

## David J. Bayless, Ph.D, P.E., FASME

*Loehr Professor of Mechanical Engineering*

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*Member of Graduate Faculty of the Department of Chemical and Biomolecular Engineering*  
Ohio University - Athens, OH 45701-2979

### Research Interests

Development of photobioreactors for remediation of CO<sub>2</sub> emissions, coal and biomass gasification via ultra-high temperature steam reforming, Fischer-Tropsch reforming of coal syngas, adapting planar solid oxide fuel cells to use coal-derived syngas, hot gas particulate clean-up, membrane-based wet electrostatic precipitation for particulate and mercury control, membrane-based wet electrostatic precipitation.

### Educational History

1987	B.S.M.E.	University of Missouri at Rolla
1992	M.S. Engineering Management	University of Central Florida
1995	Ph.D. in ME (Drs. R.O. Buckius and J.E. Peters)	University of Illinois (Urbana)
2004	Ohio University Executive Leadership Institute	Voinovich School (Ohio)

### Professional Experience

1995-current	Asst., Assoc. and Full ( <i>Loehr</i> ) Professor of Mech. Eng.	Ohio University
2004-current	Associate Director and Director, Robe Leadership Institute	Ohio University
2004-current	Fellow, Voinovich School for Leadership and Public Policy	Ohio University
2000-2007	Program Manager, State of Ohio Coal Research Consortium	
1998-current	Director of the Ohio Coal Research Center	Ohio University
2009-current	Director, Center of Excellence for Energy and the Environment at Ohio University as designated by the Board of Regents	State of Ohio
2010-current	Director, Center for Algal Research and Commercialization	State of Ohio
1996-1998	Director, Project Probe	American Electric Power
1995-current	Consultant for industrial, financial, policy and legal firms	
1991-1994	National Science Foundation Graduate Fellow	University of Illinois
1986-1991	Nuclear Propulsion Officer and Instructor	United States Navy

### Professional Memberships

Coal Utilization Research Council, Combustion Institute, Air and Waste Management Assoc., Sigma Xi, American Soc. of Mechanical Engineers, American Society for Engineering Education.

### Selected Awards

2009	Russ College Outstanding Undergraduate Teacher, Ohio University
2007	Elected to the rank of Fellow of the American Society of Mechanical Engineers
2007	Named Loehr Professor of Mechanical Engineering
2006	Invited Speaker, Energy Insurance Mutual 20 <sup>th</sup> Anniversary Meeting; Invited reviewer - DOE NETL Fuel Processing Program Review
2005	Invited Speaker, Ohio Mineland Partnership Annual Meeting, Purdue University CCTR Project Review, DOE NETL Fuel Cell Review
2001	Russ Outstanding Research Paper, College of Engineering and Technology, O.U.

### **Selected Awards (continued)**

2001,5,10 White Outstanding Research Award, Mechanical Engineering, O.U.  
2000 Invited panelist at the closing session of the American Power Conference  
1998, 2006 White Outstanding Teaching Award, Mechanical Engineering, O.U.  
1997-2001 Sponsored Faculty at the American Power Conference  
1997-99, 2009 Outstanding Mechanical Engineering Professor, ENT Student Council, O.U.  
1994-1995 Link Foundation Energy Graduate Fellow  
1991-1994 National Science Foundation Graduate Fellow  
1990 Navy Achievement Medal, U.S. Navy

### **Registration**

Registered Professional Engineer (Missouri E-24997, Ohio E-65420).

### **Patents**

“Membrane Electrostatic Precipitator” No. 6,231,643 (with H. Pasic, M.K. Alam), May 15, 2001.  
“Membrane Laminar Wet Electrostatic Precipitator,” No. 6,783,575, (with H. Pasic, M.K. Alam), August 31, 2004.  
“Enhanced Practical Photosynthetic CO<sub>2</sub> Mitigation,” No. 6,667,171 (with M. Vis, G. Kremer) December 23, 2003.  
“Sulfur Tolerant Anodes for Deployment of Coal Syngas with Planar SOFC for Stationary Power Generation,” 60/664,735, (with J. Trembly), March 23, 2005.  
“Apparatus and Method for Growing Biological Organisms for Fuel and Other Uses”, 60/799,440 (with M. Vis, G. Kremer and B. Stuart), May 10, 2006.  
“Flow Controlling Header for Delivering Fluid,” 60/938,517 (with S. Switzer, M. Vis, G. Kremer and B. Stuart), May 17, 2007.  
“Solid Oxide Fuel Cell Reaction Process Suitable for Use with Sulfur-Containing Fuels” (with M. Cooper and J. Trembly), March 30, 2006.  
“High Temperature Carbon Recycling Gasification,” 60/911,348, April 12, 2007  
“Carbon Dioxide Based Heat Pump for Water Purification,” 60/954,360, (with V. Gowreesan and C. Perrera) Aug. 7, 2007.

### **Invention Disclosures (not yet patents)**

“Thermal Processing for Conversion of Biomass to Biochar and Syngas,” OU 11011, submitted Dec 3, 2010  
“Hybrid system for enhancing algal growth using vertical membranes”, OU 10010, submitted March 10, 2010  
“Biocompatible algal leaching using solvents over membrane substrates,” OU 09021

### **Selected Publications**

De Silva, C., Kaseman, B., and Bayless, D., “Silver (Ag) as Anode and Cathode Current Collectors in High Temperature Planar Solid Oxide Fuel Cells,” accepted for publication in the *International Journal of Hydrogen Energy* **36**, pp. 779-786 (2011) – Citations 0  
Cooper, M., DeSilva, C., and Bayless, D. “Comparison of LSV/YSZ and LSV/GDC SOFC Anode Performance in Coal Syngas Containing H<sub>2</sub>S,” *Journal of the Electrochemical Society*, 157 (11), pp. B1713-B1718 (2010) – Citations 0  
Bayless, D.J., Mitchell, J., and Robe, T.R., “Engineering Leadership Studies and the Robe Leadership Institute Model in the Russ College of Engineering and Technology at Ohio

- University,” Paper 1175, *Proceedings of the Frontiers in Education Conference*, San Antonio, TX, 2009. – Citations 1
- Shi, L., Prudich, M. and Bayless, D., “A CFD Model of Autothermal Reforming,” *International Journal of Hydrogen Energy* (34) pp. 7666-7675, 2009. – Citations 0
- Shi, L., and Bayless, D., “A Model of Steam Reforming of Iso-Octane: The Effect of Thermal Boundary Conditions on Hydrogen Production and Reactor Temperature,” *International Journal of Hydrogen Energy* (33) pp. 4577-4585, 2008. – Citations 2
- Burnette, D.D., Kremer, G.G., and Bayless, D.J., “The Use of Hydrogen-depleted Coal Syngas in Solid Oxide Fuel Cells,” *Journal of Power Sources* (182) pp. 329-333, 2008. – Citations 6
- (Invited) Bayless, D. “Bioremediation of Greenhouse Gases,” *World Ecology Report* (in consultation with the United Nations), Spring 2008, pp. 7-9. Citations 0
- Shi, L., Bayless, D., “Analysis of Jet Fuel Reforming for Solid Oxide Fuel Cell Applications in Auxiliary Power Units,” *International Journal of Hydrogen Energy* (33):3 pp. 1067-1075, 2008. Citations 10
- Tremblay J., Gemmen R., Bayless D., “The Effect of Coal Syngas Containing AsH<sub>3</sub> on the Performance of SOFCs: Investigations into the Effect of Operation Temperature and AsH<sub>3</sub> Concentration,” *Journal of Power Sources* (171) pp 818-825, 2007. Citations 12
- Brown, I., Jones, J, Bayless, D., Sarkisova, S., Garrison, D., McKay, D., “Cyanobacteria for Human Habitation beyond Earth,” *Proceedings of 7<sup>th</sup> European Workshop on Microalgal Biotechnology*; NASA Paper 20070021574, 2007 – Citations 8
- Zemke P.E., Wood B.D., Dye D.J., and Bayless, D., “Economic analysis of a vertical sheet algal photobioreactor for biodiesel production,” 2007 Pages: 815-820 Published: 2007  
Times Cited: 2
- Cooper, M., and Bayless, D.J., Electrochemical H<sub>2</sub>S Scrubbing of a Coal Syngas Fuel Stream via SOFCs, *Fifth International Conference on Fuel Cell Science, Engineering and Technology*, Paper FuelCell2007-25042, New York, June 2007. Citations 2
- (Invited) Tremblay, J., Gemmen, R., and Bayless, D.J., The Effect of Trace Coal Syngas Species on the Performance of a Solid Oxide Fuel Cell, *Fifth International Conference on Fuel Cell Science, Engineering and Technology*, Paper FuelCell2007-25151, New York, June 2007. Citations 12
- Tremblay, J.P., Gemmen, R.S., Bayless, D.J., “The Effect of Coal Syngas Containing HCl on the Performance of Solid Oxide Fuel Cells: Investigations into the Effect of Operational Temperature and HCl Concentration,” *Journal of Power Sources*, (169):2, pp.347-354, 2007. Citations 16
- Shi, L., Bayless, D., Kremer, G., and Stuart, B., “Numerical Investigations of the Flow Pattern in an Electrically Enhanced Cyclone,” *Journal of the Air and Waste Management Association*, (57), pp. 489–496, 2007. Citations 0
- Shi, L. and Bayless, D., “Comparison of Boundary Conditions for Predicting the Collection Efficiency of Cyclones,” *Powder Technology*, (173) pp. 29–37, 2007. Citations 5
- Tremblay, J.P., Gemmen, R.S., Bayless, D.J., “The Effect of IGFC Warm Gas Cleanup System Conditions on the Gas-Solid Partitioning and Form of Trace Species in Coal Syngas and Their Interactions with SOFC Anodes,” *Journal of Power Sources*, (163):2, pp 986-996, 2007. Citations 36
- Marquez, A., Ohrn, T., Tremblay, J., Ingram, D., and Bayless, D., “Effects of Coal Syngas and H<sub>2</sub>S on the Performance of Solid Oxide Fuel Cells: Part 2: Stack Tests,” *Journal of Power Sources*, (164):2, pp 659-667, 2007. Citations 10

- Shi, L., Bayless, D., Kremer, G., and Stuart, B., "CFD Simulation of the Influence of Temperature and Pressure on the Flow Pattern in Cyclones," *Industrial & Engineering Chemistry Research*, (45) pp. 7667-7672, 2006.
- Bayless, D.J., Kremer, G., Vis, M., Stuart, B., Shi, L., Cuello, J., Ono, E., "Photosynthetic CO<sub>2</sub> Mitigation using a Novel Membrane-based Photobioreactor," *Journal of Environmental Engineering and Management*, (16)4, pp. 209-215, 2006. Citations 18
- Avetisyan, M., Bayless, D., and Gnuni, T., "Optimal Expansion of Developing Power System under the Conditions of Market Economy and Environmental Constraints," *Energy Economics*, (28) pp. 455-466, 2006. Citations 2
- Tremblay, J., Marquez, A., Ohrn, T., and Bayless, D., "Effects of Coal Syngas and H<sub>2</sub>S on the Performance of Solid Oxide Fuel Cells: Single-cell tests," *Journal of Power Sources*, (158) pp. 263-273, 2006. Citations 29
- Tremblay, J.P., Gemmen, R.S., Bayless, D.J., "A Study of the Transport of Coal Syngas Species Through a Solid Oxide Fuel Cell Anode," *Proceedings of the 23<sup>rd</sup> Annual International Pittsburgh Coal Conference*, paper 35-1, Pittsburgh, PA, 2006.
- Tremblay, J.P., Gemmen, R.S., Bayless, D.J., "The Effect of a Current Collection Layer Containing a Sulfur Tolerant Material On the Operation of a PSOFC Utilizing Coal Derived Syngas Containing H<sub>2</sub>S as Fuel," *Proceedings of the 23<sup>rd</sup> Annual International Pittsburgh Coal Conference*, paper 35-5, Pittsburgh, PA, 2006.
- Bayless, D., Shi, L., Kremer, G., Stuart, B., Reynolds, J., and Caine, J., "Membrane-Based Wet Electrostatic Precipitation," *Journal of the Air and Waste Management Association*, (55)6, pp. 784-791, 2005.
- Beshears, D., Earl, D., Muhs, J., Maxey, C., Capps, G., Stellern, S., Bayless, D., Switzer, S., "First Generation Hybrid Solar Lighting Collector System Development and Operating Experience," *Proceedings of SPIE – The International Society for Optical Engineering*, (5185), pp. 56-66, 2005.
- Bayless, D., Shi, L., Kremer, G., Stuart, B., "Membrane-Based Wet Electrostatic Precipitation – Results from Pilot Testing Experience," *Conference on Air Quality V*, Washington D.C., Sept. 2005.
- Shi, L., Kremer, G., Bayless, D., "Hot Gas Cleanup using Electrostatic Separation." *Proceedings of the 22<sup>nd</sup> Annual International Pittsburgh Coal Conference*, paper 33-2, Pittsburgh, PA, 2005.
- Li, K., Shi, L., Kremer, G., Bayless, D., "Acid Aerosol and Other Fine Particulate Control with Wet Laminar Electrostatic Precipitation." *Proceedings of the 22<sup>nd</sup> Annual International Pittsburgh Coal Conference*, paper 23-3, Pittsburgh, PA, 2005.
- Bayless, D.J., Kremer, G.G., Vis, M., Stuart, B.J., Prudich, M.E., Cooksey, J.E., and Muhs, J.S., "Enhanced Practical Photosynthetic CO<sub>2</sub> Mitigation," *Third Annual Conference on Carbon Sequestration*, Alexandria, VA, May 3, 2004.
- Bayless, D., Alam, M.K., Radcliff, R., and Caine, J., "Membrane-based Wet Electrostatic Precipitation," *Fuel Processing Technology* (85)6-7, pp. 781-798, 2004.
- Stuart, B., Kremer, G., Shi, L., Caine, J., Kish, P., Reynolds, J., Ray, I., Doonan, P., and Bayless, D. "Pilot Testing Results of Membrane-Based Wet Electrostatic Precipitation for Multipollutant Control," *Proceedings of the 29<sup>th</sup> International Technical Conference on Coal Utilization & Fuel Systems*, 2004.
- Tremblay, J., Marquez, A., Stuart, B., Botte, G., Kremer, G., and Bayless, D., "Adapting Planar Solid Oxide Fuel Cells for use with Solid Fuel Sources in the Production of Distributed Power," *Proceedings of the 29<sup>th</sup> International Technical Conference on Coal Utilization & Fuel Systems*, 2004.

- Stopek, D., Bayless, D., and Wilson, S., "Coal Gasification for Combined Heat Power Applications," *CIBO - Industrial Emissions Technology Conference*, Charlotte, NC, Aug. 2003.
- Bayless, D.J., Kremer, G.G., Vis, M., Stuart, B.J., Prudich, M.E., Cooksey, J.E., and Muhs, J.S., "Enhanced Practical Photosynthetic CO<sub>2</sub> Mitigation," *First Annual Hybrid Lighting Summit*, Oak Ridge, TN, Oct. 7, 2003.
- Caine, J., Bayless, D. and Reynolds, J., "Comparison of Metallic vs. Membrane-Based Wet ESP Technology for PM<sub>2.5</sub>, SO<sub>3</sub> Mist and Mercury Control at a Coal-Fired Power Plant," Conference on Air Quality IV, Washington D.C., Sept. 2003.
- Bayless, D., Shi, L., and Stuart, B., "Membrane-Based Wet Electrostatic Precipitation," *Proceedings of the 28<sup>th</sup> International Technical Conference on Coal Utilization & Fuel Systems*, pp. 899-910, March 2003.
- Shi, L., Alam, M.K., and Bayless, D.J., "Mercury Removal using Titania-coated Membrane Collectors in Electrostatic Precipitators," *Proceedings of the Eighteenth Annual International Pittsburgh Coal Conference*, paper 30-02, 2002.
- Bayless, D.J., and Caine, J., "Membrane-Based Wet Electrostatic Precipitation," *Proceedings of the 3<sup>rd</sup> International Conference on Air Quality*, Section B.3, 2002.
- (Invited) Bayless, D.J., and Caine, J., "Emerging Technologies - New Design Wet Membrane Electrostatic Precipitator," *2001 Particulate Control User's Group Conference*, July 2001.
- Pasic, H., Bayless, D.J., and Alam, M.K., "Membrane Based Electrostatic Precipitation," *Filtration and Separation*, 39, pp. 28-31, 2001.
- Bayless, D.J., Pasic, H., Alam, M.K., Shi, L., Haynes, B., Cochran, J., and Khan, W. "Use of Membrane Collectors in Electrostatic Precipitators," *Journal of the Air and Waste Management Association*, 51, pp. 1401-1407, 2001.
- Bayless, D.J., Kremer, G.G., Vis, M., Stuart, B.J., Prudich, M.E., Cooksey, J.E., and Muhs, J.S., "Enhanced Practical Photosynthetic CO<sub>2</sub> Mitigation," *Proceedings of the Eighteenth Annual International Pittsburgh Coal Conference*, paper 35-05, 2001.
- Bayless, D.J., "The Ohio Coal Research Consortium," *Proceedings of the 26<sup>th</sup> International Technical Conference on Coal Utilization & Fuel Systems*, pp. 507-518, 2001.
- Bayless, D.J., Pasic, H., and Alam, M.K., "Membrane-based Wet Electrostatic Precipitation," *Proceedings of the 26<sup>th</sup> International Technical Conference on Coal Utilization & Fuel Systems*, pp. 519-530, 2001.
- Bayless, D.J., Jewmaidang, J., Tanneer, S., and Birru, R., "Kinetics of Low Temperature Homogeneous SO<sub>3</sub> Formation for use in Flue Gas Conditioning for Improved Electrostatic Precipitator Performance." *Proceedings of the Combustion Institute*, 28, pp. 2499-2505, 2000.
- Bayless, D.J., "Analysis of the Evolution of Surface Voids Affecting Char Burning Rates at Diffusion-Limited Conditions," *Combustion Science and Technology*, 154, pp. 275-293, 2000.
- Bayless, D.J., Khan, A.R., Tanneer, S., and Birru, R., "An Alternative to Additional SO<sub>3</sub> Injection for Fly Ash Conditioning," *Journal of the Air and Waste Management Association*, (50):3, pp.169-174, 2000.
- Bayless, D.J., "Using Industrial Summer Intern Programs as a Tool for Engineering Education," *Journal of Engineering Education*, (88):4, pp. 465-470, 1999.
- Bayless, D.J., Brumfield C.A., Pierson, W., "American Electric Power's Summer Intern Program: Project Probe," *Proceedings of the American Power Conference*, 61, paper 27(a), 1999.

- Bayless, D.J., and Khan, A., "Effects of Gas Stream Temperature on Homogeneous SO<sub>2</sub> to SO<sub>3</sub> Conversion via Natural Gas Reburning," *Proceedings of the International Joint Power Generation Conference*, pp. 147-153, 1998.
- Bayless, D.J., "American Electric Power's Project Probe<sup>SM</sup> - Academic-Industrial Cooperation to Improve Power Engineering Education," *Proceedings of the International Joint Power Generation Conference*, pp. 467-471, 1998.
- Bayless, D.J., and Pawliger, R.I., "American Electric Power's Project Probe - Enhancing Power Engineering Education Through Industrial-Academic Cooperation," *Proceedings of the Frontiers in Education Conference*, pp. 873-878, 1997.
- Bayless, D.J., and Pawliger, R.I., "American Electric Power's Project Probe - Enhancing Power Engineering Education Through Industrial-Academic Cooperation," *Proceedings of the Frontiers in Education Conference*, pp. 1230-1235, 1998.
- Bayless, D.J., and Brumfield C.A., "American Electric Power's Project Probe - Power Engineering Education through Internship," *Proceedings of the American Power Conference*, 60, pp. 146-150, 1998.
- Bayless, D.J., "Revitalizing Power and Power Generation Engineering Education at Ohio University," *Proceedings of the American Power Conference*, 60, pp. 151-154, 1998.
- Bayless, D.J., Wismer, M., and Sheidler, R., "American Electric Power's Project Probe - A Unique Summer Intern Engineering Program," *Proceedings of the American Power Conference*, pp. 493-498, 1997.
- Bayless, D.J., and Clark, L., "Using CEMS Data to Estimate Instantaneous Heat Rate" *Proceedings of the American Power Conference*, 59, pp. 987-992, 1997.
- Bayless, D.J., Schroeder, A.R., Peters, J.E., and Buckius, R.O., "The Effects of Surface Voids on the Burning Rates of Coal Particles at Diffusion-Limited Conditions," *Combustion and Flame*, (108), pp. 187-198, 1997.
- Bayless, D.J., Schroeder, A.R., Olsen, M.G., Johnson, D.C., Peters, J.E., Krier, H., and Buckius, R.O., "The Effects of Natural Gas Cofiring on Sulfur Retention in Ash," *Combustion and Flame*, (106), pp. 231-240, 1996.
- Bayless, D.J., "Effects of Natural Gas and Coal Cofiring on Sulfur Retention in Ash," *Research Reports of the Link Energy Fellows*, (11), pp. 25-44, 1995.
- Bayless, D.J., Schroeder, A.R., Johnson, D.C., Peters, J.E., Krier, H., and Buckius, R.O., "Effects of Natural Gas Cofiring on Ignition of Coal and Coke Particles," *Combustion Science and Technology*, (98), pp. 185-196, 1994.

### **Recent Research Projects (\* denotes PI)**

- \* Ohio Center for Algae Research and Commercialization, \$2,951,000, State of Ohio Third Frontier, 10/01/2010-9/30/2013
- Low Energy Harvesting and Dewatering of Microalgae, with B. Stuart (PI) and G. Riefler, U.S. Department of Energy (ARPA-E) via sub-contract from Algaeventure Systems, January 2010, \$545,444.
- \* Ohio Research Scholars Program – Endowed Chair in Coal Syngas Utilization, \$4,920,000 (Ohio University portion, Bayless PI), joint proposal with Ohio State University (and their endowed chair in geological sequestration), awarded June, 2008.
- \* Development of Sustainable Biorefining, U.S. Department of Energy, \$1,935,000, DE-FG36-08GO88083, 08/01/08-08/31/12, with B. Stuart.
- Corrosive Properties and Suitability for Compression of Separated CO<sub>2</sub>, Ohio Coal Development Office, \$159,622, 9/1/07-8/31/09 (with Srdjan Nestic, PI)
- \* Ohio Coal Research Consortium, Ohio Coal Development Office, \$7,435,332, 9/1/00-9/30/07.

- \* Development of Sulfur Tolerant Anodes for Deployment of Coal Syngas with Planar Solid Oxide Fuel Cells for Stationary Power Generation, Ohio Coal Development Office, \$159,882, 9/1/05-8/31/07, with J. Trembly.
- Sulfur Tolerance and Improved Performance in SOFCs for Aerospace Applications, NASA, \$154,846 (of \$786,542 total award), 4/1/06-3/31/08, led by Mark DeGuire (Case Western).
- \* Distributed Hydrogen Production, U.S. Dept. of Energy, \$1,091,000, DE-FG36-03GO13059, 9/1/05-8/31/08, with G. Botte, G. Kremer, M. Prudich, B. Stuart, and S. Rackey.
- Hot Gas Cleanup Using Electrostatic Separation, Ohio Air Quality Development Authority (OCRC4), \$139,931, 9/1/04-9/30/06 (with G. Kremer).
- Hydrogen Production from Coal-Derived Syngas by Proton-Conducting Ceramic Membranes, Ohio Air Quality Development Authority (OCRC4), \$159,980, 9/1/04-9/30/06 (with V. Guliants and J. Lin, PI, both at University of Cincinnati).
- Midwest Center for Emerging Power Technologies, \$35,223, 3/1/05-8/31/06, Part of \$785,000 award from the National Science Foundation, Stark State University lead (with G. Botte, PI, M. Prudich, and A. Foley).
- \* Adapting Planar Solid Oxide Fuel Cells for use with Solid Fuel Sources in the Production of Distributed Power, United States Department of Energy, DE-FG36-03GO13059, \$3,910,000, 8/13/03-9/30/07.
- \* Adaptive Full Spectrum Solar Energy Systems (University of Nevada Reno is the lead institution in this \$3,085,000 project), United States Department of Energy DE-FC26-01NT41154, \$199,000, 6/1/01-8/31/05.
- \* Enhanced Practical Photosynthetic CO<sub>2</sub> Mitigation, United States Department of Energy DE-FC26-00NT40932, \$1,075,100, 9/1/00-2/28/05 (with M. Vis, G. Kremer, and B. Stuart).
- Consortium for Energy, Economics and the Environment, Ohio University Research Priorities, \$550,000, 1/1/05-12/31/09 (with M. Weinberg PI, K. Crist, M. Stoertz, G. Mapes, and S. Miller).
- \* Capture of Air Toxics by Membrane Electrostatic Precipitation with Reagent, Ohio Air Quality Development Authority (OCRC3), \$50,000, 9/1/03-9/30/04 (with B. Stuart).
- Development of a Membrane-Based Electrostatic Precipitator, United States Environmental Protection Agency, \$225,000, 8/1/00-7/31/02 (with M.K. Alam and H. Pasic, PI).
- Membrane-based Wet Electrostatic Precipitation, sponsored by the Ohio Coal Development Office, \$310,000, 9/1/98-9/30/02 (with M.K. Alam and H. Pasic, PI).
- \* Multi-Pollutant Control Using Membrane-Based Up-flow Wet Electrostatic Precipitation, (Croll-Reynolds is the lead institution on this \$535,000 project), United States Department of Energy DE-FC26-02NT41592, \$117,000, 10/1/02-3/31/04.
- \* Fine Particulate and Acid Aerosol Control using a Novel Laminar Membrane Precipitator, Ohio Coal Research Consortium (OCRC3), Ohio Coal Development Office, \$79,585, 9/1/02-9/30/03 (with L. Shi).
- \* Capture of Air Toxics by Membrane Electrostatic Precipitator, sponsored by the Ohio Coal Development Office, \$139,250, 9/1/01-9/30/03.
- \* Post-Doctoral Researcher for the Ohio Coal Research Center, Ohio University, \$29,513, 8/1/00-7/31/02 (with G. Kremer and M. Prudich).
- \* Role and Fate of Sulfur in Gas Reburning for NO<sub>x</sub> Control, Ohio Coal Development Office, \$287,000, 9/1/96-9/30/00 (with M. Prudich).
- \* Carbon Dioxide Mitigation through Controlled Photosynthesis, U.S. Department of Energy (FETC) \$50,000, 9/1/99-8/31/00 (with M. Vis).
- \* Flow Loop Reactor for Promoting Photosynthetic Carbon Sequestration, Stocker Endowment, \$11,000, 7/1/01-6/30/02.

Proposal for Collaborative Work of OU with Southern Environmental, Inc. Phase I Research Proposal: Novel, Membrane-Based Wet ESP, Ohio University Foundation, \$34,000, 3/1/00-3/1/01 (with M.K. Alam and H. Pasic, PI).

\* Enhanced Air Pollution Control using Electrostatic Precipitators, funded through the Ohio University 1804 Fund, \$28,500, 9/1/98 (with H. Pasic and M.K. Alam).

### **Service Work**

Central Region National Vice-President, Pi Tau Sigma, 2004-current.

Chair, RCENT Co-operative Education Committee, 2006-current

Reviewer for various DOE, NSF, and AAAS (EPSCoR) solicitations

Reviewer for several publications, including International Journal of Hydrogen Energy, Journal of the Air and Waste Management, Biotechnology and Bioengineering, Environmental Science and Technology, Combustion and Flame, and Energy Economics.

Search Committee, Executive Vice President for Development at Ohio University, 2006.

Executive member, Provost Search Committee for Ohio University, 2001-2002 and 2004-2005.

Search Committee, Director of External Relations for Russ College of Engineering, 2002.

Search Committee, Director of Budget and Planning for Russ College of Engineering, 2001.

ASME Region V Industrial Relations Chairman, 1995-1998.

ASME FACT CIAR (Committee on Industrial-Academic Relations) National Vice-Chair, 1998.

*Pi Tau Sigma* (Ohio Alpha Omicron Chapter of the M.E. Honor Society) charter advisor and advisor to the Ohio Delta Chapter of *Tau Beta Pi*, 1996-current.

Conference Co-Chair, First Annual Ohio Air Quality and Coal Research Symposium, Athens Ohio, December 2-3, 2004.

Conference Chairman, First Ohio Forum on Carbon Dioxide Reduction, Capture, and Sequestration, Delaware, Ohio, March 23, 2001.

Conference Chairman, Second Ohio Forum on Carbon Dioxide Reduction, Capture, and Sequestration, Lancaster, Ohio, April 26, 2002.

Conference Chairman, Ohio Mercury Control and Monitoring Forum, Columbus, Ohio, April 18, 2003.

Conference Chairman, Ohio Hydrogen from Coal Forum, Columbus, Ohio, April 2, 2004.

Session Chair for Electrostatic Precipitation, American Filtration and Separation Society Fall 2006 Conference, October 2006.

Professional engineering service to Facilities Management in evaluating new technology for DOE/OCDO proposal for new power plant for Ohio University.

MATHCOUNTS volunteer, 1997-2006.

Mechanical Engineering Laboratory Curriculum Chair, 2002-2004.

Stewardship Campaign Chair, First United Methodist Church Athens, 2004-2006.

### **Graduate Students Directed**

1. Hua Liang, "*Viability of Stirling-based Combined Cycle Distributed Power Generation*," June 1998.
2. Abu Hossain, "*Combustion of Solid Fuel in a Fluidized Bed Combustor*," August 1998.
3. Ashikur Khan, "*Experimental Studies of the Homogenous Conversion of SO<sub>2</sub> to SO<sub>3</sub> via Natural Gas Reburning*," June 1999.
4. Jirasak Jewmaidang, "*Homogenous Formation of SO<sub>3</sub> in Gas Reburning for NO<sub>x</sub> Control*," November 1999.
5. Srinivas Tanneers, "*Low Temperature Conversion of SO<sub>2</sub> to SO<sub>3</sub>*," October 2000.
6. Brian Haynes, "*Membrane Based Electrostatic Precipitation*," March 2000.

7. Rajinder Bagga, "*Biological Sequestration of Carbon Dioxide*," June 2000.
8. Joe Cochran, "*Wet Membrane-Based Electrostatic Precipitation*," November 2000.
9. Vijayagopal Veluthen, "*Plasma Enhanced Mercury Capture in Wet Electrostatic Precipitators*," August 2003.
10. Vishal Pawar, "*Use of Laminar ESP for the Capture of Titanium Dioxide Particles*," August 2004.
11. Pavan Valavala, "*Tensile and Creep Behavior of Omniscil in Membrane Based Wet Electrostatic Precipitators*," March 2005 (defended April 27, 2004).
12. Jason Trembly, "*The Effect of Coal Syn Gas Containing Hydrogen Sulfide on the Operation of a Planar Solid Oxide Fuel Cell*," March 2005 (defended Dec. 9, 2004).
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