

CURRICULUM VITAE

NAME:

Eric G. Eddings

TITLE:

Chair, Department of Chemical Engineering, University of Utah
Professor, Department of Chemical Engineering, University of Utah

EDUCATION:

B.S. Chemical Engineering, University of Utah, 1988
Ph.D. Chemical Engineering, University of Utah, 1992

PROFESSIONAL SOCIETIES:

- American Institute of Chemical Engineers (AIChE)
- American Society for Engineering Education (ASEE)

ACADEMIC EXPERIENCE:

Department Chair (2019-present)

University of Utah, Department of Chemical Engineering, Salt Lake City, Utah

Associate Dean for Research (2011-2019)

University of Utah, College of Engineering, Salt Lake City, Utah

Professor (2009-present)

University of Utah, Dept. of Chemical Engineering, Salt Lake City, Utah

Associate Professor (2001-2009)

University of Utah, Dept. of Chemical Engineering, Salt Lake City, Utah

Visiting Scholar (March/April 2001)

Tsinghua University, Dept. of Thermal Engineering, Beijing, People's Republic of China:

Research Associate Professor (2000-2001)

University of Utah, Dept. of Chemical and Fuels Engineering, Salt Lake City, Utah

Research Assistant Professor (1998-2000)

University of Utah, Dept. of Chemical and Fuels Engineering, Salt Lake City, Utah

INDUSTRIAL EXPERIENCE:

Partner (2011-2021)

Amaron Energy, Salt Lake City, Utah

Technical Advisor (2001-2010)

Reaction Engineering International, Salt Lake City, Utah

Vice President, Business Development (1998-2001)

Reaction Engineering International, Salt Lake City, Utah

Manager, Industrial Technologies (1996-1998)

Reaction Engineering International, Salt Lake City, Utah

Senior Engineer (1992-1996)

Reaction Engineering International, Salt Lake City, Utah

Lead Chemist (1988)

Unisys Corp., Salt Lake Printed Circuit Facility, Salt Lake City, Utah

Assistant Chemist (1985-1987)

Unisys Corp., Salt Lake Printed Circuit Facility, Salt Lake City, Utah

Printed Circuit Process Technician (1982-1985)

Sperry-Univac Corp., Central Printed Circuit Facility, Salt Lake City, Utah

HONORS AND AWARDS:

- Fellow, American Institute of Chemical Engineers, 2022
- 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, 2013, 2015, 2016, 2018)
- Kirkpatrick Chemical Engineering Honor Award (2005)
- Phi Kappa Phi (1992)

RESEARCH GRANTS (\$25.6 M Total - \$19.0 M as PI and \$6.6 M as co-PI):

“Environmentally Friendly Production of High-Quality and Multifunctional Carbon Quantum Dots from Coal,” U.S. Department of Energy w/U of Wyoming, Jan. 2021 – Dec. 2023, \$219,618.

“Sub-pilot-scale Production of High-value Products from U.S. Coals,” U.S. Department of Energy, Jun. 2020 – Nov. 2023, \$1,932,495.

“Plastic-derived Mesophase Pitch for Carbon Fiber Production,” University of Utah Ascender Grant, Apr. 2020 – Aug. 2023, \$70,000.

“Development of Allothermal Rotary Gasifier with CO₂ Acceptor for Hydrogen Production from Coal Waste and Biomass,” U.S. Department of Energy Phase I SBIR w/Reaction Engineering International, Jun. 2022–Jun. 2023, \$75,000.

“Rotary Kiln Approach to Produce Biochar from Invasive Scrub Species for Soil Remediation and Carbon Sequestration,” U.S. Department of Energy Phase I SBIR w/Reaction Engineering International, Jun. 2022–Jun. 2023, \$34,000.

“SusChEM: Co-firing Biomass and Coal under Pressurized Oxy-fired Combustion Conditions,” U.S. National Science Foundation, Jul. 2016 – Jun. 2022, \$537,078.

“Coal to Carbon Fiber Program,” Utah Office of Energy Development,

Jul. 2021 – Jun. 2022, \$83,833.

“Heavy Hydrocarbon Processing,” Phillips 66, Jul. 2021 - Dec. 2021, \$36,600.

“Biomass Co-firing Demonstration,” PacifiCorp, Jul. 2017 - Nov. 2021, \$636,268.

“Production of Carbon Fiber from Coal-derived Pitch,” U.S. Dept. of Commerce, Economic Development Administration, Oct. 2016 – Sep. 2020, \$1,583,569.

“Task 3.3: Experimental Data and Analysis for V/UQ,” U.S. Department of Energy, Carbon Capture Multidisciplinary Simulation Center, Mar. 2014 - Dec. 2020, \$1,768,000.

“Coal to Carbon Fiber Program,” Utah Office of Energy Services, Jul. 2018 – Jun. 2020, \$469,000.

“Production of Hydrogen Through Photoelectrocatalytic Oxidation of Coal using TiO₂ Nanotube Arrays,” University of Utah Research Foundation, Seed Grant w/Bobby Mohanty, Jul 2016 – Jun 2017, \$17,500.

“Milling of Hunter Coal with Torrefied Wood Blends,” PacifiCorp, Sept. 2016 - Dec. 2016, \$60,363.

“Development of a Sub-surface Burner Technology for In-situ Heating,” AMO, LLC, May 2014 - Jun. 2016, \$175,000.

“Hydroprocessing of Fast Pyrolysis Bio-Oils,” Dept. of Transportation Sun Grant w/ Utah State University, Oct. 2013 - Apr. 2016, \$187,500.

“NSF Workshop on Combustion,” U.S. National Science Foundation, Feb. 2014 - Jan. 2015, \$49,957.

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

“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. 2014, \$502,025.

“Underground Coal Thermal Treatment,” U.S. Department of Energy, Clean and Secure Energy from Coal program, Oct. 2011 – Aug. 2014, \$396,283.

“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. 2014, \$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.

“Depolymerization of Waste Plastics to Produce Liquid Fuels,” PK Clean

Technologies, Inc., Oct. 2011 – May 2014, \$294,906.

“Characterization of Oxy-combustion Impacts in Existing Coal Fired Boilers,” U.S. Department of Energy, w/ Reaction Engineering International, Oct 2012 – Aug. 2013, \$214,820.

“Development of Combustion Tuning Guidelines,” Korea South East Power (KOSEP) through Pusan National University, May 2013 - May 2014, \$35,286.

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

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

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

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

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

“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.

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

“Emissions from Waste Biomass Filter Cake and Syrup,” Detroit Stoker Company, Apr. 2012 – May. 2012, \$27,690.

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

“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.

“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.

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

“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.

“Fuel Rich Reagent Injection for NO_x Control,” Electric Power Research Institute w/Reaction Engineering International, April-May, 2007, \$14,150.

“Pilot-scale Demonstration of Advanced Layered Technology Approach (ALTA) for NO_x Control in Coal-Fired Utility Boilers,” U.S. Department of Energy, w/Electric Power Research Institute and Reaction Engineering International, Oct. 2005-Apr. 2007, \$90,000.

“Sulfur Capture in Coal-Fired Stoker Furnaces”, Detroit Stoker Company, October 2006 – December 2006, \$24,000.

“Hydrocarbon Emissions from Cement Samples”, various cement companies, with Reaction Engineering International, Nov. 1999 – Dec. 2006, \$99,000.

“Emission Characteristics of Catalytically-Modified Pulverized Coal”, Headwaters Energy Services, Inc., May 2005 – December 2006, \$136,500.

“SO₂ Evolution and Capture on Cement Raw Materials,” Portland Cement Association, w/CTLGroup, Dec. 2005-Dec. 2006, \$64,000.

“Performance-Enhancing Liquid Additives for Coal-fired Power Generation,” Afton Chemical Corp., w/Reaction Engineering International, August 2005 – December 2006, \$54,360.

“Mercury Evolution from Cement Raw Materials”, Portland Cement Association w/Reaction Engineering International, June 2005 – April 2006, \$28,000.

“Multifunctional Fuel Additives for Reduced Jet Fuel Particulate Emissions”, U.S. Air Force, Phase II SBIR w/Reaction Engineering International, August 2003 – November 2005, \$200,000.

“Cofiring Bagasse and Cane Waste in Stoker-fired Boilers”, Detroit Stoker Company, March 2004 – June 2005, \$22,000.

“Enhanced Coal Reburning Under Oxidizing Conditions,” U.S. DOE, October 2002 – June 2004, \$50,000.

“Residual Ash from Coconut Char Sorbent”, U.S. Army, Phase II-plus SBIR w/Reaction Engineering International, June 2004 – August 2004, \$10,000.

“Flame Stability of Pulverized Petroleum Coke,” ConocoPhillips w/Reaction Engineering International, Sept. – Oct. 2003, \$35,000.

“Catalytic NO_x Reduction Using Waste Paint Pigments,” Waste Markets, Inc., Sept. – Nov. 2003, \$5,000.

“Design of Catalyst Slipstream Reactor,” American Electric Power (AEP) w/Reaction Engineering International, Sept. – Nov. 2003, \$7,000.

“Construction and Testing of a Corrosion Management Methodology for Coal-Fired Boilers,” Ohio Coal Development Office, State of Ohio w/Reaction Engineering International, June. – Nov. 2003, \$23,000.

“NOx Control Optimization and Integration to Utility Boilers”, U.S. DOE program, subcontract from Reaction Engineering International, Dec. 1999 – Sept. 2004, \$287,625.

“Oxygen Enhanced Combustion for NOx Control”, U.S. DOE program, subcontract from Praxair, Inc., Dec. 1999 – Dec. 2003, \$324,000.

“Fuel Additives for Reduced Jet Fuel Particulate Emissions”, U.S. Air Force, Phase I SBIR w/Reaction Engineering International, July 2002 – December 2002, \$25,000.

“Development and Demonstration of Novel Low NOx Burners for Boilers,” Institute of Gas Technology, Dec. 1999 – June 2002, \$40,000.

“Evolution of Nitrogenous Species from Mining Leachate Residues,” Cement Industry Environmental Consortium, July 2001 – October 2002, \$28,678.

“Validation of Simulations for Jet Fuel Pool Fires”, U.S. DOE program through the Center for Simulation of Accidental Fires and Explosions (C-SAFE) at the University of Utah, co-PI with Adel Sarofim, Oct. 1997 – Sept. 2002, \$2,066,000.

“Destruction of Biosludge in a Stoker-Fired Furnace”, Detroit Stoker Company, Sept. 2001 – January 2002, \$12,000.

“Construction of a Pilot-Scale Stoker Furnace”, Detroit Stoker Company, June 2000 – July 2001, \$178,000.

“Methods for the Reduction of NOx Emissions and Unburned Carbon in Ash – Phase II”, U.S. DOE program with Reaction Engineering International, co-PI with David Pershing, Sept. 1998 – Oct. 2000, \$461,621.

“Low Emission Boilers Systems (LEBS)”, U.S. DOE program with D.B. Riley, Inc., co-PI with David Pershing, Oct. 1997 – Sept. 2001, \$2,802,754.

“Minimization of NOx Emissions From Multi-Burner Coal-Fired Boilers”, U.S. DOE program, co-PI with David Pershing and Adel Sarofim, Sept. 1997 – Sept. 2001, \$487,000.

“Fuel-Rich SNCR”, Reaction Engineering International, Feb-March 1999, \$9,000.

“Thermal Soil Desorption”, ThermoRetec, March-April 1999, \$10,000.

“Processing and Drying of Biomass Residue for Feedstock to a Dedicated

Cogeneration Facility”, DOE SBIR Phase I with Reaction Engineering International, \$14,000.

“Kinetics of Sulfur Evolution During Coal Combustion”, Electric Power Research Institute (EPRI) program, with Reaction Engineering International, July – October, 2000, \$5,000.

GRADUATE STUDENTS SUPERVISED:

Current: Teri Draper - Ph.D. Chemical Engineering (Terry Ring, co-advisor)
Alex Prlina – Ph.D. Chemical Engineering

Previous: Wenjia Wang – “*Development of a Mild Solvolysis Liquefaction Method for Converting Low-rank Aromatic-rich Hydrocarbons into Value-added Mesophase Pitch,*” Ph.D. Thesis, Chemical Engineering, May 2023.

Joshua Malzahn – “*Controlled Secondary Gas-phase Reactions in Pyrolysis as a Pathway to Produce Anisotropic Carbon Materials from Non-Traditional Carbon Feedstocks,*” Ph.D. Thesis, Chemical Engineering, April 2022.

Ding Wang – “*Developments with Two Novel Coal Utilization Methods,*” Ph.D. Thesis, Chemical Engineering (Swomitra Mohanty, co-advisor), December 2019.

Fatemeh Babazadeh – “*Development of a Sub-surface Heater Technology for In-situ Heating,*” Ph.D. Thesis, Chemical Engineering (Geoff Silcox, co-advisor), December 2017.

Pal Toth – “*Applications of Image Processing in Combustion Research,*” Ph.D. Thesis, Chemical Engineering, May 2014.

Keith Gneshin – “*Mass Transfer and Devolatilization Phenomena in Very Large Coal Domains at Very Slow Heating Rates,*” Ph.D. Thesis, Chemical Engineering, August 2013.

Liyong Wang – “*Experimental and Modeling Study of SO₂ Behavior During Oxy-coal Combustion in Fluidized Beds,*” Ph.D. Thesis, Chemical Engineering, August 2012.

Joseph Adams – “*Oxy-coal Combustion using Oxygen Transport Membranes,*” Ph.D. Thesis, Chemical Engineering, August 2012.

Pal Toth – “*Holographic interferometry for CFD model validation,*” M.S. Thesis, Chemical Engineering (w/Terry Ring), August 2012.

Astrid Sanchez – “*Effect of O₂ and CO₂ on Nitrogen Compound Emissions During Fluidized Bed Oxy-Combustion Reactions,*” Ph.D. Thesis, Chemistry, University of Antioquia, Colombia (co-advisor w/Prof. Fanor Mondragon), August 2011.

Laurie Marcotte – “*Quantification of Uncertainty for Holographic Interferograms,*” M.S. Thesis, Chemical Engineering, August 2010.

Ignacio Preciado – “*Study of Soot Deposition in Flames and Its Effect on Heat Transfer to Metal Surfaces,*” Ph.D. Thesis, Chemical Engineering, December 2008.

Tara Henriksen – “*Simultaneous Spatially and Temporally Resolved Laser Induced Incandescence and Laser Induced Fluorescence Measurements in*

Jet Propulsion Fuel 8 and Heptane Pool Fires,” Ph.D. Thesis, Chemical Engineering, December 2007.

Alexander Santamaria – “*Chemical-Structural Characterization and Ethanol Effect on the Products Generated in Ethylene and Benzene Inverse Diffusion Flames,*” Ph.D. Thesis, Chemistry, University of Antioquia, Colombia (co-advisor w/Prof. Fanor Mondragon), February 2007.

Joy Sroykum – “*Statistical Validation of Chemical Kinetic Mechanisms in Reacting Flows,*” M.S. Thesis, Chemical Engineering, August 2007.

Shihong Yan – “*Formulation and Some Applications of Jet Fuel Surrogates,*” Ph.D. Thesis, Chemical Engineering, Dec. 2005.

Ignacio Preciado – “*Effect of Temperature, O₂ Concentration and Fuel Additives on Soot Reduction in Jet Fuel Diffusion Flames*”, M.S. Thesis, Chemical and Fuels Engineering, June 2005.

William Ciro – “*Heat Transfer at Interfaces of a Container of High-Energy Materials Immersed in a Pool Fire,*” Ph.D. Thesis, Chemical Engineering, Dec. 2004.

Zoran Djurisc – “*Chemical Kinetics of Nitrogen Fixation in Hydrocarbon Flame Fronts,*” Ph.D. Thesis, Chemical and Fuels Engineering, Dec. 2004.

Jimmy Daghlian – “*Soot Volume Fraction and Temperature Measurement in a Slot Burner Utilizing Laser Extinction and Emission,*” M.S. Thesis, Chemical and Fuels Engineering (w/Adel Sarofim), May, 2002.

Marc Wachenhausen – “*The Behavior of Iron Pyrite and Toxic Metals Under Low-NO_x Firing Conditions in a Wet-Bottom Boiler*”, Diploma Thesis (M.S.) in Mechanical Engineering, RWTH-Aachen, University of Technology, Germany, Oct. 1999 (w/Ulrich Ranz).

POST-DOCTORAL RESEARCH ASSOCIATES SUPERVISED:

Ding Wang, - Ph.D., Chemical Engineering, University of Utah (w/Swomitra Mohanty, Michael Nigra)

Helga Kovacs, - Ph.D., Mechanical Engineering, University of Miskolc

Zsolt Dobo, - Ph.D., Materials Science & Engineering, University of Miskolc

Haijun Wan, - Ph.D., Physical Chemistry, Chinese Academy of Science

Hongzhi Zhang, - Ph.D., Chemical Engineering, University of Utah

Ignacio Preciado, - Ph.D., Chemical Engineering, University of Utah

Husam el Gendy, - Ph.D., Physics, University of Utah (w/Milind Deo & Terry Ring)

Nathan D. Marsh, - Ph.D., Mechanical Engineering, Princeton University

Zhiwei Yang, - Ph.D., Mechanical Engineering, University of Delaware

TEACHING RESPONSIBILITIES:

Ch En 1703 Introduction to Engineering Computing

F03 (35 students), F04 (33 students), F05 (39 students), S06 (17 students), F15 (115 students)

Ch En 2953/55 Undergraduate Seminar

S20 (88 students), F20 (79 students), S21 (67 students), F21 (58 students), S22 (76 students), F22 (70 students), S23 (61 students), F23 (68 students)

Ch En 3353 Fluid Mechanics

F01 (32 students), F02 (31 students), F03 (30 students), F04 (30 students), F05 (38 students), F06 (34 students), F07 (53 students), F08 (35 students), F09 (36 students), F13 (78 students)

Ch En 3553 Chemical Reaction Engineering

S07 (30 students), S08 (54 students), S09 (33 students), S11 (31 students), S13 (47 students)

Ch En 3702 Projects Lab II

S21 (37 students), S23 (55 students)

Ch En 3853 Chemical Engineering Thermodynamics

F17 (88 students), F18 (65 students), F19 (67 students)

Ch En 4905 Senior Projects Laboratory II

S03 (12 students), S04 (21 students), S05 (22 students), S15 (25 students)

Ch En 5305/6305 Air Pollution Control Engineering

F98 (11 students), F99 (17 students), F07 (15 students)

Ch En 5153/6153 Fundamentals of Combustion

F10 (32 students), F11 (15 students), F16 (27 students)

Ch En 5960 Wood-fired Automobile Project

F14 (12 students), S15 (12 students)

UNIVERSITY SERVICE:

Departmental

Department Chair (2019 - present)

Graduate Committee (2001 – 2019)

Faculty Search Committee - Chair (July 2018 – June 2019)

Faculty Search Committee - Member (October 2015 – June 2016)

Faculty Search Committee - Chair (January 2015 – September 2015)

Faculty Search Committee - Member (February 2014 - December 2014)

Director of Graduate Studies (July 2002 – 2007)

Undergraduate Curriculum Committee (2005 – 2009)

College

Associate Dean for Research, College of Engineering (2011 – 2019)

Chair, College Safety Committee (2013 – 2019)

College Curriculum Committee (2001 – 2011)

University

Department of Mining Engineering, Internal Review Team (2024)
University F&A Task Force (2018-2019)
University Lab Safety Culture Task Force (2018-2019)
Internal Commercialization Coordinating Council (2013 - 2018)
University Funding Incentive Seed Grant Committee Co-chair (2012-2014, 2017-2018)
University Funding Incentive Seed Grant Committee (2012-2018)
University Research Instrumentation Fund Review Committee (2015-present)
Human Resources Service Delivery Advisory Committee (2014 - 2016)
Search Committee, Director of Institutional Analysis (2015)
Academic Senate (2007 – 2010)
Executive Committee – Academic Senate (2007 - 2008)
Postdoctoral Affairs Advisory Board (2006-2008)
Directors of Graduate Studies Council (2002 – 2007)
University Graduate Research Fellowship Selection Committee (2003)

PROFESSIONAL SERVICE:

Boards, Councils:

Member, Board of Directors, Engineering Research Council (ERC), American Society for Engineering Education (ASEE) - 2016 - 2019
Member, Engineering Research Council (ERC), American Society for Engineering Education (ASEE) - 2011 - 2019
Academic Advisor on Energy Science and Technology, Institute for Thermal Power Engineering, Zhejiang University, China, 2015 - 2017
Scientific Advisor, Kerpely Antal Materials Science and Technology Doctoral School, University of Miskolc, 2010 - 2014
Member, Strategic Advisory Board, University of Miskolc, Hungary, 2011 - 2012

Conference/Workshop Organization:

Scientific Committee for ISCC-10: The 10th International Symposium on Coal Combustion, Taiyuan City, Shanxi Province, China, August 6-9, 2023.
Scientific Committee for CARBON 2023: The World Conference on Carbon 2023, Cancun, Mexico, July 16-21, 2023.
Scientific Committee for CARBON 2019: World Conference on Carbon, Lexington, Kentucky, July 14-19, 2019.
Scientific Committee of the 6th International Technical Conference on CO₂ Emission Control and Utilization, Hangzhou, China, June 15-18, 2018.
Conference Planning Committee of the ASEE Engineering Research Council Annual Meeting, Washington, DC [2017-2019].

Conference Programming Committee of the International Technical Conference on Clean Energy (The Clearwater Clean Energy Conference), Clearwater, FL (190 attendees) [2017-present].

Workshop Organizer (w/Zhongyang Luo of Zhejiang University) of the "NSF/NSFC Workshop on Combustion Related to Sustainable Energy," Hangzhou, China, to identify research priorities for joint NSF/NSFC projects. Sponsored by the U.S. National Science Foundation and the National Science Foundation of China (30 attendees) [2014].

Conference Organizer (w/Qiang Yao of Tsinghua University) of the "U.S./China Conference on Applied Combustion Technologies", Park City, Utah, sponsored by the University of Utah, Tsinghua University, CEntry Constructors and Engineers, and China Electricity Council (70 attendees) [2007].

Session Chair:

Chair of Session on "Recovery of Rare Earth Elements," 44th International Technical Conference on Clean Energy (Clearwater Clean Energy Conference), June 16-19, 2019, Clearwater, FL.

Chair of Two Sessions on "Recovery of Rare Earth Elements," 43rdnd International Technical Conference on Clean Energy (Clearwater Clean Energy Conference), June 3-7, 2018, Clearwater, FL.

Chair of Session on "Rare Earth, Carbon Sorbents and other Coal-Derived Products," 42ndnd International Technical Conference on Clean Energy (Clearwater Clean Energy Conference), June 10-15, 2017, Clearwater, FL.

Co-Chair of Session on "Unconventional Fuels: Shale Oil - Upstream and Downstream," 2015 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 9-13, 2015, Salt Lake City, UT.

Chair of Session on "Tech for Energy," 19th International Commercialization of Micro, Nano and Emerging Technologies (COMS) Conference, Oct. 12-15, 2014, Salt Lake City, UT.

Co-Chair of Session on "Mercury and Trace Element Emissions and Controls under Oxyfuel Combustion Conditions," 3rd Oxyfuel Combustion Conference, Sept. 9-13, 2013, Ponferrada, Spain.

Chair of Session on "Reaction Kinetics," 8th National Combustion Meeting, May 19-22, 2013, Park City, UT.

Chair of Two Sessions on "Oxycombustion of Coal," 2011 American Institute of Chemical Engineers (AIChE) Annual Meeting, October 17-21, 2011, Minneapolis, MN.

Chair of Three Sessions on "Oxycombustion of Coal," 2010 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 7-12, 2010, Salt Lake City, UT.

Chair of Three Sessions on "Oxycombustion of Coal," 2009 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 8-13, 2009, Nashville, TN.

Chair - Session on "Fundamentals: Gas-Solid Flow," 20th International Conference on Fluidized Bed Combustion, May 18-20, 2009, Xi'an, China.

Chair of Session on "Oxycombustion of Coal," 2008 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 16-21, 2008, Philadelphia, PA.

Co-chair (w/ Bill Green, MIT) Session on "Combustion Reaction Engineering," 2008 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 16-21, 2008, Philadelphia, PA.

Co-chair (w/Arun Bose, U.S. DOE) Three Sessions on "Oxycombustion of Coal – Needs, Challenges and Opportunities," 2007 American Institute of Chemical Engineers (AIChE) Annual Meeting, November 4-9 (2007), Salt Lake City, Utah.

Chair of Session on “Emission Reduction & Boiler Operation”, China-US Workshop on Advanced Technology of Industrial Boilers, Beijing, China (2004), sponsored by U.S. EPA, U.S. DOE.

Chair of Session on “NO_x Emissions and Control,” Annual Spring Meeting of the American Flame Research Committee, International Flame Research Foundation, Salt Lake City, UT (2004).

Chair of Session on “Organic Emissions”, Air & Waste Management Association, Boiler and Industrial Furnaces (BIF) Conference, St. Louis, MO (1997).

Invited Panel Forums:

Technical/Policy Forum: Western States Coal Strategies Forum, United States Energy Association, Moab, UT November 20-22, 2019.

Technical/Policy Forum: Innovation for Future Energy Development, Utah Governor’s Office of Energy Development, Provo, UT March 28, 2019.

Public Forums to Discuss New Economic Development Opportunities for Coal in 2018:

- Discover Global Markets: Indo-Pacific, U.S. Dept. of Commerce Trade Talks, Salt Lake City, UT, Dec. 11, 2018.
- Grand Junction Chamber of Commerce Energy Briefing, Grand Junction, CO, Sept. 5, 2018.
- Governor’s Office of Energy Development, Advanced Coal Resource Group, Salt Lake City, UT, Aug. 28, 2018.
- “Fly Away with Composites” Workshop, DTC-Freeport, Clearfield, UT, Aug. 21, 2018.
- Colorado Northwestern Community College Networking Group, Craig, CO, July 19, 2018.
- Steamboat Springs Economic Development Council, Steamboat Springs, CO, July 20, 2018.
- Associated Governments of Northwest Colorado, Board of Directors & Members Meeting, Meeker, CO, May 16, 2018.
- Public Utilities, Energy and Technology Interim Committee, Utah Legislature, Salt Lake City, UT, May 2018.
- Club20 (Western Slope Counties) Energy Committee – 2018 Winter Policy Meeting, Grand Junction, CO, March 2, 2018.

Technical Forum, “The Grand Challenges Facing our Country: Solutions and Innovations,” 21st Century Energy Transition Symposium, Fort Collins, CO, Oct. 30-31, 2017.

Educational Forum, “Strengthening Economies in Utah: A Forum for Coal-reliant Communities,” National Association of Counties, Richfield, UT, Oct. 18-20, 2017.

Educational Forum, “Professors Forum – Educating Students about the Cement Industry,” Portland Cement Association, (2002 and 2003).

Technical Forum, “Control of Mercury Emissions from Cement Kilns,” IEEE/PCA Cement Technical Conference, Dallas, TX (2003).

Public Forum, “Environmental Impact of the Construction of St. Lawrence Cement Plant”, City of Hudson, NY (2000). (public question and answer following 1-day review of Air Permit and Environmental Impact documents)

Technical Forum, “Dioxin Emissions from Cement Kilns,” Portland Cement Association, Annual Fall Meeting, Kansas City, KS (1997).

Short Courses:

“Combustion: Fundamentals and Applications,” organized and taught one-day short course, Detroit Stoker Company, Monroe, MI (2013) – 12 participants.

“Combustion: Applications and Recent Trends,” one-day short course, Korea South East Power Co. (KOSEP), Salt Lake City, UT (2013) – 22 participants.

“Combustion: Fundamentals and Applications,” one-day short course, PetroAlgae, LLC, Melbourne, FL (2010) – 15 participants.

“Applied Combustion Technology: Problem Solving for the Utility and Process Industries,” co-taught three-day short course, Huazhong University of Science and Technology, Wuhan, China (2009) – 200 participants.

“Applied Combustion Technology: Problem Solving for the Utility and Process Industries,” co-organized and co-taught three-day short course, Salt Lake City and Provo, UT (2004, 2005, 2007) – 33 participants.

“Principles of Combustion in Cement Kilns,” organized and co-taught two-day short course, preceding IEEE/PCA Cement Technical Conference, Salt Lake City, UT (2002) – 20 participants.

“Fundamentals of Combustion and Pollutant Formation,” organized and taught one-day short course, Detroit Stoker Company, Monroe, MI (2000) – 15 participants.

“Combustion Fundamentals”, co-organized and co-taught three-day short course, Monsanto Chemical Co., Soda Springs, ID (1999). – 24 participants.

REVIEWER:

ACS Omega

American Chemical Society

Applied Energy

ASME Journal of Heat Transfer

Journal of the Air & Waste Management Association

Biomass and Bioenergy

Chemical Engineering Research and Design

Chemical Engineering Science

Combustion and Flame

Combustion Science & Technology

Computers & Chemical Engineering

Energy & Fuels

Environmental Engineering Science

Environmental Science & Technology

Fuel
Fuel Processing Technology
Industrial & Engineering Chemistry Research
International Journal of Greenhouse Gas Control
International Journal of Heat and Mass Transfer
Journal of Fire Protection Engineering
Journal of the Air and Waste Management Association
National Institutes of Health
National Science Foundation
Proceedings of the Combustion Institute
Thermochemica Acta
U.S. Department of Agriculture
U.S. Department of Energy

PEER-REVIEWED PUBLICATIONS:

86. J. Malzahn, **E.G. Eddings**, “Effect of secondary gas-phase reactions (SGR) in pyrolysis of carbon feedstocks for anisotropic carbon materials production – 3: Modifying non-coking coal tar through co-pyrolysis of coal with linear low-density polyethylene and high-impact polystyrene,” *Journal of Analytical and Applied Pyrolysis*, **175**, 106208, October 2023.
85. A. Prlina, **E.G. Eddings**, R. Breault, “Multiphysics Simulation of Supercritical CO₂ Gasification for Hydrogen Production,” *International Journal of Energy for a Clean Environment*, **24**(8):1-14, June 2023.
84. Z. Karimi, J. Moon, J. Malzahn, **E.G. Eddings**, R. Warren, “Ultra-low cost supercapacitors from coal char: effect of electrolyte on double layer capacitance,” *Energy Advances*, **2**, 1036-1044, May 2023.
83. Z. Sun, C.K. Russell, K.J. Whitty, **E.G. Eddings**, J. Dai, Y. Zhang, M. Fan, Z. Sun, “Chemical looping-based energy transformation via lattice oxygen modulated selective oxidation,” *Progress in Energy and Combustion Science*, **96**, 101045, May 2023.
82. T.S. Draper, A. Gunnarsson, A. Fry, K. Andersson, T. Ring and **E.G. Eddings**, “A Comparison of Industrial-Scale Radiometer Heat Flux Measurements Between Pulverized-Coal and Coal/Biomass Co-firing Combustion,” *ASME Open Journal of Engineering*, **2**, 021007, January 2023.
81. X. He, Y. Gao, Y. Shi, X. Zhang, Z. Liang, R. Zhang, X. Song, Q. Lai, H. Adidharma, A.G. Russell, **E.G. Eddings**, W. Fei, F. Cheng, S.C.E. Tsang, J. Wang, M. Fan, “[EMmim][NTf₂] – A Novel Ionic Liquid (IL) in Catalytic CO₂ Capture and ILs’ Applications,” *Advanced Science*, **10**, 3, 2205352, January 2023.
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79. T. Allguren, K. Andersson, A. Fry, **E.G. Eddings**, “NO Formation during co-combustion of coal with two thermally treated biomasses,” *Fuel Processing Technology*, **235**, 107365, October 2022.
78. J. Malzahn, I. Preciado, M. Weisenberger, **E.G. Eddings**, “Effect of secondary gas-phase reactions (SGR) in pyrolysis of carbon feedstocks for anisotropic carbon materials

- production – 2: Effects of SGR on tars produced from varying ranks of coal,” *Journal of Analytical and Applied Pyrolysis*, **165**, 105579, August 2022.
77. J. Malzahn, I. Preciado, D. Wang, M. Weisenberger, **E.G. Eddings**, “Effect of secondary gas-phase reactions (SGR) in pyrolysis of carbon feedstocks for anisotropic carbon materials production – 1: Controlling SGR to modify intermediate coal tar species to improve pitch anisotropy,” *Journal of Analytical and Applied Pyrolysis*, **164**, 105541, June 2022.
 76. W. Lu, T. Wang, Z. He, K. Sun, Z. Huang, G. Tan, **E.G. Eddings**, H. Adidharma, M. Fan, “A New Method for Preparing Excellent Electrical Conductivity Carbon Nanofibers from Coal Extraction Residual,” *Cleaner Engineering and Technology*, **4**, 100109, October 2021.
 75. J. Ding, L. Huang, G. Ji, Y. Zeng, Z. Chen, **E.G. Eddings**, M. Fan, Q. Zhong, H. Kung, “Modification of Catalytic Properties of Hollandite Manganese Oxide by Ag Intercalation for Oxidative Acetalization of Ethanol to Diethoxyethane,” *ACS Catalysis*, **11**, 9, 5347-5357, April 2021.
 74. O. Chansa, Z. Luo, **E.G. Eddings**, C. Yu, “Alkali release measurement with Laser-Induced Breakdown Spectroscopy and kinetic modeling during oxy-fuel co-combustion of biomass and coal,” *Fuel*, **289**, 119658, April 2021.
 73. X. Liang, Q. Wang, Z. Luo, **E.G. Eddings**, T.A. Ring, S. Li, J. Lin, J. Yan, X. Yang, X. Jia, “Experimental Investigation on Sulfur-containing Products in Pressurized Oxy-Fuel Pyrolysis of Pulverized Coal,” *Journal of Cleaner Production*, **279**, 123818, January 2021.
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SHORT COMMUNICATIONS

K.E. Kelly, Z. Luo, T. Wang and **E.G. Eddings**, “Joint NSF-NSFC Workshop on Combustion Related to Sustainable Energy,” *Combustion Science & Technology*, **188** (2), pp. 247-249 (2016).

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8. K.J. Whitty, H.R. Zhang and **E.G. Eddings**, “Pollutant Formation and Control,” Ch. 6 in *Synthesis Gas Combustion*, T. Lieuwen, V. Yang, R. Yetter (Eds.), CRC Press, (2009).
7. 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*, H. Bockhorn, A. D’Anna, A.F. Sarofim, H. Wang (Eds.), KIT Scientific Publishing (ISBN 978-3-86644-441-6), 2009
6. J.P. Spinti, J.N. Thornock, **E.G. Eddings**, P.J. Smith and A.F. Sarofim, “Heat Transfer to Objects in Pool Fires,” in *Transport Phenomena in Fires*, M. Faghri and B. Senden (Eds.), Series: Developments in Heat Transfer, Vol. 20, WIT Press, Southampton, U.K., 2008.
5. **E.G. Eddings**, “Combustion,” Ch. 16, Mechanical Engineer’s Handbook, 3rd Edition, *Book 4: Energy and Power*, M. Kutz (Ed.), John Wiley & Sons, New York, 2006.
4. **E.G. Eddings**, M.P. Heap, D.W. Pershing, A.F. Sarofim, and P.J. Smith, "The Design of a Coal-Fired High-Temperature Furnace for an Advanced Combined Cycle System", in *Clean Combustion Technologies, Part B*, M.d.G. Carvalho, F.C. Lockwood, W.A. Fiveland and C. Papadopoulos (Eds.), CRC Press (ISBN: 978-9056996215), 1999.
3. **E.G. Eddings**, P.J. Smith, M.P. Heap, D.W. Pershing, and A.F. Sarofim, "The Use of Models to Predict the Effect of Fuel Switching on NO_x Emissions", in Coal Blending and Switching of Western Low-Sulfur Coals, R.W. Bryers and N.S. Harding (Eds.), ASME, New York, pp. 169-184 (1994).
2. P.J. Smith, **E.G. Eddings**, B.R. Adams and M.P. Heap, "Application of Combustion Computations to Industrial Problems", in Coal Blending and Switching of Western Low-Sulfur Coals, R.W. Bryers and N.S. Harding (Eds.), ASME, New York, pp. 441-452 (1994).
1. **E.G. Eddings** and J.S. Lighty, "Fundamental Studies of Metal Behavior During Solids Incineration", in *Incineration of Hazardous Waste 2: Toxic Combustion By-Products*, W.R. Seeker and C.P. Koshland (Eds.), Taylor & Francis, pp. 375-390 (1994).

DIGITAL MEDIA:

E.G. Eddings, “Turbulent Pulverized Coal Flames,” videos and discussion in Multi-Media Fluid Mechanics, Instructional CD, 2nd Edition, G. M. Homsy et al., Cambridge University Press, 2009.

INVITED LECTURES:

34. **E.G. Eddings**, “Engineering a New High-tech Future for Coal Utilization,” Invited Lecture, University of Buffalo (SUNY), Buffalo, NY, September 27, 2023.
33. **E.G. Eddings**, “Engineering a New Future for Coal Utilization,” Invited Lecture, University of South Florida, virtual visit (COVID-19), March 24, 2021.
32. **E.G. Eddings**, “A High-Tech Future for Coal Utilization,” Invited Lecture, Zhejiang University, Hangzhou, China, virtual visit, October 14, 2020.
31. **E.G. Eddings**, “Is There a High-Tech Future for Coal?,” Invited Lecture, Brigham Young University, Provo, Utah, March 28, 2019.
30. **E.G. Eddings**, “What is the Future for Coal Use in the U.S.?”, Invited Talk, 2019 SME Annual Conference & Expo and CMA 121st National Western Mining Conference, February 26, 2019.
29. **E.G. Eddings**, “Is There a High-Tech Future for Coal in the U.S.?,” Invited Lecture, Michigan Technological University, Houghton, Michigan, December 6, 2018.
28. **E.G. Eddings**, “Production of Carbon Fiber from Coal-derived Pitch,” Invited Lecture, Institute for Thermal Power Engineering, Zhejiang University, Hangzhou, China, October 12, 2017.
27. **E.G. Eddings**, “What is the Future for Coal Use in the United States?,” Invited Lecture, Korea Institute for Energy Research, Daejeon, South Korea, July 7, 2017.
26. **E.G. Eddings**, “Validation and Uncertainty Quantification in Combustion Simulations,” Invited Lecture, College of Energy Engineering, Zhejiang University, Hangzhou, China, October 13, 2016.
25. **E.G. Eddings**, “Energy Research at the University of Utah,” Invited Lecture, College of Energy Engineering, Zhejiang University, Hangzhou, China, October 27, 2015.
24. **E.G. Eddings**, “Non-Traditional Energy Resources,” Invited Lecture, Faculty of Materials Science, University of Miskolc, Miskolc, Hungary, September 28, 2015.
23. **E.G. Eddings**, “Behavior of Mineral Matter During Coal Combustion,” Invited Lecture, North China Electric Power University, Baoding, Hubei Province, China, September 11, 2012.
22. **E.G. Eddings**, “Clean Fuel Technologies to Address Global CO₂ Issues,” Plenary Lecture, 25th microCAD International Scientific Conference, University of Miskolc, Miskolc, Hungary, March 31, 2011.
- 19-21. **E.G. Eddings**, “Oxycombustion Applications for Coal,” presented at the following venues (May 2009):
 - Zhejiang University, Institute for Thermal Power Engineering, Hangzhou, China
 - Chongqing University, College of Power Engineering, Chongqing, China
 - Institute of Mechanics, Chinese Academy of Sciences, Beijing, China
18. **E.G. Eddings**, “The Formation of Soot in Hydrocarbon Flames,” Invited Lecture, Department of Combustion Technology, University of Miskolc, Miskolc, Hungary, September 30, 2008.
17. **E.G. Eddings**, “Oxy-Coal Combustion: One Solution for a Carbon-Constrained Economy,” Invited Lecture, Pusan National University, Pusan, South Korea, and Korean Electric Power Research Institute, Daejeon, South Korea, March 19 and 21, 2008.
16. **E.G. Eddings** and C.A. Wight, “Simulation and Validation of Explosion Violence of

Energetic Devices in Fires,” Invited Lecture, Gordon Research Conference on Energetic Materials, Tilton, New Hampshire, June 21, 2006.

15. **E.G. Eddings**, “Use of Oxy-Coal Combustion to Address a Carbon-Constrained Economy,” Invited Lecture, Hungarian Academy of Sciences, Miskolc, Hungary, April 19, 2006.
14. **E.G. Eddings**, “Status of the Incineration of Hazardous Waste in the United States,” Invited Lecture, Tsinghua University, Beijing, China, June 1, 2004.
13. **E.G. Eddings**, “Practical and Theoretical Limitations to Reducing NO_x Emissions in Pulverized-Coal Fired Utility Boilers,” and “Use of Combustion Simulations to Solve Industrial Problems,” Invited Lectures, University of Miskolc, Miskolc, Hungary, May 10, 2004.
12. **E.G. Eddings**, Constance L. Senior, Adel F. Sarofim, “Simulation of Hg and Other Trace Element Transformations in Coal-Fired Utility Boilers,” Invited Paper, 2002 Yokohama Trace Element Workshop, Yokohama, Japan, July 18, 2002.
- 7-11. **E.G. Eddings**, “Prediction and Control of NO_x Emissions in Pulverized Coal-Fired Utility Boilers” and “The Formation and Control of Polychlorinated Dibenzo-*p*-Dioxins and Dibenzo-Furans,” presented at the following venues (March/April 2001):
 - Tsinghua University, Dept. of Thermal Engineering, The State Key Laboratory of Clean Combustion of Coal, Beijing, China
 - Zhejiang University, Institute for Thermal Power Engineering, Hangzhou, China
 - Thermal Power Research Institute, State Power Corporation of China, Xi’an, China
 - Southeast University, Thermoenergy Engineering Research Institute, Nanjing, China
 - Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China
6. **E.G. Eddings**, “Validation of Complex, CFD-based Simulations of Large-Scale Fires and Explosions,” Invited Lecture, Research Center for Fire Safety, Dept. of Mechanical Engineering, National Cheng-Kong University, Tainan, Taiwan, October 30, 2000.
5. **E.G. Eddings**, “R&D for the Prevention and Minimization of Dioxin Emissions,” Invited Lecture, Workshop on the Control of Dioxin Emissions sponsored by Combustion Institute of Taiwan, the Taiwan Environmental Science and Technology Association and China Steel Corporation, Kaohsiung, Taiwan, October 26, 2000.
4. **E.G. Eddings** and A.F. Sarofim, “Transient Heat Transfer in Exploding and Detonating Systems,” Invited Paper, International Colloquium on Control of Detonation Processes, Moscow, Russia, July 4-7, 2000.
3. **E.G. Eddings** and A.F. Sarofim, “Advances in the Use of Computer Simulations for Evaluating Combustion Alternatives,” Invited Paper, 3rd CREST International Symposium on High Temperature Air Combustion and Gasification, Yokohama Symposia, Yokohama, Japan, March 6-9, 2000.
2. A.F. Sarofim and **E.G. Eddings**, “Mineral Matter Transformation During Pulverized Coal Combustion,” Plenary Paper, 4th International Symposium on Coal Combustion, Beijing, China, Aug. 19, 1999.
1. **E.G. Eddings**, “Use of Computational Fluid Dynamics Based Models in Practical Combustion Applications,” Invited Lecture to participants from industry and various universities, Tsinghua University, Beijing, China, August 17, 2000.

TRADE JOURNAL PUBLICATIONS:

E.G. Eddings and T.A. Ring, "Brighteners in Acid Copper Plating Baths," Printed Circuit Fabrication, Vol. 13, No. 12, pp. 34-38 (1990).

CONFERENCE PROCEEDINGS, PAPERS & PRESENTATIONS:

203. H-S. Shim, X. Li, M Denison, **E.G. Eddings** and I. Preciado, "Rotary Kiln Approach to Produce Biochar from Invasive Scrub Species for Soil Remediation and Carbon Sequestration," presentation at 47th International Technical Conference on Clean Energy, Tampa, FL, July 23-27, 2023.
202. H-S. Shim, X. Li, M Denison, **E.G. Eddings** and I. Preciado, "Development of Rotary Kiln-Based Conversion Technology for Hydrogen-Enriched Syngas Production from Coal Waste and Biomass," presentation at 47th International Technical Conference on Clean Energy, Tampa, FL, July 23-27, 2023.
201. J. Moon, Z. Karimi, A. Prlina, C. Van Ginkel, E.G. Eddings, R. Warren, "Flash Pyrolyzed Coal Char for Sodium Ion Battery Anodes," 243rd Electrochemical Society (ECS) Meeting, May 28-June 2, 2023, Boston, MA.
200. W. Wang, M. Cooley, K. Jolley, R.M. Kirby and **E.G. Eddings**, "Predicting the performance of mesophase formation and properties of mesophase pitch based on experimental investigation and machine learning," presentation at 2022 AIChE Annual meeting, Phoenix, AZ, Nov. 13-18, 2022.
199. W. Wang, K. Jolley, M. Nelson and **E.G. Eddings**, "Solvolysis liquefaction of low-rank coals and polyolefin waste-plastics-derived liquid to manufacture mesophase pitch intermediates of value-added high-performance carbon materials," presentation at 2022 AIChE Annual meeting, Phoenix, AZ, Nov. 13-18, 2022.
198. A. Prlina, **E.G. Eddings** and R. Breault, "Multiphysics Simulation of Supercritical CO₂ Gasification for Hydrogen Production," presentation at 46th International Technical Conference on Clean Energy, Tampa, FL, Aug. 1-4, 2022.
197. J.O.L. Wendt and **E.G. Eddings**, "Three Decades of Joint REI/University of Utah Combustion Research," presentation at 46th International Technical Conference on Clean Energy, Tampa, FL, Aug. 1-4, 2022.
196. A. Butterfield, T. Tran, I. Preciado, G. Silcox and **E.G. Eddings**, "Products from Pandemic Labs: Custom At-Home & Benchtop Unit Operations Teaching Modules," presentation at 2021 AIChE Annual meeting, Boston, MA, Nov. 7-11, 2021.
195. J. Malzahn, I. Preciado and **E.G. Eddings**, "Utilizing Pyrolysis Secondary Gas-Phase Reactions to Produce Anisotropic Carbons from Non-Graphitizing Feedstocks," presentation at 2021 AIChE Annual meeting, Boston, MA, Nov. 7-11, 2021.
194. J. Malzahn, S. Fang, S. Sane, S. Zhe, R.M. Kirby and **E.G. Eddings**, "Effect of Pyrolysis Conditions on Producing Mesophase Pitch from Varying Ranks of Coal and Correlating Their Product Properties with Machine Learning Models," presentation at 2021 AIChE Annual meeting, Boston, MA, Nov. 7-11, 2021.
193. W. Wang, I. Preciado and **E.G. Eddings**, "Thermochemical Co-conversion of Waste Polyolefins with Low-rank Aromatic-rich Hydrocarbons into an Intermediate of High-Quality Anisotropic Pitch," presentation at 2021 AIChE Annual meeting, Boston, MA, Nov. 7-11, 2021.
192. W. Wang, J. Malzahn, I. Preciado and **E.G. Eddings**, "Mild Solvolysis Liquefaction of Low-Rank Coal into a Feedstock of Value-Added Carbon Material Precursors," presentation

- at 2021 AIChE Annual meeting, Boston, MA, Nov. 7-11, 2021.
191. T. Allguren, R. Edland, K. Andersson, A. Fry, **E.G. Eddings**, and F. Normann, "NO formation during co-combustion of coal with two thermally treated biomasses," presentation at the 45th International Technical Conference on Clean Energy, Clearwater, FL, July 26-29, 2021.
 190. **E.G. Eddings**, A. Fry and K. Andersson, "Overview of a Comprehensive Program to Assess the Impact of Co-firing Biomass with Coal in a 480 MW Power Plant," presentation at the 45th International Technical Conference on Clean Energy, Clearwater, FL, July 26-29, 2021.
 189. T. Draper, A. Prlina, T. Ring and **E.G. Eddings**, "A Comparison of Industrial-Scale (480 MWe) Radiometer Heat Flux Measurements Between Pulverized-Coal and 85% Coal/15% Biomass Co-firing Combustion," presentation at the 45th International Technical Conference on Clean Energy, Clearwater, FL, July 26-29, 2021.
 188. A. Prlina, **E.G. Eddings** and R. Breault, "Multiphysics Simulation of Supercritical CO₂ Gasification," presentation at the 45th International Technical Conference on Clean Energy, Clearwater, FL, July 26-29, 2021.
 187. Z. Karimi, J. Moon, C. Van Ginkel, J. Malzahn, E.G. Eddings, R. Warren, "Bituminous Coal Char-Derived Hard Carbon As a Low-Cost Anode Material for Sodium-Ion Batteries," 239th Electrochemical Society (ECS) Meeting, May 30-June 3 2021, Digital Meeting. ECS Meeting Abstracts, 111 (2021).
 186. Z. Karimi, J. Moon, C. Van Ginkel, J. Malzahn, E.G. Eddings, R. Warren, "Effect of Electrolyte Composition on the Performance of Coal Char-Derived Carbon Supercapacitors," 239th Electrochemical Society (ECS) Meeting, May 30-June 3 2021, Digital Meeting. ECS Meeting Abstracts, 267 (2021).
 185. J. Malzahn, I. Preciado, D. Wang, M. Weisenberger and **E.G. Eddings**, "Investigating Pyrolysis Conditions of Coals for Carbon Fiber Production," paper at CARBON 2019, Lexington, KY, July 14-19, 2019.
 184. J. Malzahn, I. Preciado, D. Wang, M. Weisenberger and **E.G. Eddings**, "Production of Mesophase Pitch from Coal for Carbon Fiber Production," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
 183. T. Allguren, R. Edland, K. Andersson, A. Fry, **E.G. Eddings** and F. Normann, "NO formation during co-combustion of coal with two thermally treated biomasses," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
 182. R. Edland, T. Allguren, K. Andersson, A. Fry, F. Normann, **E.G. Eddings** and J. Wendt, "On the nitrogen chemistry in jet and swirled pilot-scale PF flames," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
 181. C. Jaramillo and **E.G. Eddings**, "Moisture Uptake and Mechanical Stability of Upgraded Biomass for Use in Pulverized Coal Co-firing," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
 180. T. Draper, K. Scheib, S. Harding, M. Hradisky, J. Spinti, T. Ring, A. Fry, M. Backman, A. Gunnarson, K. Andersson and **E.G. Eddings**, "A comparison of heat transfer measurements between pulverized-coal and 85% coal/15% biomass co-firing combustion in a 1.5 MW pilot-scale furnace," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
 179. A. Fry, S. Fakourian, K. Andersson, T. Allguren, A. Gunnarson, J. Wendt, Y. Wang, X. Li, M. Backman and **E.G. Eddings**, "Comparison of Combustion Performance and Fouling Behavior While Firing a 15 wt% Blend of Prepared Woody Biomass with Coal and Pure

- Coal in a 1.5 MW Pilot-scale Furnace," presentation at the 44th International Technical Conference on Clean Energy, Clearwater, FL, June 16-20, 2019.
178. T. Draper, J. Brindle, T. Ring and **E.G. Eddings**, "Progress in a Model to Predict the Complex Refractive Indices of Natural Coal Ash at High Temperature," presentation at the 43rd International Technical Conference on Clean Energy, Clearwater, FL, June 3-7, 2018.
 177. A. Fry, S. Fakourian, T. Jasperson and **E.G. Eddings**, "Elucidating the Behavior of a Blend of Prepared Woody Biomass and Utah Bituminous Coal in a Raymond Bowl Mill," presentation at the 43rd International Technical Conference on Clean Energy, Clearwater, FL, June 3-7, 2018.
 176. A. Fry, Z. Dobo, **E.G. Eddings**, K. Andersson and K. Clark, "Demonstration of the Co-firing of Modified Biomass with Pulverized Coal at the Hunter Plant," presentation at the 43rd International Technical Conference on Clean Energy, Clearwater, FL, June 3-7, 2018.
 175. A. Owen, D. Eaton, R. Andrews, **E.G. Eddings** and M. Weisenberger, "Coal to Carbon Fiber," presentation at the 2018 Coal Prep Technology Conference and Exhibition, 23-25 April 2018, Lexington KY.
 174. **E.G. Eddings**, "Conventional and Unconventional Methods for Coal Extraction and Processing," presentation at the DOE/NETL Workshop on Research Needs to Enable the Use of Coal as a Precursor for Value-Added Products, Pittsburgh, PA, April 5, 2018.
 173. K. Andersson, F. Normann, **E.G. Eddings** and A. Fry, "On the Sulphur Chemistry in Low-Recycle and Pressurized Oxy-Combustion Systems," presentation at the 42nd International Technical Conference on Clean Energy, Clearwater, FL, June 11-15, 2017.
 172. A. Fry, S. Fakourian, **E.G. Eddings**, Z. Dobo and K. Clark, "Milling of Utah, Sufco Coal with 15% Prepared Manti – La Sal Woody Biomass in a Raymond Bowl Mill," presentation at the 42nd International Technical Conference on Clean Energy, Clearwater, FL, June 11-15, 2017.
 171. D. Wang, S.K. Mohanty and **E.G. Eddings**, "Developments in the Production of High-value Products from Coal," presentation at the 42nd International Technical Conference on Clean Energy, Clearwater, FL, June 11-15, 2017.
 170. T. Draper, J. Gorewoda, L. Kolczynski, A. Fry, V. Scherer, Terry Ring and **E.G. Eddings**, "The influence of temperature on the spectral emittance of ash deposits taken from a 1.5 MW, oxy-fired pulverized coal test facility," presentation at the 42nd International Technical Conference on Clean Energy, Clearwater, FL, June 11-15, 2017.
 169. D. Wang, S.K. Mohanty and **E.G. Eddings**, "Production of Hydrogen through Photo-electro-catalytic Oxidation of Coal using TiO₂ Nanotube Arrays," presentation at the 231st Electrochemical Society Meeting, New Orleans, May 28-June 1, 2017.
 168. A. Fry, J. Spinti, I. Preciado, O. Diaz and **E.G. Eddings**, "Pilot-Scale Investigation and Modeling of Heat Flux and Radiation from an Oxy-coal Flame," presentation at the 41st International Technical Conference on Clean Coal & Fuel Systems, Clearwater, FL, June 5-9, 2016.
 167. L. Kolczynski, A. Fry, T. Draper, T. Ring and **E.G. Eddings**, "Density, Porosity, and Heat Capacity Characteristics of Ash Deposits from a 1.5 MW Coal Furnace," presentation at the 41st International Technical Conference on Clean Coal & Fuel Systems, Clearwater, FL, June 5-9, 2016.
 166. T. Draper, A. Fry, L. Kolczynski, T. Ring and **E.G. Eddings**, "Thermal Characterization of a 1.5 MW Pulverized-coal Reactor using Infrared Heat Flux and Measured Heat Loss," presentation at the 41st International Technical Conference on Clean Coal & Fuel Systems, Clearwater, FL, June 5-9, 2016.
 165. O. Diaz, J. Spinti, A. Fry, B. Schroeder, J. Thornock, B. Isaac, D. Harris, M. Hradisky, S.

- Smith, **E.G. Eddings** and P.J. Smith, "A Validation/Uncertainty Quantification Analysis of a 1.5 MW Oxy-Coal Fired Furnace," presentation at the Western States Section of the Combustion Institute 2016 Spring Meeting, Seattle, WA, March 21-22, 2016.
164. A. Fry, J. Spinti, I. Preciado, O. Diaz and **E.G. Eddings**, "Heat Flux, Radiation and CO Distributions from a 1.5 MW Oxy-Coal Flame," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
163. J. Caldwell, R. Coates and **E.G. Eddings**, "Field-Deployable Mobile Biomass Pyrolysis Technology," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
162. D. Wang, K. Kelly and **E. Eddings**, "Liquid and Gaseous Hydrocarbons from Underground Coal Thermal Treatment," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
161. T. Draper, **E. Eddings** and T. Ring, "Thermal Characterization of Ash Deposits in a 1.5 MW Reactor," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
160. M. Lemieux, S. Mohanty and **E. Eddings**, "Value-Added Products From Thermal Treatment of Biomass Pyrolysis Oil," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
159. F. Babazadeh, G. Silcox, L. Switzer and **E. Eddings**, "Cold Flow Study of a Segregated Zoning Burner," presentation at the 2015 AIChE Annual Meeting, Salt Lake City, UT, November 9-13, 2015.
158. A. Fry, J. Spinti, I. Preciado, O. Diaz and **E.G. Eddings**, "Predicting Heat Transfer Characteristics of a 1.5 MWth Oxy-Coal Flame," paper at 5th Meeting of the IEAGHG International Oxyfuel Combustion Research Network Meeting, Wuhan, China, October 27-30, 2015.
157. O. Diaz-Ibarra, J. Spinti, A. Fry, B. Schroeder, J. Thornock, B. Issac, D. Harris, M. Hradisky, S. Smith, **E. Eddings**, P. Smith "A Validation/Uncertainty Quantification Analysis of a 1.5 MW Oxy-Coal Fired Furnace," paper at the American Flame Research Committee (AFRC) 2015 Industrial Combustion Symposium, Salt Lake City, UT, September 9-11, 2015.
156. A. Fry, J. Spinti, I. Preciado, O. Diaz and **E.G. Eddings**, "Pilot-scale Investigation of Heat Flux and Radiation from an Oxy-coal Flame," paper at the American Flame Research Committee (AFRC) 2015 Industrial Combustion Symposium, Salt Lake City, UT, September 9-11, 2015.
155. F. Babazadeh, G. Silcox, L. Switzer and **E. Eddings**, "Development of a Sub-Surface Burner Technology for In-Situ Heating," paper at the American Flame Research Committee (AFRC) 2015 Industrial Combustion Symposium, Salt Lake City, UT, September 9-11, 2015.
154. L. Urán, L. Carvajal, L. Gaviria, D. Wang, **E. Eddings** and A. Molina, "A reaction mechanism for the formation of coke from thermal cracking of a heavy Colombian crude oil at in situ combustion (ISC) conditions," presentation at Petroleum and Gas 2015 - International Petroleum Conference & Exhibition, Bogota, Colombia, August 24-25, 2015.
153. A. Fry, J. Spinti, O. Diaz, I. Preciado and **E. Eddings**, "Predicting Heat Transfer Characteristics of a 1.5 MWth oxy-coal Flame," paper at The 40th International Technical Conference on Clean Coal & Fuel Systems, Clearwater, Florida, May 31 - June 4, 2015.
152. T. Draper, P. Toth, T. Ring and **E. Eddings**, "Optical heat flux and temperature measurements on a 100 kW oxy-fuel combustor," paper at the 7th European Combustion Meeting (ECM 2015), Budapest, Hungary, March 30 - April 2, 2015.

151. P. Toth, A. Marton, T. Draper, A. Palotas and **E. Eddings**, "The behavior of secondary pyrolysis products in oxy-coal flames," paper at the 7th European Combustion Meeting (ECM 2015), Budapest, Hungary, March 30 - April 2, 2015.
150. L. Urán, L. Carvajal, L. Gaviria, D. Wang, **E. Eddings** and A. Molina, "Coke formation during pyrolysis of a Colombian heavy crude oil under in situ combustion conditions," presentation at the 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.
149. **E.G. Eddings**, R. Okerlund, R.L. Coates and S. Bell "Combustion Behavior of Raw, Torrefied and Pyrolyzed Biomass when Co-fired with Pulverized Coal," 20th International Conference on Impacts of Fuel Quality on Power Production, October 26-31, 2014 in Snowbird, Utah.
148. **E.G. Eddings**, R.L. Coates, T. Gardner and D. McAvoy "Scaling and Demonstration of a Mobile Process for Biomass Pyrolysis," Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products, Denver, Colorado, Sept. 2-5, 2014.
147. K.E. Kelly, D. Wang, O. Diaz, **E.G. Eddings**, and D.W. Pershing "Comprehensive Greenhouse Gas Evaluation of Underground Coal Thermal Treatment for Production of Syngas and Liquid Fuels," paper at The 39th International Technical Conference on Clean Coal & Fuel Systems, Clearwater, Florida, June 1-5, 2014.
146. **E.G. Eddings**, T. Gardner and R. Coates "Mobile Pyrolysis Process for Conversion of Biomass into Energy Products," presentation at the 2013 North American Biochar Symposium, October 13-16, 2013.
145. P. Toth, T.A. Ring, A.B. Palotas and **E.G. Eddings** "Application of optical diagnostic techniques to oxy-coal flames," presentation at the 3rd IEAGHG Oxyfuel Combustion Conference, Ponferrada, Spain, Sept. 9-13, 2013.
144. P. Toth, A.B. Palotas, T.A. Ring, and **E.G. Eddings** "A robust method for the quantitative imaging of dense reacting particulate flows," paper at the 8th National Combustion Meeting, Park City, UT, May 19-22, 2013.
143. P. Toth, A.B. Palotas, T.A. Ring, **E.G. Eddings**, R. Vander Wal, C.K. Gaddam, J. Levinthal, I.C. Jaramillo and J.S. Lighty, "Detailed investigation of soot nanostructure: Effect of pressure," paper at the 8th National Combustion Meeting, Park City, UT, May 19-22, 2013.
142. D. Rezaei, **E.G. Eddings**, K.E. Kelly and J.O.L. Wendt "Near-field aerodynamic effects of pure O₂ injection in co-axial oxy-coal turbulent diffusion flames," paper at the 8th National Combustion Meeting, Park City, UT, May 19-22, 2013.
141. **E.G. Eddings**, "Potential Uses for Woody Biomass Resources," presentation at 2013 Governor's Energy Development Summit, Salt Lake City, UT, January 10-11, 2013.
140. **E.G. Eddings** A. Vance, R. Okerlund, and R. Coates, "Overview of a Co-firing Study of Pulverized Coal with Pinion Pine/Juniper Wood," presentation at 3rd Annual Southern Utah Biomass Summit, Beaver, UT, September 18-20, 2012.
139. **E.G. Eddings** A. Vance, R. Okerlund, and R. Coates, "Co-firing Pulverized Coal with Pinion Pine/Juniper Wood in Raw, Torrefied and Pyrolyzed Forms," presentation at American Flame Research Committee Fall Meeting, Salt Lake City, UT, September 5-7, 2012.
138. A. Fry, B. Adams, **E. Eddings** and T. Fout, "Carbon, Sulfur and Nitrogen Behavior During Pilot-Scale Testing of Oxy-coal Combustion," Power Plant Air Pollutant Control "MEGA" Symposium, Baltimore, MD, August 20-23, 2012.
137. P. Toth, A.B. Palotas, J.S. Lighty and **E.G. Eddings**. "A Novel Framework for the Quantitative Analysis of High Resolution Transmission Electronmicrographs of Soot". International Sooting Flames Workshop, Warsaw, Poland, July 28-29, 2012.

136. **E.G. Eddings** A. Vance, R. Okerlund, D. Hanks, R. Coates and S. Bell, "Comparison of Pinion Pine/Juniper Wood Co-Firing in Raw, Torrefied and Pyrolyzed Forms," presentation at The 37th International Technical Conference on Clean Coal & Fuel Systems, Clearwater, Florida, June 3-7, 2012.
135. K. Gneshin, W. Ding, R. Krumm and **E.G. Eddings**, "Hydrocarbon Evolution and Porosity Development in Bituminous Coal Under Conditions that Simulate Underground Coal Pyrolysis," paper presented at The 37th International Technical Conference on Clean Coal & Fuel Systems, Clearwater, Florida, June 3-7, 2012.
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