

**Juan C. Ramirez, Ph.D., P.E., CFEI
Engineer**

Professional Profile

Dr. Juan Ramirez is an Engineer in Exponent's Thermal Sciences practice. Dr. Ramirez is a mechanical engineer and as such, he performs scientific investigations of fires and explosions in industrial, commercial, and residential settings. Past work has included investigations involving industrial systems such as gas-fired grain dryers, thermal fluid ovens, positive displacement compressors, grain elevators, and conveyor systems. Dr. Ramirez also provides consulting services in chemical process safety and hazard analysis. He has conducted facility siting and consequence analysis modeling studies, and participated as a HAZOP study team member.

Prior to joining Exponent, Dr. Ramirez was a post-doctoral research associate at the Materials Science & Technology Division of Los Alamos National Laboratory. During this time, he developed physical models for the kinetics of phase transformations, heat and mass transfer, nucleation, growth, and diffusion. He also performed computational modeling work in the fields of materials processing, solidification, and microfluidics.

Before returning to school full-time for his doctoral work, Dr. Ramirez worked in engineering consulting designing heating, ventilation, and air conditioning systems for retail and grocery stores and office buildings. He also interacted with architects, city officials, and inspectors involved in HVAC projects across the U.S. and Mexico.

Academic Credentials and Professional Honors

Ph.D., Mechanical Engineering, The University of Iowa, 2004

M.S., Mechanical Engineering, University of Missouri-Rolla, 1999

B.S., Mechanical Engineering, Universidad Central de Venezuela, 1996

Honorable mention for graduating first in class of 30 mechanical engineers

Licenses and Certifications

Professional Engineer, Illinois, License # 062063583

Certified Fire and Explosion Investigator (CFEI) by the National Association of Fire Investigators (NAFI) National Certification Board, Register # 14685-7659.

40-Hour HAZWOPER training program in accordance with 29 CFR Part 1910.120

Languages

Spanish

Academic Appointments

Adjunct Instructor, Engineering Thermodynamics or Mechanics of Materials, College of Dupage, continuously since the Fall semester, 2009

Peer-Reviewed Publications

Ramirez, JC, Ogle RA, Smyth SA. Towards an exergy-based explosion energy model for boiling-liquid expanding-vapor explosions. ASME 2011 International Mechanical Engineering Conference & Exposition IMECE 2011, Denver, CO, November, 2011.

Ogle RA, Ramirez JC, Smyth SA. Calculating the explosion energy of a boiling liquid expanding vapor explosion using exergy analysis. Process Safety Progress 2011; in press. doi: 10.1002/prs.10465.

Ramirez JC, Fecke M, Morrison D, Martens JD. Root cause analysis of an industrial boiler explosion (and how hazard analysis could have prevented it). Proceedings, ASME 2010 International Mechanical Engineering Congress & Exhibition IMECE2010, Vancouver, Canada, November 12–18, 2010.

Ramirez JC, Ogle RA, Carpenter AR, Morrison D. Preventing overpressure hazards from trapped liquids. Process Safety Progress 2010; 29:313–317.

Ramirez JC, Eby DJ, Bullen DB, Carpenter AR, Ogle RA. Inerted vessels: Avoiding hazards caused by gas buoyancy. Journal of Loss Prevention 2009; 22:791–794.

Mihaila B, Stan M, Ramirez JC, Zubelewicz A, Cristea P. Simulations of coupled heat transport, oxygen diffusion and thermal expansion in UO₂ nuclear fuel elements. Journal of Nuclear Materials 2009; 395:182–189.

Cristea P, Stan M, Ramirez JC. Point defects and oxygen diffusion in fluorite type oxides. Journal of Optoelectronics and Advanced Materials 2007; 9:1750–1756.

Stan M, Ramirez JC, Cristea P, Hu SY, Deo C, Uberuaga BP, Sriviliputhur S, Rudin SP, Wills JM. Models and simulations of nuclear fuel materials properties. Journal of Alloys and Compounds 2007; 444–445:415–423.

Ramirez JC, Stan M, Cristea P. Simulations of heat and oxygen diffusion in UO₂ nuclear fuel rods. Journal of Nuclear Materials 2006; 359:174–184.

Ramirez JC, Conlisk AT. Formation of vortices near abrupt nano-channel height changes in electro-osmotic flow of aqueous solutions. Biomedical Microdevices 2006; 8:325–330.

Lu Y, Beckermann C, Ramirez JC. Three-dimensional phase-field simulations of the effect of convection on free dendritic growth. *Journal of Crystal Growth* 2005; 280:320–334.

Ramirez JC, Beckermann C. Examination of binary alloy free dendritic growth theories with a phase-field model. *Acta Materialia* 2005; 53:1721–1736.

Ramirez JC, Beckermann C, Karma A, Diepers HJ. Phase-field modeling of solidification of binary alloys with coupled heat and solute diffusion. *Physical Review E*, 2004: 69:051607-1 – 051607-2.

Ramirez JC, Beckermann C. Evaluation of a Rayleigh-number-based freckle criterion for Pb–Sn and Ni–base Superalloys. *Metallurgical and Materials Transactions A*, 2003; 1525–1536.

Conference Presentations

Morrison DR, Fecke M, Ramirez JC. Using LOPA to understand necessary safeguards for steam boiler operation. 3rd CCPS Latin American Process Safety Conference and Expo, Buenos Aires, Argentina, August 8–10, 2011.

Ogle RA, Carpenter AR, Ramirez JC. Risk assessment of a propane storage sphere: Maintain or decommission? 7th Global Congress on Process Safety, American Institute of Chemical Engineers, 2011 Spring Meeting, Chicago, IL, March 16, 2011.

Ogle RA, Ramirez JC, Smyth SA. Calculating the explosion energy of a BLEVE using exergy analysis. 7th Global Congress on Process Safety, American Institute of Chemical Engineers, 2011 Spring Meeting, Chicago, IL, March 16, 2011.

Ogle RA, Morrison D, Carpenter AR, Ramirez JC. Process safety management of combustible and flammable liquids. The 2010 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2010), Caracas, Venezuela, October 19–21, 2010. (In Spanish).

Fecke MR, Martens J, Morrison D, Cowells, Ramirez JC. A guide to developing and implementing safety checklists: Plant steam utilities. AIChE 2-1- Midwest Conference, Chicago, IL, October 1, 2010.

Ogle RA, Morrison D, Carpenter AR, Ramirez JC. Common causes and corrections for explosions and fires in improperly inerted vessels. The 2008 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2008), Caracas, Venezuela, October 29–31, 2008. (In Spanish).

Ogle RA, Morrison D, Carpenter AR, Ramirez JC. The relationship between automation complexity and operator error. The 2008 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2008), Caracas, Venezuela, October 29–31, 2008. (In Spanish).

Ramirez JC, Eby DJ, Bullen DB, Carpenter AR, Ogle RA. Inerted vessels: Avoiding hazards caused by gas buoyancy. 2008 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2008.

Morrison D, Ogle RA, Ramirez JC. Evaporator upset investigation in a sugar processing plant. First Andean Congress on Safety and Health at Work, Lima, Perú, October 22–24, 2008. (In Spanish).

Stan M, Mihaila B, Valone SM, Andersson AD, McClellan KJ, Morales L, Conradson SD, Rudin SP, Wills JM, Cristea P, Ramirez JC. Thermodynamic models of actinide oxides. Materials Capability Review, Los Alamos National Laboratory, April 28–May 1, 2008 (invited).

Stan M, Hu SY, Mihaila B, Cristea P, Ramirez JC. Multiscale simulation of thermo-mechanical processes in irradiated fission-reactor materials. Computational Materials Science Network (CMSN) Symposium, Salt Lake City, UT, September 13–15, 2007 (invited).

Stan M, Ramirez JC, Cristea P, Hu SY, Deo C, Uberuaga BP, Srivilliputhur S, Rudin SP, Wills JM. Models and simulations of nuclear fuel materials properties. Materials Capability Review, Los Alamos National Laboratory, Los Alamos, NM, May 15–18, 2007.

Stan M, Ramirez JC, Cristea P. Thermodynamics of nuclear fuel materials. High Temperature Materials Chemistry conference, HTMC, Vienna, Austria, September 18–22, 2006 (invited).

Cristea P, Stan M, Ramirez JC. Point defects and oxygen diffusion in fluorite-type oxides. Romanian Conference on Advanced Materials, ROCAM 2006, Bucharest, Romania, September 9–10, 2006 (invited).

Stan M, Ramirez JC, Cristea P, Baskes MI, Valone SM, Hu SY. Thermodynamics of roses-toward predictive thermodynamic models and simulations. THERMO International 2006 Conference, Boulder, CO, July 30–August 4, 2006 (invited).

Stan M, Uberuaga BP, Srivilliputhur S, Ramirez JC, Deo C, Cristea P, Hu SY, Rudin SP, Wills JM. Models and simulations of nuclear fuel materials. Plutonium Futures—The Science 2006 International Conference, Pacific Grove, CA, July 9–13, 2006 (invited).

Ramirez JC, Zhao P, Heinrich JC. Diffuse and sharp interface methods in thermosolutal dendritic growth. TMS Annual Meeting, San Antonio, TX, March 12–16, 2006.

Ramirez JC, Conlisk AT. Geometry effects in electroosmotic flow in micro and nanochannels. COMSOL Multiphysics Conference, Boston, MA, October 23–25, 2005.

Ramirez JC, Beckermann C. Convective effects on thermosolutal dendritic growth. Poster presentation, TMS Annual Meeting, San Francisco, CA, February 13–17, 2005.

Ramirez JC, Beckermann C. Simulation of binary alloy free dendritic growth with a phase—Field model. Proceedings, International Conference Solidification Science and Processing: Emerging Trends, Bangalore, India, November 17–20, 2004.

Ramirez JC, Beckermann C. Examination of binary alloy free dendritic growth theories with a phase--field model. In: Solidification Processes and Microstructures: A Symposium in Honor of Wilfried Kurz, TMS Annual Meeting, p.373–378, Charlotte, NC, March 14–18, 2004.

Ramirez JC, Beckermann C. Phase—Field modeling of dendritic solidification with coupled heat and solute diffusion. Invited oral presentation to the Computational Phase Transformation Symposium, TMS Annual Meeting, San Diego, CA, March 2–6, 2003.

Ramirez JC, Beckermann C. Quantitative modeling of binary alloy solidification with coupled heat and mass diffusion via the phase—Field method. Proceedings, AIAA 41st Aerospace Sciences Meeting and Exhibit, Reno, NV, January 6–9, 2003.

Prior Experience

Los Alamos National Laboratory, Post-Doctoral Research Associate, 2004–2007
The University of Iowa, Research and Teaching Assistant, 2000–2004
Henderson Engineers, HVAC Design Engineer, 1999

Professional Affiliations

- American Society of Mechanical Engineers
- National Fire Protection Association
 - Technical Committee on Water Cooling Towers (Principal Member)
- National Association of Fire Investigators