of observed uranium minerals in the supergene-weathered Bangombé U-deposit: implications for blind prediction modeling. Uranium Geochemistry 2003, Nancy, France.

Palenik, C.S., Utsunomiya, S, Kesler, S.E. and Ewing, R.C. (2002) Gold nanoparticles in arsenian pyrite from a Carlin-type deposit observed by HRTEM. Geological Society of America, Fall National Meeting, Denver, CO.

Palenik, C.S, Jensen, K.A. and Ewing, R.C. (2002) Thermodynamic prediction of observed uranyl phases in the supergene-weathered Bangombe U-deposit: Implications for Blind Prediction Modeling. International Mineralogical Association, Scotland, England.

Jensen, K.A., Palenik, C.S., Ewing, R.C. and Burns, P.C. (2001) Uranyl Phases in the Bangombe U-Deposit, Migration '01, Bregenz, Austria.

Jensen, K.A., Palenik, C.S., Ewing, R.C. and Burns, P.C. (2001) Oxidative Alteration of the Oklo-Okelobondo and Bangombe U-Deposits in Gabon: Observed and Predicted Mineralogy, American Chemical Society - Fall National Meeting, Chicago, IL.

Palenik, C.S., Lian, J. and Ewing, R.C. (2001) Microanalysis of radiation damage across a zoned zircon crystal. Materials Research Society, Fall National Meeting, Boston, MA.

Palenik, C.S., Lian, J. and Ewing, R.C. (2001) Zircon as a host for the disposal of Plutonium, Workshop on Engineering Mineralogy of Ceramic Materials, ISEPS, Siena, ITALY.

Jensen, K.A., Palenik, C.S., Ewing, R.C., Burns, P. (2000) The role of sulfates during supergene weathering in the Oklo-Okelobondo uranium deposits, Geological Society of America, Reno, NV.

Stoecklein, W. and Palenik, C.S. (1998) Forensic analysis of automotive paints: Evidential value and the batch problem. Presentation – 4th meeting of the European Paint Group. Paris, France, October 5-6.

Palenik, C.S., (1998) Analysis of Chrome-Bearing Spinel from the Allende Meteorite Geophysical Science Exposition '98, University of Chicago.

Simon, S.B., Grossman, L., Ebel, D., Palenik, C. (1998) Large Relict Chromium Spinel from Allende: A link to Murchison?, 29th Lunar and Planetary Science Conference, Houston, TX.

Palenik, C.S. and Olson, L. (1995) Identification of Gel-Based Inks, INTER/MICRO-95, Chicago, IL.

Palenik, C.S. Original Paint Finish Systems on Foreign Automobiles (1994) INTER/MICRO-94, Chicago, IL.