

R. MICHAEL BANISH
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Chemical and Materials Engineering
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Education

- Ph.D. (1992) Materials Science and Engineering, University of Utah.
Dissertation title: "Effusive Ampoule Physical Vapor Transport"
B.A. (1978) Chemistry and Biology, Westminster College, Salt Lake City, Utah.

Positions Held

- 2003-present Associate Professor, Chemical and Materials Engineering
2006-2012 UAH Campus Coordinator, Materials Science Graduate Program (Tri-campus)
1986-2005 Center for Microgravity and Materials Research, Senior Research Scientist
1978-1984 U. S. Bureau of Mines, Salt Lake City, Utah, Analytical Chemist.

Research

Thermophysical Properties of Materials (mass and thermal diffusivity, viscosity and undercooling measurements), Ternary-quaternary phase diagrams. Optical properties of materials. Dr. Banish has been the Co-I or PI for three spaceflight investigations. The scope of projects included the scientific investigation and hardware design, construction and operation. The first project was the self-diffusion of liquid indium metal on the Mir space station (1996-97). Dr. Banish was the PI on two (separate) NASA flight investigations Self-diffusion in liquid metals and Transport Properties of Te-Based II-IV Semiconducting compounds. These projects were unique NASA partnerships since UAH and Dr. Banish were directly responsible for the hardware design and construction. Both projects had completed their scientific reviews and were undergoing hardware reviews. These projects were cancelled after the loss of the Columbia Space Shuttle and ISS research was deemphasized.

Publications

- R. M. Banish, R. F. Xiao and F. Rosenberger, *Vapor Concentration Measurement by Photothermal Deflectometry*, J. Appl. Physics 64 (1988) 2907.
- L.B. Jalbert, R.M. Banish and F. Rosenberger, *Real-time Diffusivity Measurements in Liquids at Several Temperatures with one Sample*, Phys. Rev. E 57 (1998) 1727.
- L.B. Jalbert, F. Rosenberger and R.M. Banish, *On the Insensitivity of Liquid Diffusivity Measurements to Deviations from 1-D Diffusion*, J. Phys.: Cond. Matter 10 (1998) 7113.
- A. Taylor, R. M. Banish, Rhoda Hirsch and P. G. Vekilov, *Miniaturized scintillation technique for protein solubility determination*, Review of Scientific Instruments, 70, (1999) p. 2845.
- Yu Yu Khine and R. M. Banish, *Electromagnetic damping of convective contamination in self-diffusivity experiments with periodic heating conditions*, Materials Science and Engineering A, 393 (2005) 338.
- M.J. Assael, K Kakosimos, , R. M. Banish, et.al., *Reference Data for the Density and Viscosity of Liquid Aluminum and Liquid Iron*, Journal of Physical and Chemical Reference Data, 35, (2006) 285.

Yu Yu Khine and R. M. Banish, *3-D Mass Diffusivity Model of Liquid Metals in the Presence of a Magnetic Field*, , Journal of Crystal Growth, 287 (2006) 287.

Yu Yu Khine and R. M. Banish, *Effect of Input Diffusivity in an Axisymmetric Mass Diffusivity Model for Liquid Metals with an Applied Magnetic Field*, Annals New York Academy of Sciences 1077 (2006) 115.

M.J. Assael, K Kakosimos, , R. M. Banish, et.al., *Reference Data for the Density and Viscosity of Liquid Copper and Liquid Tin*, Journal of Physical and Chemical Reference Data, 35, (2010) 3103.

R.M. Banish and J.I.D. Alexander, *Reduced Algorithms for Diffusivity Determinations*, in Transport Properties of Fluids, W.A. Wakeham, A. Nagashima, and M.J. Assael editors. IUPAC (2014)

Graduate Students,

11 Master Degrees (Chemical Eng, Mechanical Eng, Physics, MTS), 1 Ph.D. (MTS)
Current 2 Master Degree 2 Ph.D. students

Selected Presentations and Invited Lectures

Viscosity and Density Measurements of Water-Corexit 9500A-Alkane Organics, 19th Symposium on Thermophysical Properties, Boulder, CO 2015.

Viscosity and Surface Tension of Si-Transition Metal Alloys, 19th Symposium on Thermophysical Properties, Boulder, CO 2015.

The Effect of Au on the Melting Point of SAC Alloys, 18th Symposium on Thermophysical Properties, Boulder, CO, June 24-29, 2012, with Julie Thomas.

Thermal Diffusivity Measurements in Sn-based Pb-free Solder Alloys, with Manijeh M. Alipour, 18th Symposium on Thermophysical Properties, Boulder, CO, June 24-29, 2012, to be submitted to International Journal of Thermophysics.

The Thermal Diffusivity of Type I, II and III Cement pastes during Curing, for publication in Cement and Concrete Research, 17th Symposium on Thermophysical Properties, Boulder, CO, July 29-August 2, 2009, with Alberto Hernandez-Barral

Application of Magnetic Fields to Minimize Convective Contamination for self-diffusivity measurements, 17th Symposium on Thermophysical Properties, Boulder, CO, July 29-August 2, 2009, paper with Yu Yu Khine.

Effect of Input Diffusivity in an Axisymmetric Mass Diffusivity Model for Liquid Metals with an Applied Magnetic Field, Engineering Conferences International, Tomar, Portugal, August 7-12, 2005

Thermal Diffusivity Determinations using Reduced Algorithms, 15th Symposium on Thermophysical Properties, Boulder, CO, June 22-27, 2003.

Convective effects during diffusivity measurements in liquids with an applied magnetic field, 16th European Conference on Thermophysical Properties, London, England 1-4 September 2002.

Consulting

Dr. Banish has done extensive consulting in the characterization and analysis of military based fuels. His work has included both the fundamental properties and characteristics of these fuels as well as analysis of their components, including trace impurity analysis. He has also consulted on the development of carbon sequestration technologies and semiconductor process development. Dr. Banish has consulted with Polaris Sensor Technologies (6 years), Grassmare, Inc (10 years), New York Energy Group (2 years), KT Engineering (1 year) Ceder Safe (1 year). Dr. Banish has also served as an expert witness, covering manufacturing processes and product quality.