

Eric G. Eddings
Associate Dean for Research, College of Engineering
Professor, Chemical Engineering
University of Utah

EDUCATION AND TRAINING

Ph.D. 1992, Chemical Engineering, University of Utah

B.S. 1988, Chemical Engineering, University of Utah

PROFESSIONAL EXPERIENCE

2011-present, Associate Dean for Research, College of Engineering, University of Utah

2010-present, Vice President of Technology, Amaron Energy, Salt Lake City, Utah

2005-present, Professor, Dept. of Chemical Engineering, University of Utah

2001-2005, Associate Professor, Dept. of Chemical Engineering, University of Utah

2001-present, Technical Advisor, Reaction Engineering International, Salt Lake City, Utah

1998-2000, Associate/Asst. Research Professor, Dept. of Chemical Engineering, University of Utah

1998-2001, Vice President, Reaction Engineering International, SLC, Utah

1992-1998, Manager/Senior Engineer, Reaction Engineering International, SLC, Utah

1982-1988, Lead/Asst. Chemist/Process Operations, Unisys Corporation, Salt Lake City, Utah

HONORS AND AWARDS

- Honorary Degree, *Doctor Honoris Causa*, University of Miskolc, Hungary, 2010
- Outstanding Teaching Award, College of Engineering, 2007
- Outstanding Instructor, Department of Chemical Engineering, 2007-2008, 2009-2010
- Rated in Top 15% of College of Engineering Instructors (2004, 2005, 2006, 2007, 2008, 2011)
- Kirkpatrick Chemical Engineering Honor Award (2005)
- Phi Kappa Phi (1992)

GRANTS RECEIVED (past 5 years)

“Use of Alternative Biomass Fuels in Lime Kilns,” Houghton Cascade, co-PI w/Kevin Whitty, May 2012 – Sep. 2012, \$110,000.

“Development of Burner Technology for In-situ Oil Shale Processing,” AMSO, LLC, co-PI w/Geoff Silcox, May 2012 – Apr. 2014, \$415,782.

“Mercury Reduction During Combustion of Low-Rank Coals,” Reaction Engineering International, Sept. 2012, \$18,560.

“NO_x Reduction During Pulverized Coal Combustion Using Various Chemical Agents,” Reaction Engineering International, Feb. 2012 – Jun. 2012, \$84,264.

“Comparison of Pinion Pine/Juniper Wood Co-Firing in Raw, Torrefied and Pyrolyzed Forms,” U.S. Forest Service/Utah State University, Feb. 2012 – Apr. 2012, \$49,350.

“Bio-Derived Fuels from the Pyrolysis of Waste Biomass Feedstocks,” WRE Biofuels, Oct. 2011 – Sept. 2012, \$75,000.

“Depolymerization of Waste Plastics to Produce Liquid Fuels,” PK Clean Technologies, Inc., Oct. 2011 – Sept. 2012, \$70,134.

“Char Burnout of Largest Fraction of Pulverized Coal Grinds Under Oxycoal Conditions,” Praxair, Inc, Aug. 2011 – Dec. 2012, \$117,000.

“IR Camera Diagnostics & V/UQ for Temperature Measurements,” U.S. Department of Energy, Clean and Secure Energy from Coal program, co-PI w/Terry Ring, Oct. 2011 – Aug. 2013, \$502,025.

“Underground Coal Thermal Treatment,” U.S. Department of Energy, Clean and Secure Energy from Coal program, co-PI w/Phil Smith, John McClennan, Oct. 2011 – Aug. 2013, \$396,283.

“Experimental Studies on Burner Characteristics, Ash Deposition, Corrosion and Chemistry under Oxycoal Combustion Conditions,” U.S. Department of Energy, w/ Reaction Engineering International, co-PI w/Jost Wendt and JoAnn Lighty, Oct. 2008 – Dec. 2011, \$833,543.

“Sorbent for Mercury Capture in a Circulating Fluidized Bed,” ADA-Environmental Solutions, w/Reaction Engineering International, May-Dec, 2011, \$88,900.

“Reagent to Mitigate Leachability of Toxic Metals from Coal Ash,” Headwaters, Inc., w/Reaction Engineering International, Aug.-Oct, 2011, \$13,129.

“Corn Stover Co-firing with Byproducts from Ethanol Production,” Detroit Stoker Company, Aug.-Oct., 2011, \$24,000.

“Oxyfiring of Coal in Entrained-Flow and Fluidized Bed Combustors,” Praxair, Inc., August 2007 – Dec. 2011, \$764,000.

“Oxy-Coal Combustion using Oxygen Transport Membranes,” U.S. Department of Energy, w/Praxair, Inc., April 2007 – June 2012, \$619,547.

“Advanced Diagnostics for Oxy-Coal Systems,” U.S. Department of Energy, Clean and Secure Energy from Coal program, co-PI w/Terry Ring, Oct. 2009 – Aug. 2013, \$299,863.

“Oxy-Coal Single-Particle Combustion,” U.S. Department of Energy, Clean and Secure Energy from Coal program, Oct. 2009 – Aug. 2013, \$129,955.

“Pilot-Scale Oxy-Coal Circulating Fluidized Bed Combustion,” U.S. Department of Energy, Clean and Secure Energy from Coal program, Oct. 2009 – Aug. 2013, \$144,525.

“Bench-Scale Simulation of Underground Thermal Treatment of Coal,” U.S. Department of Energy, Clean and Secure Energy from Coal program, Oct. 2009 – Sep. 2011, \$133,021.

“Co-Firing of Municipal Solid Waste Briquettes with Coal,” Detroit Stoker Company, June-July, 2011, \$22,000.

“Evaluation of a Coal Drying Process”, Syncoal Solutions, Inc., June –August 2010, \$42,679.

“Co-Combustion of Biomass/Bio-Derived Oil with Fossil Fuels”, PetroAlgae, LLC, Oct. 2009 – June 2010, \$51,000.

“Validation of Simulations for Jet Fuel Pool Fires – Year 6-10”, U.S. DOE program through the Center for Simulation of Accidental Fires and Explosions (C-SAFE) at the University of Utah, Dec. 2002 – Sept. 2010, \$3,188,745.

“Investigation of the Emission Characteristics of Modified Coals”, Headwaters Energy Services, Inc., June 2007 – December 2009, \$197,225.

“Multi-Scale Thermal Processing (Pyrolysis) of Shale,” U.S. Department of Energy, Utah Heavy Oil Program, co-PI w/Milind Deo, Oct. 2008 – Sept. 2009, \$151,707.

“Biomass Fuel Characterization in Stoker-Fired Furnaces”, Detroit Stoker Company, July 2001 – December 2009, \$119,000.

“Activated Carbon Drying & Raw Rice Hull Combustion & Gasification,” Producers Rice Mill, Inc., March 2009, \$12,500.

“Novel Sorbent for CO₂ Capture,” Micore, LLC, April 2009, \$51,500.

“Oxy-Coal Combustion in Circulating Fluidized Beds,” U.S. Department of Energy, Utah Clean Coal Program, Oct. 2008 – Sept. 2009, \$75,081.

“Advanced Diagnostics for Oxycoal Combustion,” U.S. Department of Energy, Utah Clean Coal Program, w/Terry Ring, Oct. 2008 – Sept. 2009, \$109,158.

“Near-Field Aerodynamics of Oxycoal Flames,” U.S. Department of Energy, Utah Clean Coal Program, w/Jost Wendt, Oct. 2008 – Sept. 2009, \$125,050.

“Biofuel Performance Characterization in Diesel Engines,” Phase I DOD (Army) STTR w/Resodyn Corporation July 2008 – December 2008, \$30,000.

“Development of Fundamental Rate Parameters for Oxy-Coal Firing in Circulating Fluidized Beds,” U.S. Department of Energy, Utah Clean Coal Center, July 2006 – June 2008, \$185,000.

“Detailed Study of Shale Pyrolysis for Oil Production,” U.S. DOE/Utah Heavy Oil Center, co-PI w/Milind Deo, May 2007 – June 2008, \$150,000.

“Chemical Production from Coal and Oil Shale Using a Retort,” Millennium Synfuels, Inc., co-PI w/JoAnn Lighty, Kevin Whitty, Geoff Silcox, April – Feb. 2008, \$255,000.

“Combustion Characteristics of Corn Stover in a Stoker-Fired Furnace,” Detroit Stoker Company, August 2007, \$15,667.

“Combustion Characteristics of Suspension-Fired Distiller Grains and Palm Kernels,” Detroit Stoker Company, June-July 2007, \$36,212.

REFEREED JOURNAL PUBLICATIONS (past 5 years)

J. Zhang, K.E. Kelly, **E.G. Eddings**, and J.O.L. Wendt, “CO₂ Effects on Near Field Aerodynamic Phenomena in 40kW, Co-Axial, Oxy-Coal, Turbulent Diffusion Flames,” *International Journal of Greenhouse Gas Control*, Vol. 5, S-1, S47-S57, 2011

- J. Ahn, Ryan Okerlund, A. Fry and **E.G. Eddings**, "Sulfur Trioxide Formation During Oxy-Coal Combustion," *International Journal of Greenhouse Gas Control*, Vol. 5, S-1, S127-S135, 2011.
- J. Zhang, K.E. Kelly, **E.G. Eddings**, J.O.L. Wendt, "Ignition in 40kW co-axial turbulent diffusion oxy-coal jet flames," *Proceedings of the Combustion Institute*, 33, 3375-3382, 2011.
- A. Sanchez, **E.G. Eddings** and F. Mondragon, "FTIR on line Monitoring of NO, N₂O and CO₂ during Oxygen-enriched Combustion of Carbonaceous Material," *Energy and Fuels*, 24 (9), pp. 4849-4853, 2010.
- Y. Okumura, J. Zhang, **E.G. Eddings**, J.O.L. Wendt, "Effect of O₂/CO₂ Ratio on Fuel-NO_x Formation in Oxy-coal Combustion," *Journal of Environment and Engineering*, Vol. 5, No. 2, 417-430, 2010.
- A. Santamaria, N. Yang, **E.G. Eddings** and F. Mondragon, "Chemical and Morphological Characterization of the Soot Produced in an Inverse Diffusion Flame with Aromatic and Aliphatic fuels," *Combustion and Flame*, 157, 33-42, 2010.
- C.A. Wight and **E.G. Eddings**, "Science-based Simulation Tools for Hazard Assessment and Mitigation," *International Journal of Energetic Materials and Chemical Propulsion*, Vol. 8, Issue 5, pp. 373-389, 2009.
- T.L. Henriksen, G.J. Nathan, Z.T. Alwahabi, N. Qamar, T.A. Ring and **E.G. Eddings**, "Planar measurements of soot volume fraction and OH in a JP-8 pool fire," *Combustion and Flame*, 156, 1480-1492, 2009.
- K. Szemmelveisz, I. Szöcs, Á.B. Palotás, L. Winkler and **E.G. Eddings**, "Examination of the Combustion Conditions of Herbaceous Biomass," *Fuel Processing Technology*, 90, 839-847, 2009.
- L. Huynh, H.R. Zhang, S. Zhang, **E.G. Eddings**, A.F. Sarofim, M. Law, P. Westmoreland and T. Truong, "Kinetics of Enol Formation from Reaction of OH with Propene," *Journal of Physical Chemistry A*, 113(13), 3177-3185, 2009.
- H.R. Zhang, **E.G. Eddings**, A.F. Sarofim and C.K. Westbrook, "Fuel Dependence of Benzene Pathways", *Proceedings of the Combustion Institute*, 32(1), 377-385, 2009.
- H.R. Zhang, **E.G. Eddings**, and A.F. Sarofim, "Pollutant Emissions from Gasoline Combustion: 1. Dependence on Fuel Structural Functionalities", *Environmental Science & Technology*, 42 (15), 5615-5621, 2008.
- K.J. Whitty, H.R. Zhang and **E.G. Eddings**, "Emissions from Syngas Combustion", *Combustion Science & Technology*, 180 (6), 1117 – 1136, 2008.
- H.R. Zhang, **E.G. Eddings**, and A.F. Sarofim, "A Journey from n-Heptane to Liquid Transportation Fuels. 1. The Role of the Allylic Radicals and Its Related Species in Aromatic Precursor Chemistry", *Energy and Fuels*, 22, 945-953, 2008.
- T.L. Henriksen, G.J. Nathan, T.A. Ring and **E.G. Eddings**, "Puffing Frequency and Soot Extinction Correlation in JP8 and Heptane Pool Fires," *Combustion Science & Technology*, 180, (4), 699-712, 2008.
- A. Santamaria, **E.G. Eddings**, and F. Mondragon, "Effect of ethanol on the chemical structure of the soot extractable material of an ethylene inverse diffusion flame," *Combustion and Flame*, **151**, 235-244, 2007.
- H. Zhang, **E.G. Eddings**, A.F. Sarofim, and C.K. Westbrook, "Mechanism Reduction and Generation Using Analysis of Major Fuel Consumption Pathways for n-Heptane in Premixed and Diffusion Flames," *Energy & Fuels*, 21(4), 1967-1976, 2007.
- H. Zhang, **E.G. Eddings** and A.F. Sarofim, "Olefin Chemistry in a Premixed n-Heptane Flame," *Energy & Fuels*, 21, 677-685, 2007.
- A. Santamaria, F. Mondragon, W. Quinones, **E.G. Eddings**, A.F. Sarofim, "Average structural analysis of the extractable material of young soot gathered in an ethylene inverse diffusion flame," *FUEL*, **86**, 1908-1917, 2007.
- N.D. Marsh, I. Preciado, **E.G. Eddings**, A.F. Sarofim, A.B. Palotas and J.D. Roberston, "Evaluation of Organo-Metallic Fuel Additives for Soot Suppression," *Combustion Science & Technology*, 179 (5), 987-1001, 2007.
- H.R. Zhang, **E.G. Eddings** and A.F. Sarofim, "Criteria for Selection of Components for Surrogates of Natural Gas and Transportation Fuels," *Proceedings of the Combustion Institute*, 31, 401-409, 2007.
- H. Zhang, **E.G. Eddings** and A.F. Sarofim, "Combustion Reactions of Paraffin Components in Liquid Transportation Fuels Using Generic Rates," *Combustion Science & Technology*, 179 (1-2), 61-89, 2007.

RELEVANT NON-REFEREED PUBLICATIONS

K.J. Whitty, H.R. Zhang and **E.G. Eddings**, “Pollutant Formation and Control,” Ch. 6 in *Synthesis Gas Combustion*, eds. T. Lieuwen, V. Yang, R. Yetter, CRC Press/Taylor and Francis (2009).

H.R. Zhang, **E.G. Eddings**, A.F. Sarofim, C.L. Mayne, Z. Yang and R.J. Pugmire “Selection of Surrogates for Jet Fuels,” in *Combustion Generated Fine Carbonaceous Particles*, eds. H. Bockhorn, A. D’Anna, A.F. Sarofim, H. Wang, KIT Scientific Publishing (ISBN 978-3-86644-441-6), 2009

E.G. Eddings, “Combustion,” Ch. 16, Mechanical Engineer’s Handbook, 3rd Edition, *Book 4: Energy and Power*, John Wiley & Sons, New York, 2006.