

**STEFAN FINSTERLE**

# Curriculum Vitae Stefan Finsterle

Stefan Finsterle  
Earth Sciences Division, MS 90-1116  
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September 2009

## EDUCATION

1993 Ph.D. Hydrogeology Swiss Federal Institute of Technology, Zürich, Switzerland  
1988 M.S. Env. Eng. Swiss Federal Institute of Technology, Zürich, Switzerland  
1985 B.S. Env. Eng. Swiss Federal Institute of Technology, Zürich, Switzerland

## RESEARCH INTERESTS

Inverse modeling of nonisothermal multiphase flow systems; fracture and unsaturated zone hydrology; optimization; geostatistics; test design and data analysis.

## WORK HISTORY

2005/2006 **Lecturer**, *University of California, Berkeley, California*  
since 2001 **Staff Geological Scientist**, (Head Hydrogeology Department February 2006–December 2008) *Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California*  
1996 **Visiting Assistant Professor**, *College of Sciences, Clemson University, South Carolina*  
1995 **Visiting Scientist**, *School of Engineering, University of Auckland, Auckland, New Zealand*  
1994 – 2001 **Geological Scientist**, *Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California*  
1993 – 1994 **Post-Doctoral Fellow**, *Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California*  
1988 – 1993 **Research Engineer**, *Laboratory of Hydraulics, Hydrology, and Glaciology, Swiss Federal Institute of Technology (ETH), Zürich, Switzerland*

## SOFTWARE

Main developer of iTOUGH2 inverse modeling code (<http://esd.lbl.gov/iTOUGH2>)

## RECOGNITIONS

2005 Berkeley Lab Tech Transfer Award  
2003 Berkeley Lab Outstanding Performance Award  
1993 Medal of the Swiss Federal Institute of Technology, ETH, Zürich, Switzerland, for an outstanding doctoral dissertation.  
1989 Diplompreis des Schweizerischen Kulturingenieur Vereins, for an outstanding master thesis in land surveying.

## Select Peer-Reviewed Journal Articles, Stefan Finsterle (Total: 44)

- Lehikoinen, A., S. Finsterle, A. Voutilainen, M.B. Kowalsky, and J.P. Kaipio, Dynamical inversion of geophysical ERT data: state estimation in the vadose zone, *Inverse Problems in Science and Engineering*, 99999(1), 1–22, doi:10.1080/17415970802475951, 2009.
- Finsterle, S., C. Doughty, M.B. Kowalsky, G.J. Moridis, L. Pan, T. Xu, Y. Zhang, and K. Pruess, Advanced vadose zone simulations using TOUGH, *Vadose Zone J.*, 7:601–609, 2008.
- Finsterle, S., and M. B. Kowalsky, Joint hydrological-geophysical inversion for soil structure identification, *Vadose Zone J.*, 7:287–293, doi:10.2136/vzj2006.0078, 2008.
- Lehikoinen, A., S. Finsterle, A. Voutilainen, L. M. Heikkinen, M. Vauhkonen, and J. P. Kaipio, Approximation errors and truncation of computational domains with application to geophysical tomography, *Inverse Problems and Imaging*, 1(2), 371–389, 2007.
- Linde, N., S. Finsterle, and S. Hubbard, Inversion of tracer test data using tomographic constraints, *Water Resour. Res.*, 42(4), W04410, doi:10.1029/2004WR003806, 2006.
- Finsterle, S., Demonstration of optimization techniques for groundwater plume remediation using iTOUGH2, *Environmental Modelling and Software*, (21)5, 665–680, 2005.
- Kowalsky, M., S. Finsterle, J. Peterson, S. Hubbard, Y. Rubin, E. Majer, A. Ward, and G. Gee, Estimation of field-scale soil hydraulic parameters and dielectric parameters through joint inversion of GPR and hydrological data, *Water Resour. Res.*, 41, W11425, 2005.
- Finsterle, S., Multiphase inverse modeling: Review and iTOUGH2 applications, *Vadose Zone J.*, 3: 747–762, 2004.
- Kowalsky, M.B., S. Finsterle, and Y. Rubin, Estimating flow parameter distributions using ground-penetrating radar and hydrological measurements during transient flow in the vadose zone, *Adv. Water Resour.*, 27(6), 583–599, 2004.
- Finsterle, S., C. F. Ahlers, R. C. Trautz, and P. J. Cook, Inverse and predictive modeling of seepage into underground openings, *J. of Contam. Hydrol.*, 62–63, 89–109, 2003.
- Finsterle, S., J. T. Fabryka-Martin, and J. S. Y. Wang, Migration of a water pulse through fractured porous media, *J. Contam. Hydr.*, 54 (1–2), 37–57, 2002.
- Finsterle, S., and R. C. Trautz, Numerical modeling of seepage into underground openings, *Mining Engineering*, 53(9), 52–56, 2001.
- Finsterle, S., Using the continuum approach to model unsaturated flow in fractured rock, *Water Resour. Res.*, 36(8), 2055–2066, 2000.
- Finsterle, S., and B. Faybishenko, Inverse modeling of a radial multistep outflow experiment for determining unsaturated hydraulic properties, *Advances in Water Resources*, 22(5), 431–444, 1999.
- Finsterle, S., and J. Najita, Robust estimation of hydrogeologic model parameters, *Water Resour. Res.*, 34(11), 2939–2947, 1998.
- Finsterle, S., and P. Persoff, Determining permeability of tight rock samples using inverse modeling, *Water Resour. Res.*, 33 (8), 1803–1811, 1997.
- Finsterle, S., and K. Pruess, Solving the estimation-identification problem in two-phase flow modeling, *Water Resour. Res.*, 31 (4), 913–924, April, 1995.

### 3 Book Chapters

### 130 Conference Papers and Abstracts

### 35 Technical Reports

## Relevant Publications (1999–2009)

1. Mukhopadhyay, S., Y.W. Tsang, and S. Finsterle, Parameter estimation from flowing fluid temperature logging data in unsaturated fractured rock using multiphase inverse modeling, *Water Resour. Res.*, 45, W04414, doi:10.1029/2008WR006869, 2009.
2. Senger, R., T. Xu, P. Marschall, and S. Finsterle, Modeling approaches of two-phase flow phenomena associated with corrosion of SF/HLW canisters in a proposed repository in Opalinus clay, Switzerland, *Physics and Chemistry of the Earth*, 33, S317–S326, 2008.
3. Xu, T., S. Senger, and S. Finsterle, Corrosion-induced gas generation in a nuclear waste repository: Reactive geochemistry and multiphase flow effect, *Appl. Geochem.*, 23, 3423–3433, doi:10.1016/j.apgeochem.2008.07.012, 2008.
4. Kowalsky, M.B., J. Birkholzer, J. Peterson, S. Finsterle, S. Mukhopadhyay, and Y. Tsang, Sensitivity analysis for joint inversion of ground-penetrating radar and thermal-hydrological data from a large-scale underground heater test, *Nuclear Technology*, 164(2), 169–179, 2008.
5. Finsterle, S., C. Doughty, M.B. Kowalsky, G.J. Moridis, L. Pan, T. Xu, Y. Zhang, and K. Pruess, Advanced vadose zone simulations using TOUGH, *Vadose Zone J.*, 7:601–609, doi:10.2136/vzj2007.0059, 2008.
6. Salve, R., N.Y. Krakauer, M.B. Kowalsky, and S. Finsterle, A qualitative assessment of microclimatic perturbations in a tunnel, *Int. J. Climatol.*, 28(15), 2081U3, doi:10.1002/joc.1697, 2008.
7. Finsterle, S., and M. B. Kowalsky, Joint hydrological-geophysical inversion for soil structure identification, *Vadose Zone J.*, 7:287–293, doi:10.2136/vzj2006.0078, 2008.
8. Lehtikoinen, A., S. Finsterle, A. Voutilainen, L. M. Heikkinen, M. Vauhkonen, and J. P. Kaipio, Approximation errors and truncation of computational domains with application to geophysical tomography, *Inverse Problems and Imaging*, 1(2), 371–389, 2007.
9. Finsterle, S., Comment on “Seepage into drifts and tunnels in unsaturated fractured rock” by Dani Or, Markus Tuller, and Randall Fedors, *Water Resour. Res.*, 42, W07603, doi:10.1029/2005WR004777, 2006.
10. Zhang, Y., H. H. Liu, Q. Zhou, and S. Finsterle, Effects of diffusive property heterogeneity on effective matrix diffusion coefficient for fractured rock, *Water Resour. Res.*, 42, W04405, doi:10.1029/2005WR004513, 2006.
11. Finsterle, S., Multiphase inverse modeling: Review and iTOUGH2 applications, *Vadose Zone J.*, 3: 747–762, 2004.
12. Ghezzehei, T. A., R. C. Trautz, S. Finsterle, P. J. Cook, and C. F. Ahlers, Modeling coupled evaporation and seepage in ventilated tunnels, *Vadose Zone J.*, 3: 806–818, 2004.
13. Unger, A., S. Finsterle, and G. S. Bodvarsson, Transport of radon gas into a tunnel at Yucca Mountain—estimating large-scale fractured tuff hydraulic properties and

- implications for the ventilation system, *Journal of Contam. Hydrol.*, 70, 152–171, 2004.
14. Engelhardt, I., S. Finsterle, and C. Hofstee, Experimental and numerical investigation of flow phenomena in nonisothermal, variably saturated bentonite/crushed rock mixtures, *Vadose Zone J.*, 2: 239–246, 2003. (LBNL-52838)
  15. Engelhardt, I., and S. Finsterle, Thermal-hydrologic experiments with bentonite/crushed rock mixtures and estimation of effective parameters by inverse modeling, *Applied Clay Science*, 23, 111–120, 2003. (LBNL-52837)
  16. Houseworth, J. E., S. Finsterle, and G. S. Bodvarsson, Flow and transport in the drift shadow in a dual-continuum model, *Journal of Contam. Hydrol.*, 62–63, 133–156, 2003.
  17. Finsterle, S., C. F. Ahlers, R. C. Trautz, and P. J. Cook, Inverse and predictive modeling of seepage into underground openings, *J. of Contam. Hydrol.*, 62–63, 89–109, 2003.
  18. Liu, H. H., G. S. Bodvarsson, and S. Finsterle, A note on unsaturated flow in two-dimensional fracture networks, *Water Resour. Res.*, 38(9), 1176, doi:10.1027/2001WR000977, 2002.
  19. Finsterle, S., J. T. Fabryka-Martin, and J. S. Y. Wang, Migration of a water pulse through fractured porous media, *J. Contam. Hydr.*, 54 (1–2), 37–57, 2002.
  20. Finsterle, S., and R. C. Trautz, Numerical modeling of seepage into underground openings, *Mining Engineering*, 53(9), 52–56, 2001.
  21. Finsterle, S., Using the continuum approach to model unsaturated flow in fractured rock, *Water Resour. Res.*, 36(8), 2055–2066, 2000.
  22. Ahlers, C. F., S. Finsterle, and G. S. Bodvarsson, Characterization of subsurface pneumatic response at Yucca Mountain, *J. Contam. Hydr.*, 38(1–3), 47–68, 1999.
  23. Wang, J. S. Y., R. C. Trautz, P. J. Cook, S. Finsterle, A. L. James, and J. Birkholzer, Field tests and model analyses of seepage into drift, *J. Contam. Hydr.*, 38(1–3), 323–347, 1999.

**AROKIASAMY J. "A.J." FRANCIS**

**AROKIASAMY JOSEPH FRANCIS**  
**(Microbiologist/Scientist with tenure)**  
Brookhaven National Laboratory  
Environmental Sciences Department, Bldg. 490A  
Upton, NY 11973

*Curriculum Vitae*

**EDUCATION**

**B.Sc.(Ag). 1963 (Agriculture) Annamalai University**

**M.Sc.(Ag). 1965 (Soil Microbiology) Annamalai University**

Thesis: "Investigation on the UV induced mutants of *Rhizobium* sp. and their ability to fix atmospheric nitrogen". May 1965.

Advisor: Dr. G. Rangaswami

**Ph.D. 1971 (Microbiology) Cornell University, Ithaca, New York, USA**

Major: Soil Microbiology, Minor: Plant Pathology and Insect Pathology

Thesis: "A comparison of effective and ineffective associations in the *Rhizobium*-legume symbiosis". January 1971.

Advisor: Dr. Martin Alexander

**RESEARCH INTERESTS**

Microbial transformations of radionuclides and toxic metals: interactions of microorganisms with toxic metals and radionuclides; mechanisms of mobilization and immobilization of radionuclides and toxic metals in wastes, contaminated soils and materials; biotransformation of radionuclide/metal-organic complexes and chelating agents. Remediation of radionuclide and toxic metal contaminated soils and wastes. Nitrogen and carbon transformations and cycling in the terrestrial environment.

**EMPLOYMENT**

2002 – present	Microbiologist/Scientist (Tenured)
2005 – present	Group Leader, Molecular Environmental Science, Environmental Sciences Department
2002 – 2007	Associate Director, Center for Environmental and Molecular Sciences (CEMS) Stony Brook University and Brookhaven National Laboratory (Environmental Molecular Science Institute (EMSI) supported by NSF and DOE).
2001 – 2005	Deputy Head, Environmental Research and Technology Division, Environmental Sciences Department
1979 – 2001	Group Leader, Environmental Microbiology, Dept. of Applied Science
1979 –2002	Microbiologist/Scientist (with continuing appointment)

1977 –1977 Associate Scientist (Microbiologist)  
1975 – 1977 Assistant Scientist (Microbiologist)  
1973 – 1975 Stanford Research Institute, Microbiologist, Menlo Park, CA  
1970 – 1973 Cornell University, Research Associate  
1966 –1970 Cornell University, Research Assistant  
1965 – 1966 Agricultural College and Research Institute, Coimbatore, India  
Research Assistant

### **PROFESSIONAL ASSOCIATIONS, HONORS, AWARDS**

Elected to BNL Council, September 2004. BNL Council Member September 2004-February2007; March 2008 - present.

Adjunct Professor, (1993 - present) State University of New York at Stony Brook, Department of Material Science and Engineering at the State University of New York at Stony Brook, NY.

Class-I Visiting Researcher and Group Leader for Heavy Elements Microbiology Research (2002 - 2005) Advanced Science research Center, Japan Atomic Energy Research Institute (JAERI), Tokai, Japan.

Scientific Advisor and Class-I Visiting Researcher (2005 - present) to Research Group for Dynamics of Molecular and Cellular Responses to Stimuli, Advanced Science research Center, Japan Atomic Energy Agency (JAEA), Tokai, Japan.

Awarded Certificate of appreciation from DOE Office of Science for Waste minimization and environmental stewardship.

Member: American Society for Microbiology; American Chemical Society.

American Nuclear Society (1977 - 1982).

First rank and first class, M.Sc (Ag), Recipient of Madras State Merit Scholarship.

Listed in (i) American Men and Women in Science, and (ii) Who's Who in Technology Today.

Member of the technical advisory group, Department of Health Services, Nitrogen Pollution, Suffolk County, 1975 - 1977.

Member of the review team for the U.S. Department of Energy's Alternate Fuels Production Source Evaluation Board, 1980.

Consultant to Food and Agriculture Organization of the United Nations, Rome - Agricultural and Environmental Microbiology, 1982.

Consultant to Advanced Center in Agricultural Microbiology, Tamil Nadu Agriculture University, Coimbatore, India (UN/FAO-sponsored Program), 1982 - 84.



Consultant to Directorate of Plant Protection, Ministry of Agriculture, New Delhi, India (Indo-U.S. AID Program), 1986.

Member of the Scientific Panel-New York State High School Science Contest, May 1986.

Consultant to Public Service Electric and Gas Co., NJ, 1986-1988.

External Examiner-Ph.D. Degree: Annamalai University, India, 1985, 1986, 1987;  
Napier College, Edinburgh, UK, 1987.  
Material Sci. and Engineering SUNY Stony Brook, 1998  
Indian Institute of Technology, Madras, 2007

Consultant to Sandia National Laboratory: Waste Isolation Pilot Plant (WIPP) Program, 1988-present.

Member-Biotechnology Group, Research Development, Demonstration, Testing and Evaluation-Five Year Plan-U.S. Department of Energy, 1989, 1990.

Invited participant at the Microbiology in Nuclear Waste Disposal (MIND) European Research Group meetings held in Switzerland 1987; Sweden 1988; United Kingdom 1990.

Invited Participant and Contributor to U.S. Department of Energy, Office of Energy Research Program Documents:

Basic Research for Environmental Restoration, DOE/ER-0482T, 1990  
Basic Research Needs for Management and Disposal of DOE Wastes,  
DOE/ER-0492T, 1991.

Consultant, United Nations Development Program (UNDP) under TOKTEN project, 1991.

DOE Biotechnology Workshop, The Office of the Technology Development (OTD) Bioremediation Program, 1991.

American Academy of Microbiology, Invited Participant in the Colloquium "Strategies and Mechanisms for Field Research in Environmental Bioremediation," San Antonio, Texas, January 8-10, 1993, American Society for Microbiology.

Invited participant in the DOE and EPA jointly-sponsored National Technology Initiative: Environmental Technology Workshops, August, 1992.

International Atomic Energy Agency (IAEA), Vienna. Technical Committee Member (March 1993) on "Advanced Technologies for Treatment of Low and Intermediate Low-Level Radioactive Liquid Wastes".

Invited Participant, Scientific Review Group, Nuclear Waste Disposal Concept, Atomic Energy Control Board (AECB), Environment Canada, Canada. 1993.

Invited Key Note Speaker and Member of the Organizing Committee of NATO Advance Research Workshop (ARW) on "Biotechnologies for Radioactive and Toxic Wastes Management and Site Restoration: Scientific, Educational, Social, Economical, Business Aspects." November 28 - December 2, 1994, Mol, Belgium.

Invited Participant and Contributor to U. S. Department of Energy, Office of Energy Research, "Natural and Accelerated Bioremediation Research (NABIR) Program Plan," 1995.

Member of the Review Panel for the DOE Alexander Hollander Distinguished Post doctoral Fellowship Program, 1996.

Invited to give a presentation to the National Research Council (NRC) Committee on Building an Environmental Management Science Program (EMSP), May 11, 1996.

Foreign Distinguished Scientist Inviting Program, Japan Atomic Energy Research Institute, (JAERI), Tokai, Japan. March 29 - April 28, 1998.

Consultant to Nuclear Fuel Industries, Ltd. (NFI), Tokai, Japan (1999).

Foreign Distinguished Scientist Inviting Program, Japan Atomic Energy Research Institute (JAERI), Tokai, Japan, September 1-30, 2000.

Advisor to the Actinide Migration Evaluation (AME) Group, The Rocky Flats Environmental Technology Site, Rocky Flats, CO. (2000-2002).

Class-I Research Scientist - Actinide-Microbiology Group, Japan Atomic Energy Research Institute (JAERI), Tokai, Japan, April 1, 2001 - March 30, 2002.

Member of the Scientific Advisory Committee (SAC) of the International Conference on Uranium Mining and Hydrogeology III (UMH III) September 15- 21, 2002; UMH (IV) September 11-16, 2005; UMH (V), September, 14-18, 2008, Freiberg, Germany.

Scientific Advisor to Heavy Element Microbiology Group, Advanced Science Research Center (ASRC), Japan Atomic Energy Research Institute, Tokai, Japan. April 1, 2003- 2005.

Scientific Advisor to Research Group for Heavy Element Geomicrobiology, Advanced Science Research Center (ASRC), Japan Atomic Energy Research Institute, Tokai, Japan. April 1, 2005-present.

Guest Editor: A. J. Francis with T. Ohnuki. Journal of Nuclear and Radiochemical Sciences. Special Issue: The 4<sup>th</sup> International Symposium on Advanced Science Research "Advances In Heavy Elements Microbiology Research (ASR2004)." November 15 - 16, 2004, JAERI, Tokai, Ibaraki, Japan.

Member of the Advisory Board of the Symposium.2nd International Symposium on Green/Sustainable Chemistry, held at the University of Delhi, India. January 10-13, 2006.

Ph.D. Committee member – Chengdong Zhang (2006) and Hao Wang (2007), Ph.D. Graduate students, Department of Chemistry and Environmental Science, New Jersey Institute of Technology.

Member Environmental Sciences Task force (2005 -2006): Consortium for Integrative Environmental Research (CIER) Stony Brook University, Stony Brook New York.

Reviewer research grant proposals for

DOE's Natural Accelerated Bioremediation Program (NABIR) and  
Environmental Management Science program (EMSP).

NSF

US Department of Agriculture (USDA)/ Agricultural Research Service (ARS).

Natural Environment Research Council UK

Swiss National Science Foundation

Reviewed manuscripts for

Applied and Environmental Microbiology

Applied Radiation and Isotopes

Arch Environmental contamination and Toxicology

Biogeochemistry

Biotechnology and Bioengineering

Biotechnology Progress

Canadian Journal of Microbiology

Environmental Pollution.

Environmental Science and Technology

Geobiology

Geochimica Cosmochimica Acta

Journal of Agricultural and Food Chemistry

Journal of Bacteriology

Journal of Biogeochemistry

Journal of Contaminant Hydrology

Journal of Environmental Quality

Journal of Environmental Waste Management

Journal of Industrial and Applied Microbiology,

Journal of Plant Nutrition and Soil Science

Journal of Radioanalytical and Nuclear Chemistry

Microbiology

Nature

PLoS Biology

Radiochemica Acta

Soil Science

Talanta

Waste Management Journal

Water Air and Soil Pollution

**PATENTS**

1. Francis, A.J., Dodge, C.J, Chendrayan, K., Quinby, H.L. Anaerobic microbial dissolution of lead and production of organic acids. U.S. Patent No. 4,758,345-DOE Case No. S-66, 261. Issued July 19, 1988.
2. Francis, A.J., Dodge, C.J., and Gillow, J.B. Microbial stabilization and mass reduction of wastes containing radionuclides and toxic metals. Patent No. 5,047,152. Issued September 10, 1991.
3. Francis, A.J. and Dodge, C.J. Waste site reclamation with recovery of radionuclides and metals. U.S. Patent No. 5,292,456. Issued March 8, 1994.
4. Francis, A.J. and Dodge, C.J. Anaerobic microbial remobilization of coprecipitated metals. U.S. Patent No. 5,354,688. Issued October 11, 1994.
5. Chidambaram, D. And A.J. Francis. "Extracellular Bioreduction of Uranium", Filed 3/23/2007, U.S. Patent Office Assigned Provisional Serial Number 60/896,597.

**CONVENER**

"Mineral Cycles and Metals in the Environment." 77th Annual Meeting of the American Society for Microbiology, New Orleans, 1977.

"Microbiological Aspects of Transuranic and Other Radioactive Wastes." Round Table Symposium, 79th Annual Meeting of the American Society for Microbiology, Los Angeles, May 8, 1979.

Co-chair at the 7th International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere. Migration '99. September 26 - October 1, 1999, Lake Tahoe, NV.

Co-chair at the 2<sup>nd</sup> International Symposium "Plutonium in the Environment" Osaka, Japan, November 9 - 12, 1999.

Co-organizer and Co-chair Symposium on "Environmental Chemistry and Microbiology of Actinides" (# 67) Pacifichem 2000. December 14 - 19, 2000, Honolulu, Hawaii.

Co organizer of workshop on "Ionic Liquids" at BNL April 7, 2004.

Cochairman Water Rock Interaction Int'l Conference Saratoga Springs, NY June 27-July 2, 2004.

Scientific Chair and Co organizer "The Fourth International Symposium on Advanced Science Research - Advances in Heavy Elements Microbiology Research (ASRC2004), JAERI. Japan November 15-16, 2004.

Co-organizer and Co-chair Symposium on "Actinides and the Environment: A Paradigm for Interdisciplinary Research" (# 306) Pacificchem 2005. December 15 - 21, 2005 Honolulu, Hawaii.

Co-chair session: "Behavior of Radionuclides in Aquatic Environments at the International Symposium on Environmental Modeling and Radioecology, from October 18 -20, 2006, Rokkasho, Aomori, Japan.

### **INVITED SPEAKER**

"Effects of Acidity on Decomposition of Leaf Litter in Terrestrial and Aquatic Environments," Invited Speaker at the Seminar on Acidic Pollutants and Their Effects on Environmental Microbial Processes, American Society for Microbiology Annual Meeting, Atlanta, GA, 1982.

"Acid Rain Effects on Soil and Aquatic Microbial Processes," Invited Speaker at the Acid Deposition Conference, Plattsburgh, NY, June 10-12, 1983.

Workshop on the Role of Microorganisms on the Behavior of Radionuclides in Aquatic and Terrestrial Systems and Their Transfer to Man. Panel Discussion: Moderators: A.J. Francis (USA), and P.O. Agnedal (Sweden), Brussels, Belgium, April 25-27, 1984.

Role of Soil Microbial Processes in Integrated Pest Management. Special lecture presented at the Integrated Pest Management Training Program in Hyderabad, India, at the invitation of the Ministry of Agriculture, Government of India, October 1986.

Integration of Laboratory and Modeling Studies of Microbial Processes Relevant to Nuclear Waste Disposal NAGRA, Baden, Switzerland, November 18-20, 1988. Invited to chair a session on "By-Products" (gas, complexants, etc.).

MIND Group-Formulation of Collaborative Technical Programme, 2nd Meeting of the Microbiology in Nuclear Waste Disposal (MIND) Working Group-Stockholm, Sweden, May 14-21, 1988. Invited to chair a session on "Near- and Far-Field Processes."

Environmental Science Course, BNL: April 1990, "Microbial Transformation of Pollutants;" March 1991 - Environmental Restoration: Microbiological Aspects.

MIND - 3rd Meeting of the International Group held in Edinburgh, Scotland, September 12-14, 1990. Invited to present a paper on "Mechanisms of Anaerobic Microbial Transformations of Uranium in Mixed Wastes," and co-chaired a session on "The Way Forward."

Atomic Energy of Canada Ltd., Whiteshell Laboratories, Pinawa, Manitoba. "Microbial Transformations of Radioactive Wastes," July 1991.

"Microbial Transformations of Radionuclides and Toxic Metals," Pennsylvania State University, University Park, PA, February 21, 1992.

Invited Panelist, U.S. DOE/EPA National Technology Initiative, Environmental Technology Workshop, "Bioremediation," U.S. EPA, Cincinnati, OH, Sept. 9-10, 1992.

"Bioremediation of Radionuclides and Toxic Metals Contaminated Materials, Soils, and Wastes," Colloquium, Department of Materials, Sciences and Engineering, State University of New York at Stony Brook, November 11, 1992.

"Environmental Restoration-Microbiological Aspects," SUNY/College at Old Westbury, October 8, 1992.

"Microbiological Transformations of Toxic Metals in Wastes," Academe-Industry- Symposium "Chemistry, Environment and You," American Chemical Society, New York Branch, Tarrytown, NY, November 14, 1992.

"Microbiological Transformations of Toxic Metals and Radionuclides and Bioremediation of Contaminated Sites." First International Mini Symposium on Removal of Contaminates from Waste Waters and Soils. Institute of Engineering, UNAM, Mexico City, Mexico, June 23, 1993.

"Microbial Treatment of Radioactive Wastes." Seminar Department Applied Science, Brookhaven National Laboratory, Upton, NY, October 25, 1993.

"Remediation of Uranium Contaminated Soils." DOE, Uranium Soil Technology Exposition, Cincinnati, OH, September 27, 1994.

"Bioremediation of Radionuclides and Toxic Metals Soils and Wastes." NATO Advanced Research Workshop (ARW) on "Biotechnologies for Radioactive and Toxic Wastes Management and Site Restoration: Scientific, Educational, Social, Economical, Business Aspects, Mol, Belgium, November 28 - December 2, 1994.

"Mechanisms of microbial transformations of uranium in subsurface environments. International Chemical Congress of Pacific Basin Societies, Honolulu, Dec. 17-22, 1995.

"Harnessing Microbes to Clean Radioactive Waste" 316th Brookhaven Lecture, Brookhaven National Laboratory, Upton, NY. May 15, 1996.

"Bioremediation of Radionuclides and Toxic Metals" presented at the Keller College - Issues in Science and Engineering Spring '97 Program, Course No. LSE 310. SUNY Stony Brook New York. February 27, 1999.

“Mechanisms of Microbial Transformations of Radionuclides and Toxic Metals in Subsurface Environments” at the Workshop on Mathematical Issues in Bioremediation. Sponsored by the Center for Nonlinear Studies Los Alamos National Laboratory and the Society for Industrial and Applied Mathematics (SIAM) June 11-13, 1997 Los Alamos, NM.

“Microbial Mobilization and Immobilization (Stabilization) of Toxic metals and Radionuclides” at the Workshop on Natural Attenuation of Metals and Radionuclides. Sponsored by Sandia National Laboratory, Albuquerque, NM. June 18-20, 1997.

“The Microbial Transformations of Uranium and Other Actinides” BNL Physics Colloquium, December 2, 1997.

“Bioremediation of radioactive wastes” Special Topic Lecture - BNL Summer Schools in Nuclear Chemistry. July, 1998, sponsored by ACS.

"Bioremediation of Uranium Contaminated Soils and Wastes. Uranium Mining and Hydrology II. Freiberg, Germany, September, 15, 1998

“Bioremediation of radionuclides and toxic metals contaminated soils and wastes” Special Topic Lecture - BNL Summer School in Nuclear Chemistry. July 13, 1999, sponsored by ACS.

“Biotransformation of Actinides in Radioactive Wastes” The Chemical Sciences and Technology (CST) Division Colloquium Series, Los Alamos National Laboratory, September 15, 1999.

“Microbial Transformations of Plutonium and Implications for its Mobility” at the 2<sup>nd</sup> International Symposium "Plutonium in the Environment" Osaka, Japan, November 9 - 12, 1999.

“Bioremediation of radioactive wastes” Special Topic Lecture - BNL Summer School in Nuclear Chemistry. July 17, 2000, sponsored by ACS.

“Bioremediation of radionuclide and toxic metal contaminated soils and wastes” presented at the International Conference of Soil Remediation, Hangzhou, China. October 15-19, 2000.

“Biotransformation of Radionuclides and Bioremediation of Contaminated Sites” Special Topic Lecture - BNL Summer School in Nuclear Chemistry. July 17, 2001, sponsored by ACS.

“Biotransformation of uranium and Transition Metal Citrate Complexes by Clostridia” at the Actinides 2001 International Conference, Hayama, Japan, November 4-9, 2001.

"Microbial Transformation of Radioactive Waste" NYU graduate school of Journalism Science and Environmental Reporting program, April 19, 2002. (Talk) Organized by Elaine Lowenstein, BNL Tour Program, Community Involvement.

“Microbial Transformations of Actinides and Environmental Restoration Through Bioremediation.” Special Topic Lecture - BNL Summer School in Nuclear Chemistry. July 10, 2002, sponsored by ACS.

Microbial Transformations of Uranium Complexed with Organic and Inorganic Ligands, presented at the 3rd International Conference on Uranium Mining and Hydrogeology III and the International Mine Water Association Symposium, Freiberg, Germany, September 15-19, 2002.

"Microbial Transformation of Radioactive Waste" New York University Graduate School of Journalism Science and Environmental Reporting Program, April 4, 2003.

"Biotransformation of Actinides and Environmental Restoration Through Bioremediation". Presented at the Geosciences Department Colloquium Series, SUNY Stony Brook October 17, 2002.

"Microbial Transformations of Uranium Complexed with Organic Ligands" DOE NABIR Annual Meeting, Arlie Center, Virginia, March 17, 2003,

"Radionuclide Decontamination with Waste Volume Reduction" Presented at the Radionuclide Decontamination Science and Technology Workshop Sponsored by Los Alamos National Laboratory (LANL) Center for Homeland Security and LANL Seaborg Institute for Transactinium Science. Los Alamos, New Mexico, September 16-17, 2003.

"Microbial Transformations of Radionuclides and Toxic Metals". Seminar presented at the Department of Chemistry and Environmental Science, New Jersey Institute of Technology, New Jersey, October 21, 2003. (Invited talk).

Francis, A.J. "Microbial Transformations of Actinides: Implications on Radioactive Waste Disposal and Environmental Remediation." Plenary lecture to be delivered at the Symposium of the 10<sup>th</sup> Anniversary Celebration of Advanced Science Research Center (ASRC), Japan Atomic Research Institute, Tokai, Japan. November 17, 2003.

Francis, A.J. "Microbial Transformations of Actinides: Implications on Radioactive Waste Disposal and Environmental Remediation" Presented to the 29<sup>th</sup> ISTC Scientific Advisory Committee, Brookhaven National Laboratory January 28, 2004.

Francis, A. J. "Microbial Transformations of Radionuclides and Toxic Metals: Implications on Radioactive Waste Disposal and Environmental Remediation" Presented to the BNL Envoy Group, March 24, 2004

Francis, A.J. "Microbial Transformation of Radioactive Waste" NYU Graduate School of Journalism Science and Environmental Reporting Program, April 16, 2004.

Francis, A.J. "Microbial Transformations of Actinides: Implications on Radioactive Waste Disposal and Environmental Remediation" Presented at the BNL Management Council Meeting September 21, 2004.

Francis, A.J. "Microbial Transformations of Actinides and Environmental Restoration through bioremediation", Harry Reid Center, University of Las Vegas Nevada, February 18, 2005.



Francis, A.J. "Microbial Transformation of Radioactive Waste" NYU Graduate School of Journalism Science and Environmental Reporting Program, April 22, 2005.

"Microbial Transformations of Actinides and Environmental Restoration Through Bioremediation." Special Topic Lecture - ACS sponsored Summer School in Nuclear Chemistry at BNL June 27, 2005.

Invited talk at the "Actinides 2005" 7<sup>th</sup> International Conference, July 4-8, 2005, Manchester, England. Microbial Transformations of Actinides in Transuranic and Mixed Wastes and its Implications on Radioactive Waste Disposal. Paper presented at the Actinides 2005 International conference, July 4- 8, 2005, Manchester, UK.

Invited talk "Biotransformation of Uranium Complexed with Organic Ligands" at the International Conference on Uranium Mining and Hydrogeology IV (UMH IV) September 11-16, 2005, Freiberg, Germany.

Francis, A.J. "Microbial Transformations of Radionuclides and Environmental Restoration Through Bioremediation" at the IUPAC sponsored 2nd International Symposium on Green/Sustainable Chemistry, held at the University of Delhi, India. January 10-13, 2006.

Francis, A.J. "Microbial Transformations of Radionuclides in Transuranic and Mixed Wastes" Colloquium, at the Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam, Chennai, Tamil Nadu. January 23-24, 2006.

Francis, A.J. "Microbial Transformations of Plutonium". Plutonium Futures – The Science 2006, Pacific Grove, California, July 9-13, 2006.

Francis, A.J. "Microbial Transformations of Actinides and Environmental Restoration Through Bioremediation." Special Topics Lecture - ACS sponsored Summer School in Nuclear Chemistry at BNL July 17, 2006.

Francis, A.J. "Emerging Trends in Separation Science and Technology" September 13-14, 2006 at the Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam, Chennai, Tamil Nadu.

Francis, A.J. "Microbial Transformations of Radionuclides and Environmental Restoration Through Bioremediation" at the "Emerging Trends in Separation Science and Technology" SESTEC-2006 held at BARC, Mumbai, September 29 – October 1, 2006, organized by the Department of Atomic Energy (DAE) – Board of Research in Nuclear Sciences (BRNS) Biennial Symposium.

Francis, A.J. "Microbial Transformations of Radionuclides Released from Nuclear Reprocessing Plants" at the International Symposium on Environmental Modeling and Radioecology" organized by the Institute for Environmental Sciences (IES), Rokkasho, Aomori, Japan, October 18-20, 2006.

Francis, A.J. "Microbial Transformations of Plutonium." International Symposium on Advanced Science Research "Frontiers of Nuclear and Radiochemistry" ASR2006. Organized by Advanced Science Research Center (ASRC), Japan Atomic Energy Agency (JAEA), Tokai, Ibaraki, Japan. October 26-27, 2006.

Francis, A.J. "Remediation of Soils, Wastes and Materials Contaminated with Radionuclides and Toxic metals by Citric Acid". Presented at the CEMS Teacher Workshop, Brookhaven National Laboratory, April 21, 2007.

Francis, A.J. "Microbial Transformations of Radionuclides and Environmental Restoration through Bioremediation." 2007 NCSS Symposium: Nuclear Science and the Environment- ACS sponsored Summer School in Nuclear Chemistry at BNL July 17, 2007.

Francis, A.J. "Microbial Transformations of Actinides and Environmental restoration Through Bioremediation". Presented at the Chemistry Department Colloquium, Brooklyn College of the City University of New York, May 4, 2007.

Francis, A.J. "Remediation of Soils, Wastes and Materials Contaminated with Radionuclides and Toxic metals by Citric Acid". Presented at the EHUFSD Professional Growth Day, Teachers Workshop, Brookhaven National Laboratory, April 22, 2008.

Francis, A.J. "Microbial Transformations of Actinides and Environmental Restoration through Bioremediation." 2008 NCSS Symposium: Nuclear Science and the Environment- ACS sponsored Summer School in Nuclear Chemistry at BNL July 15, 2008.

Francis, A. J. Microbial transformations of uranium in wastes and implication on its mobility. Presented at the International Conference on Uranium Mining and Hydrogeology V (UMH V) and the International the Uranium Mining and Milling Remediation Exchange Group (UMREG 2008) meeting, held in Freiberg, Germany, September 14-18, 2008.

Francis, A.J. Microbial Transformations of Actinides in Transuranic and Mixed Wastes: Implications on Radioactive Waste Disposal. Presented at NUCAR 2009, Mumbai, India, January 7-10, 2009.

Francis, A.J. Microbial Transformations of Actinides in Transuranic and Mixed Wastes: Implications on Radioactive Waste Disposal. Presented at IGCAR, Kalpakkam, India, January 12, 2009.

Francis, A.J. "Microbial Transformations of Actinides and Environmental Restoration through Bioremediation." Presented at the ACS sponsored in Nuclear Chemistry Summer School at BNL July 17, 2009.

## PUBLICATIONS

### JOURNAL ARTICLES

1. Francis, A.J. and M. Alexander. 1972. Catalase activity and nitrogen fixation in legume root nodules. *Can. J. Microbiol.* 18:861-864.
2. Francis, A.J. and M. Alexander. 1972. Acetylene reduction by effective and ineffective clover and soybean root nodules. *Arch. Microbiol.* 85:294-303.
3. Francis, A.J., J. Adamson, J.M. Duxbury, and M. Alexander. 1973. Life detection by gas chromatography-mass spectrometry of microbial metabolites. In *Modern Methods in the Study of Microbial Ecology. Bull. Ecol. Res. Comm. (Stockholm)* 17:485-488.
4. Francis, A.J. and M. Alexander. 1974. Physiological comparison of effective and ineffective isolates of rhizobia. *Soil Science* 118:31-37.
5. Francis, A.J., J.M. Duxbury, and M. Alexander. 1974. Evolution of dimethylselenide from soils. *Appl. Microbiol.* 28:248-250.
6. Adamson, J.A., A.J. Francis, J.M. Duxbury, and M. Alexander. 1975. Formation of volatile organic products in soils under anaerobiosis, Part I: Metabolism of Glucose. *Soil Biol. Biochem.* 7:45-50.
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9. Francis, A.J., R.J. Spanggord, G. Ouchi, R. Bramhall, and N. Bohonos. 1976. Metabolism of DDT analogues by a *Pseudomonas* sp. *Appl. Environ. Microbiol.* 32:213-216.
10. Smith, M.S., A.J. Francis, and J.M. Duxbury. 1977. Collection and analysis of organic gases from natural ecosystems: Application to poultry manure. *Environ. Sci. and Technol.* 11:51-55.
11. Nikaido, M.M., D.D. Raymond, A.J. Francis, and M. Alexander. 1977. Recovery of carcinogenic nitrosamines from water. *Water Res.* 11:1085-1087.
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15. Francis, A.J., S. Dobbs, and R.F. Doering. 1980. Biogenesis of tritiated and Carbon-14 methane from low-level radioactive waste. *Nuclear and Chemical Waste Management.* 1:153-159.
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17. Francis, A.J. 1982. Effects of acidic precipitation and acidity on soil microbial processes. *Water, Air and Soil Pollution* 18:375-394.
18. Francis, A.J. 1982. Microbial Transformation of Low-Level Radioactive Waste. In *Environmental Migration of Long-Lived Radionuclides*, IAEA-SM-257/72. Vienna. pp. 415-429.
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26. Francis, A.J., C.J. Dodge, A.W. Rose, and A. Ramirez. 1989. Aerobic and anaerobic microbial dissolution of toxic metals from coal waste: Mechanism of action. *Environ. Sci. Technol.* 23:435-441.

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147. Francis, A.J. "Microbial Transformation of Radioactive Waste" NYU graduate school of Journalism Science and Environmental Reporting program, April 19, 2002. (Talk) Organized by Elaine Lowenstein, BNL Tour Program, Community Involvement.
148. Francis, A.J. "Microbial Transformations of Actinides and Environmental Restoration Through Bioremediation". Special lecture given at the "ACS sponsored Summer School in Nuclear and Radiochemistry" at BNL – July 10, 2002 Special Topics. (Invited by Kathy Kolzky, Medical Department).
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#### **TRANSACTIONS, PROCEEDINGS, ABSTRACTS, MEETINGS**

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80. Zhang C., S.V. Malhotra, A.J. Francis. Effects of ionic liquids on uranium bioreduction. Paper presented at Pacificchem 2005 International Chemical Congress of Pacific Basin Societies, Honolulu, Hawaii, December 15-20, 2005.
81. Malhotra S.V., C Zhang, Francis, A.J. Biocatalysis of Uranium in presence of Ionic Liquids. Presented at the 10th Annual Green Chemistry and Engineering Conference June 26 - 30, 2006, Washington DC.
82. Francis, A.J., A.C. Matin, W. Gao, D. Chidambaram, Y. Barak, C. J. Dodge. 2006. Molecular mechanisms of uranium reduction by Clostridia. Poster presentation at 2006 Annual NABIR PI Meeting, April 19-21, 2006, Warrenton, VA.
83. Ozaki, T., T. Ohnuki, A. J. Francis. Effect of ionic strength on coordination of Eu(III) and Cm(III) on *Halomonas* sp. Paper presented at the 232<sup>nd</sup> American Chemical Society National Meeting, Sep 10 - -14, 2006, San Francisco.
84. Gao, W. and A. J. Francis. Mechanisms of Uranium(VI) Reduction by Clostridia. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.
85. Nankawa, T., Y. Suzuki, T. Ozaki, A.J. Francis, and T. Ohnuki. Catalytic reduction of uranium(VI) by surface immobilized cytochrome C of *Saccharomyces cerevisiae* on ITO electrode. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.
86. Wang, H., C.J. Dodge, S.V. Malhotra, and A.J. Francis. Interaction of Methoxyethyl methyl imidazolium tetrafluoroborate with uranium and its application on uranium bioreduction. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.

87. Halada, G.P., M. Cuiffo, A. J. Francis, and C J. Dodge. Effect of uranium complexation on aging of iron oxyhydroxides. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.
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89. Dodge C.J. and A.J. Francis. Mechanisms of microbial transformations of TRU wastes. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.
90. Chidambaram, D. And A.J. Francis. Extracellular reduction of hexavalent uranium by *Clostridium* sp. Paper presented at the 233<sup>rd</sup> ACS National Meeting, March 25-29, 2007, Chicago, IL.
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92. Francis, A.J., W. Gao, D. Chidambaram, C.J. Dodge, B. Salles, and A.C. Matin. Molecular mechanism of uranium reduction by clostridia and its manipulation. Poster presented at the 2<sup>nd</sup> Annual DOE-ERSP PI Meeting April 16-19, 2007, Lansdowne, Virginia.
93. Francis, A.J. and C.J. Dodge. Mechanisms of microbial transformations of actinides. Poster presented at the 2<sup>nd</sup> Annual DOE-ERSP PI Meeting April 16-19, 2007, Lansdowne, Virginia.
94. Wang, H., V. Kumar, A.J. Francis and S. V. Malhotra. Toxicity of methoxyethyl methyl imidazolium-based ionic liquids on *Clostridium* sp. Paper presented at the 11<sup>th</sup> Annual Green Chemistry Meeting, June 27-29, 2007, Washington DC.
95. Malhotra, S. V., C. Zhang, H. Wang, C.J. Dodge, A.J. Francis. Biotransformation of uranium in ionic liquids. Paper presented at the 2<sup>nd</sup> International Conference on Ionic Liquids (COIL-2) Yokohoma, Japan August 5-10, 2007.
96. Ohnuki, T., T. Yoshida, T.Ozaki, F. Sakamoto, N. Kozai, T. Nankawa, Y. Suzuki, A. J. Francis. Interactions of heavy elements with microorganisms. Paper presented at the Goldschmidt 2007 Conference, Cologne, Germany August 20 - 24, 2007.
97. Suzuki, Y., T. Nankawa, T. Ozaki, T. Ohnuki, A. J. Francis. Reduction of U(VI) by *Shewanella putrefaciens* in the presence of organic acids. Paper presented at the Goldschmidt 2007 Conference, Cologne, Germany August 20 - 24, 2007.

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99. Nankawa, T., Y. Suzuki, T. Ozaki, T. Ohnuki, A.J. Francis. In situ monitoring of uranium reduction by slab optical wave guide (SOWE) spectroscopy. Paper presented at the “Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere” - Migration '07, Munich, Germany August 26-31, 2007.
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101. Sakamoto, F., T. Nankawa, T. Ohnuki, A.J. Francis. Analysis of proteins expressed in *Saccharomyces cerevesiae* exposed to uranium. Paper presented at the “Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere” - Migration '07, Munich, Germany August 26-31, 2007.
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103. Um, W., C. F. Brown, R. J. Serne, Z. Wang, C. J. Dodge, And A. J. Francis. 2008. Uranium surface species on BX Tank Farm sediments at the Hanford Site. Paper presented at the 235th ACS National Meeting, New Orleans, LA, April 6 - 10, 2008.
104. Ohnuki, T., T. Ozaki, F. Sakamoto, N. Kozai, T. Nankawa, Y. Suzuki, A. J. Francis. Interactions of actinides with microorganisms and organic ligands. Paper presented at the Goldschmidt 2008 –“From Sea to Sky” Vancouver, Canada, July 13-18, 2008.
105. Ohnuki T., Y. Suzuki, T. Nankawa, N. Kozai, A.J. Francis. 2009. Microbial redox reaction of uranium – effects of organic acids. Paper presented at the 12<sup>th</sup> International conference on the “Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere” - Migration '09, Kennewick, Washington, USA September 20-25, 2009.
106. Xu, C., P.H. Santschi, J.Y. Zhong, P.G. Hatcher, A.J. Francis, C.J Dodge, K.A. Roberts, C.-C. Hung, B.D. Honeyman. “Mobilization Of Plutonium By Organic Matter Decomposition Products And Microbial Metabolites.” Paper presented at the 12<sup>th</sup> International conference on the “Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere” - Migration '09, Kennewick, Washington, USA September 20-25, 2009.

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**GERALD GORDON**

## Curriculum Vitae

Gerald M. Gordon  
Consultant, Materials and Corrosion Performance  
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### **Summary of Relevant Qualifications**

Internationally recognized technical expert in fields of physical metallurgy, corrosion and light water reactor and nuclear waste repository materials performance. Over 75 technical papers and 19 U.S. Patent dealing with nuclear reactor materials performance and high temperature materials performance.

Extensive experience in U.S., Europe and Asia dealing with complex technical issues with electrical utility executives, as well as state and national regulatory bodies

Excellent written and oral communication skills and ability to explain complex technical issues in lay terms

Experienced General Electric Company Executive Band Technical Manager capable of guiding challenging technical projects to successful fruition

### **Education**

B.S., Metallurgical Engineering, Wayne State University  
Ph.D., Metallurgical Engineering, The Ohio State University

### **Technical and Professional Credentials/Honors**

#### Professional Awards

- 2007 Elected Fellow, National Association of Corrosion Engineers (NACE International)
- 2002 Recipient of F.N. Speller Award from National Association of Corrosion Engineers "For distinguished and sustained contributions to the understanding of corrosion, stress corrosion cracking and physical metallurgy of austenitic stainless steel and nickel based alloys".
- 1989 Recipient of General Electric Company STEINMETZ Award for "Outstanding technical contributions in area of BWR materials performance."
- 1975 Elected Fellow, American Society for Metals

#### Other Professional Honors/Accomplishments

- Registered Professional Engineer in Metallurgical Engineering, State of California

- 2003-2004 Appointed by US DOE as member of the Independent Technology Review Group (ITRG) for the Next Generation Nuclear Plant. Served on Group as Materials Performance member from 11/03 to 5/04. Group effort culminated in issuance of final report, Design Features and Technology Uncertainties for the Next Generation Nuclear Plant, INEEL/EXT-04-1816, April, 2004.
- 2003 Invited Session Chairman on session on Performance of Nuclear Materials, 11th International Conference on Environmental Degradation of Materials - Nuclear Reactors, American Nuclear Society, Stevenson, WA, August 10-14, 2003
- 2003 Presented invited paper on “Considerations Related to Fabrication of High-Level Radioactive Waste Packages to be Emplaced at the Proposed Yucca Mountain Repository at TMS 2003 Materials Science and Technology 2003 Conference, November 10, 2003, Chicago, Ill.
- 1975-2002 Invited Session Chairman and member of organizing committees at seven other major international conferences dealing with light water reactor
- 1989 Invited by US NRC to participate as only BWR Industry member of US/Soviet Union International Technical Experts Exchange Meeting on LWR Materials Issues, Soviet Union, 1989
- 1987-89 Chairman, International Cooperative Group on Irradiation Assisted Stress Corrosion Cracking, (EPRI Administered body)
- 1987 Accredited as Corrosion Specialist, National Association of Corrosion Engineers
- 1977-90 Chairman, International BWR Working Group on Reactor Materials Performance, (Group members included Hitachi Ltd., Toshiba Corp. and ABB-Atom).
- 1976 Chairman, National Association of Corrosion Engineers Committee T-11A, Corrosion in High Purity Power Plant Water.

### **Professional Memberships**

American Society for Metals  
 The Metallurgical Society  
 National Association of Corrosion Engineers

### **Work Experience**

2/07 - Date – Consultant, Sandia National Laboratories.

Providing technical support to the Yucca Mountain Project (YMP) Lead Laboratory in the areas of waste package and drip shield materials performance, corrosion and stress corrosion cracking. Contributor to numerous NRC Requests for Additional Information (RAIs), Contention Responses and Analysis and Model Reports.

3/98 - 2/07 – AREVA/Framatome - Advanced Nuclear Power( FANP), Senior Staff

## Scientist

Responsible for providing senior technical support to the YMP Project in the area of materials performance, corrosion and selection of materials. Acted as a senior materials spokesperson for the Project with the Nuclear Regulatory Commission, Nuclear Waste Technical Review Board and Advisory Committee on Nuclear Waste. Also provided technical direction on external contracts for the Project in the areas of materials performance, design support and corrosion. Interfaced with Lawrence Livermore National Laboratory Principal Investigators in areas of corrosion, physical metallurgy and modeling of long-term materials performance.

## 7/95 - 3/98- Consultant/Independent Contractor

Provided materials/corrosion technical support to General Electric, EPRI and electric utilities.

## 1/64 - 6/95 - General Electric Company Nuclear Energy Division

Thirty-one years experience included performing research and development in the fields of corrosion/stress corrosion cracking, physical metallurgy and radiation effects on materials as a Technical Specialist and as Chief Technologist. (Work resulted in over 50 technical papers and 19 US patents).

Also, managed internationally recognized Nuclear Reactor Materials/Corrosion Research, Testing, Development and Engineering organizations whose scope has included light water and fast reactor materials performance, salt water conversion corrosion research and high temperature materials technology. Recognized by utility industry and relevant regulatory bodies worldwide as key materials and corrosion technical expert.

## 1/60 – 1/64 – Stanford Research Institute, Menlo Park, CA

Principal Investigator performing research and development testing in the area of high temperature materials performance.

## **Other Relevant Experience**

Many public appearances as General Electric materials/corrosion expert before various international and U.S. government and state regulatory groups including the Nuclear Regulatory Commission, The Advisory Committee on Reactor Safeguards, Atomic Safety and Licensing Boards, and Public Utility Commissions.

## **Gerald Gordon - Publications and Patents**

Author of over 75 publications and papers, plus 19 U.S. Patents

### **Publications During Previous 10 Years**

1. Mon, K.G., De, G.C., Gordon, G.M., Hua, F. and Andresen, P.L., "Potential SCC Initiation and Propagation in Titanium Alloys Under U.S. Nuclear Waste Repository Conditions", Proceedings, 17<sup>th</sup> International Corrosion Congress, Las Vegas, Nevada, October 6-8, 2008, NACE
2. Gordon, G., Mon, K.G. and Kim, Y.J., "Characterization of General and Localized Corrosion Resistance of Several Titanium Alloys in High Temperature Brines", Proceedings, 17<sup>th</sup> International Corrosion Congress, Las Vegas, Nevada, October 6-8, 2008, NACE
3. Hua, F., Mon, K., De, G., Gordon, G.M., and Andresen, P.L., "The Potential for the SCC of Titanium Alloys under Repository-Relevant Environments for U.S. Nuclear Waste", Journal of Metals, January 2008, pp. 66-72
4. P.L. Andresen, G.M. Catlin, P.W. Emigh and G.M. Gordon, "SCC of Ti Alloys in CT, U-bend and Constant Load Specimens", Paper No. 07607, Corrosion 2007, NACE
5. G. De, K. Mon, G. Gordon, F. Hua and D. Shoesmith, "An Evaluation of Hydrogen Induced Cracking Susceptibility of Titanium Alloys in US High-Level Nuclear Waste Repository Environments", Stainless Steel World, April 2006
6. F. Hua, G. Gordon, K. Mon, and R. Rebak, "Degradation Modes of Alloy 22 in Yucca Mountain Repository Conditions", Paper No. 06619, Corrosion 2006, NACE
7. F. Hua, K. Mon, G. Gordon, D. Shoesmith and R. Rebak, "Some Materials Degradation Issues in the U.S. High-Level Nuclear Waste Repository Study (The Yucca Mountain Project)", Proceedings, 16<sup>th</sup> International Corrosion Congress, Beijing, China, September 19-24, 2005
8. F. Hua, K. Mon, V. Pasupathi, G. Gordon and D. Shoesmith, "A Review of Corrosion of Ti Grade 7 and Other Ti Alloys in Nuclear Waste Repository Environments", Corrosion, 10, October 2005, pp 987-1003
9. P.L. Andresen and G.M. Gordon, "SCC Initiation and Growth in Alloy 22 and Titanium Alloys in Concentrated Groundwater", Proceedings, 12<sup>th</sup> International Conference on Environmental Degradation of Materials in Nuclear Systems-Water Reactors, Salt Lake City, UT, August 2005
10. K.G. Mon, G.M. Gordon, and R.B. Rebak, "Stifling of Crevice Corrosion in Alloy 22 in Chloride plus Nitrate Brines", Proceedings, 12<sup>th</sup> International Conference on Environmental Degradation of Materials in Nuclear Systems-Water Reactors, Salt Lake City, UT, August 2005, TMS
11. Fred Hua, Gopal C. De, and V. Pasupathi, Kevin Mon, Gerald M. Gordon and David W. Shoesmith, "Hydrogen Induced Cracking of Titanium Alloys in Nuclear Waste Repository Environments and its Modeling", Paper No. 05582, Corrosion 2005, NACE
12. F. Hua, K. Mon, P. Pasupathi, G. Gordon and D. Shoesmith, "Modeling the Hydrogen-Induced Cracking of Titanium Alloys in Nuclear Waste Repository Environments", Journal of Metals, January 2005, pp. 20-26
13. P.L. Andresen, G.M. Gordon and S.C. Lu, "Stress Corrosion Cracking Model for High Level Radioactive Waste Packages", Journal of Metals, January, 2005, pp.27-30.
14. F. Hua and G. Gordon, "Corrosion Behavior of Alloy 22 and Ti Grade 7 in a Nuclear Waste Repository Environment", Corrosion, Vol. 60, No. 8, pp764-777

15. S.C. Lu, G.M. Gordon, P.L. Andresen, "Validation of Stress Corrosion Cracking Model for High Level Radioactive Waste Packages", Paper PVP2004-2784, Transportation, Storage and Disposal of Radioactive Materials – 2004. PVP Proceedings-Vol 483. The American Society for Mechanical Engineering. New York, NY pp 61-68
16. P.L. Andresen, P.W. Emigh and G. M. Gordon, "SCC Growth Rate Studies on Welded and Aged Alloy 22 in Concentrated Groundwater, Paper No. 04695, Corrosion 2004, NACE
17. P.L. Andresen,, G. Catlin and G.M. Gordon, "Crack Initiation of Alloy 22 in Concentrated Groundwaters", Paper No. 04691, Corrosion 2004, NACE
18. F. Hua, K. Mon, P. Pasupathi, G.M. Gordon and D. Shoesmith, "Corrosion of Ti Gr 7 and Other Titanium Alloys in Nuclear Waste Repository Environments – A Review", Paper No. 04689, Corrosion 2004, March 2004, NACE
19. G.M. Gordon, *Considerations Related to Fabrication of High-Level Radioactive Waste Packages to be Emplaced at the Proposed Yucca Mountain Repository*, Invited paper presented at Materials Science & Technology 2003, TMS, Chicago, Ill November 9-12, 2003
20. P.L. Andresen, L.M. Young, G.M. Catlin, G.M. Gordon, Constant Load SCC of Proposed Waste Package Materials in Mixed Salt Environments, Proceedings, Eleventh International Conference on Environmental Degradation in Nuclear Power Systems –Light Water Reactors, Stevenson, WA August 10-14, 2003, American Nuclear Society, pp. 267-279
21. S.C. Lu, G.M. Gordon, P.L. Andresen and M.L. Herrera, Modeling of Stress Corrosion Cracking for High Level Radioactive Waste Packages, Transportation, Storage and Disposal of Radioactive Materials – 2003. PVP Proceedings-Vol 467. The American Society for Mechanical Engineering. New York, NY pp. 119-127
22. F. Hua and G.M. Gordon, *On Apparent Bi-linear Corrosion Behavior of Ti Grade 7 in Basic Saturated Water (BSW 12) Below And Above 80°C*, Paper No. 03687, Corrosion 2003, NACE
23. P.L. Andresen, L.M. Young and G.M. Gordon, Stress Corrosion Cracking Growth Rate Behavior of Alloy 22 (UNS N06022) in Concentrated Ground Water, Paper No. 03683, Corrosion 2003, March 2003, NACE
24. L.M. Young, P.L. Andresen, G.M. Catlin and G.M. Gordon, *Constant Load SCC Initiation Response of Alloy 22, Titanium Grade 7 and Stainless Steels at 105°C*, Paper No. 03685, Corrosion 2003, March 2003, NACE
25. G. M. Gordon, "Corrosion Considerations Related to Permanent Storage of High Level Radioactive Waste", Corrosion, October 2002, p 811-826.
26. L.M. Young, P.L. Andresen and G.M. Gordon, The Probabilistic Nature of Environmental Cracking in Candidate Waste Package Materials, Proceedings of Tenth International Conference on Environmental Degradation in Nuclear Power Systems, Water Reactors, NACE, 2002.
27. Young-Jin Kim, P.L. Andresen, Gerald M. Gordon et al, *Passivity of Nuclear Waste Candidate Materials in Mixed Salt Environments*, Paper No. 02544, Corrosion 2002, NACE
28. J.C. Estill, K.J. King, D. Fix,, D. Spurlock, G.A. Hust, S.R. Gordon, R. McCright, R. Rebak and G.M. Gordon, "Susceptibility of Alloy 22 to Environmentally Assisted Cracking in Yucca Mountain Relevant Environments", Paper No. 02535, Corrosion 2002, NACE
29. F.Hua, J Sarver, W. Mohn and G.M. Gordon, Crevice Corrosion Behavior of Candidate Nuclear Waste Container Materials in a Repository Environment, Paper No. 02529, Corrosion 2002, NACE
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