

JIANN-YANG (JIM) HWANG

Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Phone: 906-487-2600
Fax: 906-487-2921
Email: jhwang@mtu.edu

Education

B.S. Earth Sciences, National Cheng Kung University, 1974
M.S. Geosciences-Mineralogy and Economic Geology Program, Purdue University, 1980
PhD. Purdue University, 1982. Multi disciplinary, Areas and Advisors Include: Electrical Engineering: Fritz J. Friedlaender; Geology: Gunnar Kullerud; Metallurgical Engineering: Reinhardt Schuhmann, Jr.; Chemical Engineering: Phillip C. Wankat.

Professional Experience

Michigan Technological University
Department of Materials Sciences and Engineering: Professor, 2004-present

Institute of Materials Processing: Director, 1992-2011; Program Manager, 1988-1992;
Research Scientist, 1984-1987

Department of Geological & Mining Engineering & Sciences: Associate Professor,
2002-2004

Department of Mining Engineering: Department Chair, 1999-2000, Associate
Professor, 1997-2002

Department of Chemical Engineering: Adjunct Faculty, 2002-present

Department of Civil and Environmental Engineering: Graduate Faculty, 1993-present

Department of Electrical Engineering: Adjunct Faculty, 1985-present

Department of Geology and Geological Engineering: Adjunct Faculty, 1985-present

Wuhan Iron and Steel Company
Chief Energy and Environmental Advisor, 2011-present.

Purdue University
School of Electrical Engineering and Indiana Mining and Mineral Resources Research
Institute (50/50): Postdoctoral Research Associate, 1982-1984

Professional Societies

AIME/TMS The Minerals, Metals, and Materials Society
AIME/SME Society for Mining, Metallurgy, and Exploration
ACS American Chemical Society
AIChE American Institute of Chemical Engineers
IEEE Society of Magnetics
American Foundrymen's Society

Courses Taught

Environmental Engineering for the Material Processing Industries
Materials Recycling
Microwave Processing of Materials

Mining Environmental Engineering
Mineral Processing

Public Services

Editor-in-Chief, Journal of Mineral and Materials Characterization and Engineering, 2001-present
Editor, International Journal of Mineral Processing, 1990-2000
1988, Co-chairman, SME Application to Mineral Beneficiation Session
1989, Chairman, SME Application to Mineral Beneficiation Session
1990, Chairman, TMS Characterization and Materials Recycling Session
1990, ASM Thermal Spray Industry Group, Environmental Committee
1991, Chair-Elect, SME and TMS Process Mineralogy Committee
1992, Committee Chair, SME and TMS, Process Mineralogy
1993, Chairman, SME Chemical Assaying Application Session
1993, Chairman, HazMat-North Am., Industrial Hazardous Wastes Problems and Solutions
1995, Chairman, TMS, Pyrometallurgy, Beneficiation, and Solution Mining Section
2001, Chair-Elect, SME Process Mineralogy Committee
2002, Chair, SME Process Mineralogy Committee
2004, Chair, TMS Materials Characterization Committee, Symposium Organizer
2005, Chair, TMS Materials Characterization Committee, Symposium Organizer
2007, Vice Chair, TMS Pyrometallurgy Committee
2008, Chair, TMS Pyrometallurgy Committee
2008, Co-Organizer, TMS Symposium of CO₂ and Energy for Materials Industry
2009, Chair, TMS Pyrometallurgy Committee
2009, Co-Organizer, TMS Symposium of CO₂ and Energy for Materials Industry
2009, Organizer, TMS High Temperature Processing Symposium
2010, Chair, SME Secondary Materials and Environmental Committee
2011, Organizer, 2nd International Symposium on High Temp Metallurgical Processing
2011, Co-Organizer, TMS Symposium on Characterization of Mineral, Metals and Materials
2011, Chair, TMS Materials Characterization Committee
2012, Organizer, TMS Symposium on Characterization of Mineral, Metals and Materials
2012, Co-Organizer, TMS TT Chen Honorary Symposium on Hydrometallurgy, Electrochemistry and Characterization
2012, Co-Organizer, TMS 3rd International Symposium on High Temperature Metallurgical Processing
2012, Co-Organizer, SME Water Treatment for Mining Industry
2012, Co-Organizer, ACS Symposium on "Fuels, Chemicals, Materials, and Energy from Biomass, Coal, Natural gas, and other Natural Resources", with Donghai Wang, Mark Nimlos, Jiann-Yang Hwang, Guang Cao
2012, Chair, ACS 243rd Annual meeting, "Biomass Pyrolysis and other Conversion Technologies" session.
2012, Chair, ACS 243rd Annual meeting, "Fossil Fuel Research" session.
2013, Organizer, TMS Symposium on Characterization of Mineral, Metals and Materials
2013, Co-Organizer, TMS 4th International Symposium on High Temperature Metallurgical Processing

Awards/Honors

Chinese Culture and Science Scholarship (Top Student) 1972-1974.
Championship, Graduate Team, Advisor, Automotive Solutions Competition on Plastics Recycling, sponsored by American Plastics Council, Vehicle Recycling Partnership and Society of Automotive Engineers, 1994
Service Recognition Award, TMS 1993
Honorary Guest Professor, Beijing University of Science and Technology, 2000
Honorary Guest Professor, China University of Geosciences, 2002
Fulbright Research Fellow Advisor, 2005
Keynote, Sohn International Symposium, 2006
First Place, MTU Senior Design annual competition, Advisor, 2008

Honorary Guest Professor, Kunming University of Science and Technology, 2010
Honorary Guest Professor, Central South University, 2010
Chief Energy and Environmental Advisor, Wuhan Iron and Steel, 2011
TMS Technology Award, 2011

Technical Topics of Expertise

Microwave Processing of Materials, Hydrogen Storage Materials, Steelmaking, Machinability of Ductile Iron, Water Treatment, Capacitive Desalination, Biofuel, Development of Magnetic, Electrostatic, Flotation, and other Physical Separation Methods. Characterization of Minerals, Materials and Wastes, Mineralogy and Liberation. Surface Chemistry; Dispersion, Agglomeration and Surface Modifications of Fine Particles. Beneficiation of Coal, Minerals, and Solid Wastes. Ferrofluid and Magnetizing Reagents, Foundry Sand Reclamation, Plastic Recycling, Plating Sludge Leaching and Pyro Processing. Flyash Processing and Utilizations for Concrete, Filler, Ceramic, and Activated Carbon Applications. Automobile Shredding Residues (Fluff) Processing. Mixed Plastics Separation. Medical Wastes Sterilization. Activated Carbon Preparation. Lubricant Cleaning. Paper Deinking. Kraft Paper Wastewater Decoloring. Fine Particle Emission Control. Toxic Emission Control. Paint separation from Abrasives. Glass Recycling and Reuse. Mercury Adsorption. Iron and Steel Slag, Aluminum Slag and Salt Cake.

Books

- 2006 EPD Congress 2006, TMS Publications, ed. by Stanley M. Howard, Robert L. Stephens, Christopher J. Newman and J.Y. Hwang, 595p.
- 2011 2nd International Symposium on High-Temperature Metallurgical Processing, TMS 2011, ed. by J.Y. Hwang, Jaroslav Drelich, Jerome Downey, Tao Jiang and Mark Cooksey, Wiley Publication, 417p.
- 2012 Characterization of Minerals, Metals and Materials, ed. By J.Y. Hwang, S.N. Monteiro, Chen-Guang Bai, John Carpenter, Mingdong Cai, Donato Firrao, Byoung-Gon Kim, Wiley Publication, 533p.
- 2012 3rd International Symposium on High-Temperature Metallurgical Processing, TMS 2012, ed. by Tao Jiang, J.Y. Hwang, Patrick Masset, Onuralp Yucel, Rafael Padilla, and Guifeng Zhou, Wiley Publication, 482p.
- 2012 T.T. Chen Honorary Symposium on Hydrometallurgy, Electrometallurgy and Materials Characterization, ed. By Shijie Wang, John E. Dutrizac, Michael L. Free, J.Y. Hwang, and Daniel Kim, Wiley Publication, 804p.

Publications

- 1978 H.O.A. Meyer, J.Y. Hwang, and R.H. McCallister, "Luna 24: Mineral Chemistry of 90-150 Micron Clasts," Proc. Lunar and Planetary Sci. Conf., 9th, pp. 2137-2147.
- 1982 J.Y. Hwang, G. Kullerud, M. Takayasu, F.J. Friedlaender, and P.C. Wankat, "Selective Seeding for Magnetic Separations," IEEE Transactions on Magnetics, Vol. MAG-18, pp. 1689-1691.
- 1982 J.Y. Hwang and H.O.A. Meyer, "The Mineral Chemistry and Genesis of the Chinkuashik Ore Deposit, Taiwan," Proc. Geol. Soc. of China, p. 88-101.
- 1983 J.Y. Hwang and H.O.A. Meyer, "Dacite-Andesite of the Chinkuashih Region, Northern Taiwan," Memoir Geol. Soc. of China, No. 5, pp. 67-84.
- 1984 M. Takayasu, J.Y. Hwang, F.J. Friedlaender, L. Petrakis, and R. Gerber, "Magnetic Separation Utilizing a Magnetic Susceptibility Gradient," IEEE Transactions on Magnetics, Vol. MAG-20, pp. 155-159.

- 1984 J.Y. Hwang, M. Takayasu, F.J. Friedlaender, and G. Kullerud, "Application of Magnetic Susceptibility Gradients to Magnetic Separation," *Journal of Applied Physics*, Vol. 55, pp. 2592-2594.
- 1984 P.C. Wankat, J.Y. Hwang, D. Beckemeyer, F.J. Friedlaender, "Removal of Paramagnetic Particles from Single Wire HGMS," *IEEE Transactions on Magnetics*, Vol. MAG-20, pp. 1177-1179.
- 1984 W. Leiternann, F.J. Friedlaender, R. Gerber, J.Y. Hwang and B.B. Emory, "Collection of Micron Sized Particles at High Velocities in HGMS," *IEEE Transactions on Magnetics*, Vol. MAG-20, pp. 1174-1176.
- 1985 J.Y. Hwang, G. Kullerud, F.J. Friedlaender, and M. Takayasu, "A Method for Alunite Beneficiation," *AIME Prepublications*, No. 85-11.
- 1986 J.Y. Hwang, D.H. Carlson, A.M. Johnson and J. VanAlstine, "Preliminary Investigation of Graphite Resources in Michigan," Process Mineralogy VI, ed. by R.D. Hangi, The Metallurgical Society, pp. 315-327.
- 1986 J.Y. Hwang and G. Kullerud, "Recovery of Nb/Y/REE/Th from a Norwegian Ore by High Gradient Magnetic Separation," abstract, 115th AIME Annual Meeting, New Orleans.
- 1987 G. Kullerud and J.Y. Hwang, "New Methods of Mineral Separation," *Proceedings of the International Symposium on Modern Mineralogy*, Seoul, South Korea, pp. 1-12.
- 1987 J.Y. Hwang, G. Kullerud, F.J. Friedlaender, M. Takayasu, "Ultrafine Particle Processing: Alunite Beneficiation," *AIME-SME Transactions*, Vol. 280, pp. 1961-1964.
- 1988 J.Y. Hwang, D.C. Yang and C. Li, "Coal Characterization and Its Relation to Physical Cleaning," 117th AIME Annual Meeting, Phoenix, Arizona, Process Mineralogy VIII, ed. by D.J.T. Carson and A.H. Vassiliou, pp. 235-247.
- 1989 J.Y. Hwang, R.S. Kramer, and J. Liu, "The Role of Processing Mineralogy in Optimizing a Flowsheet for Recovery of Copper from White Pine Ore," 118th AIME Annual Meeting, Las Vegas.
- 1989 J. Liu, L. Cui, and J.Y. Hwang, "Flotation of Rutile with Benzyl Arsonic Acid," 1989 International Symposium on Applied Mineralogy, Montreal, Canada, Process Mineralogy IX, ed. by W. Petruk, R.D. Hagni, S. Pignolet-Brandom, and D.M. Hausen, pp. 143-153.
- 1989 R.S. Kramer, J.Y. Hwang, and A.M. Johnson, "A Mineralogical and Chemical Evaluation of the Graphite Resource in the Lower Slate Member, Michigamme Formation, Michigan," 1989 Symposium on the Geology of Michigan and Its Geological Resources, East Lansing, Michigan.
- 1990 J.W. Keck, D.H. Carlson, C.W. Schultz, and J.Y. Hwang, "Leaching Composites of Five Plating Wastes with Ammonium Carbonate," 119th AIME TMS Annual Meeting, EPD Congress '90, D.R. Gaskell ed., pp. 529-537.
- 1990 J.Y. Hwang, "Fine Coal Cleaning with Advanced Magnetic Enhancement Technology," Sixth Coal Preparation Utilization, and Environmental Control Conference, Pittsburgh, August, Proceedings, pp. 290-297.
- 1991 P.R. Mainwaring, R.S. Kramer, J. Y. Hwang, and L.M. Sutter, "Improved Characterization of Materials by Integrated Image Analysis and Microanalysis Methods," 120th Annual TMS Meeting, New Orleans, Louisiana; Journal of Metals, November 1990, p. 62.

- 1991 J.Y. Hwang, A. M. Hein, R.S. Kramer, J. Liu, T.J. Hozeska, Q. Zhang, and T.E. Scott, "Application of Characterization on Fly Ash Beneficiation to Produce Quality Controlled Products," 120th Annual TMS Meeting, New Orleans, Louisiana; Process Mineralogy XI: Characterization of Metallurgical and Recyclable Products, D. M. Hausen et al ed., pp. 167-180.
- 1991 J.Y. Hwang, "Methods to Make Fine Particles Magnetic," The 22nd Fine Particles Society Annual Meeting, San Jose, California, July 1991, Preprint, 9 p.
- 1992 J.Y. Hwang, X. Liu, R.S. Kramer, J. Liu, A.M. Hein, and Y. Wu, "Physical Concentration Processes for Reclaiming Foundry Sands," SME Annual Meeting Preprint No. 92-228, February 24-27, Phoenix, Arizona, 17 p.
- 1992 J.Y. Hwang, J. Liu, and M.L. Gray, "Coal Cleaning by Magnetic Reagent," SME Annual Meeting, February, Phoenix, Arizona, SME Preprint 92-227, 9 p.
- 1992 J.Y. Hwang, "Magnetic Reagent Technology for Mineral Processing," SME Annual Meeting, February, Phoenix, Arizona, SME Preprint 92-226, 9 p.
- 1992 R.I. Kramer, J.Y. Hwang, P.J. Suardini, A.M. Hein, "A Characterization Study of Pyrite in Three Coals Utilizing SEM, EDS, & Image Analysis," SME Annual Meeting, February, Phoenix, Arizona.
- 1992 P. T. Suardini, J. Y. Hwang, T. Durney, and D. Mills, "Studies of Alternative Medias and Procedures for Fine-Coal Washability Analyses Using a Batch, Rotor-and-Bucket Centrifuge," Coal Testing Conference, Lexington, Kentucky, March 1992, preprint, 19 p.
- 1992 Zhang, S., X. Wang, and J. Y. Hwang, "Microstructure of Activated Carbon from Wastepaper," Proceedings of the 29th Annual Electron Microscopy Colloquium, Iowa State University, Ames, Iowa, May 8-9.
- 1993 X. Liu, J.Y. Hwang, T.J. Hozeska, A.M. Hein and R.S. Kramer, "Generation of Magnetic Sand during Thermal Treatment of Silica Sand," AFS Annual Meeting 1993, Paper Number 93-112.
- 1993 R.S. Kramer, J.Y. Hwang, and A.M. Hein, "Identification of Low Concentration Phosphate Species in Iron Ore Using SEM/EDS/Image Analysis," SME-AIME Annual Meeting, Reno, NV, February 15-19, 1993, Paper number 93-057.
- 1993 X. Liu, R.S. Kramer, A.M. Hein, J.Y. Hwang, and G. Wang, "Mineralogical Evaluation of the Effect of Reclamation Processing Variables on Chromite Foundry Sand," SME Annual Meeting Preprint No. 93-210, Reno, NV, February 15-19, 1993, Paper number 93-210.
- 1993 X. Liu, J.Y. Hwang, T.J. Hozeska, and A.M. Hein, "Concrete Application for Magnetic Sand Waste from Steel Foundries," Proceedings of Waste Stream Minimization and Utilization Innovative Concepts - An Experimental Technology Exchange, Volume 1 - Industrial Solid Waste Processing, Municipal Waste Reduction/Recycling, Austin, Texas, April 22-23, 1993, R. L. Watts, Project Manager and V.E. Lee, Editor, USDOE/BATTELLE, PNL-SA-22193, Vol.1, pp.1.1-1.12.
- 1993 X. Liu, J. Y. Hwang, T. J. Hozeska, A. M. Hein, and R. S. Kramer, "Generation of Magnetic Sand during Thermal Treatment of Silica Sand," AFS Transactions, Vol. 101, pp. 327-333.
- 1993 J. Y. Hwang, X. Liu, B. Kesling, "Sand Reclamation for a Steel Foundry," AFS 1993 Annual Meeting, Paper Number 93-57.
- 1993 R. S. Kramer and J. Y. Hwang, "Magnetic Reagent Technology for Mineral Processing," Invited Paper, presented (by R. Kramer) at Upper Peninsula Section AIME/SME Annual Meeting, April 22, 1993.

- 1993 X. Liu, J. Y. Hwang, R. S. Kramer, A. M. Hein, and T. J. Hozeska, "Thermal Reclamation of oil Urethane Nobake Sands for A Steel Foundry," AFS Transactions, Vol. 101, 1993.
- 1993 R. S. Kramer, J. Y. Hwang, X. Huang, and T. Hozeska, "Characterization of Recyclable Components in Fly Ash to Produce Marketable Products," 1993 TMS Annual Meeting, Extraction and Processing for the Treatment and Minization of Wastes, Edited by J. Hager, B. Hansen, W. Imne, J. Pusatori and V. Ramachandran, TMS, pp. 1075-1096.
- 1994 J. Hwang, X. Huang, and A. M. Hein, "Synthesizing Mullite from Beneficiated Fly Ash," JOM, May 1994, pp. 36-39.
- 1994 J. Y. Hwang, X. Liu, B. Kesling, "Sand Reclamation for a Steel Foundry," AFS Transactions, Vol. 101, pp.807-815.
- 1994 R. Kramer, X. Liu, J. Y. Hwang, and G. Wang, "Mineralogical Evaluation of the Effect of Reclamation Processing Variables on the Chemistry of Foundry Sand," Process Mineralogy XII, TMS 1994, pp. 379-393.
- 1994 R. Kramer and J.Y. Hwang, "Identification of Low Concentration Phosphate Species in Iron Ore Using SEM/EDS/Image Analysis", Process Mineralogy XII, TMS, pp.309-316.
- 1994 X. Liu, J. Y. Hwang, T. J. Hozeska and B. Kesling, "Microwave Heating Characteristics of Selected Sands and Binders Used in Foudnry Operation," AFS Annual Meeting, Paper Number 94-097.
- 1994 J. Y. Hwang, X. Liu, T. J. Hozeska and B. Kesling, "A Study of Reclamation of Foundry Sand Using Microwave Selective Heating," AFS 1994 Annual Meeting, Paper Number 94-098.
- 1995 X. Liu, J. Y. Hwang, A. M. Hein and R. Kramer, "Separation of Chromite and Silica from Reclaimed Foundry Sand Using Physical Concentration Processes," Process Mineralogy XIII, TMS 1995, pp. 41-59.
- 1995 J. Y. Hwang, X. Huang, R. Tieder, and A. M. Hein, "Refractory Material Produced from Beneficiated Fly Ash," Proceedings: 11th International Symposium on Use & Management of Coal Combustion By-Products (CCBs), Vol. I, Orlando, Florida, Jan. 15-19, 1995, pp. 32-1 to 32-13.
- 1995 J. Y. Hwang, X. Liu, F.V. Zimmer, T.R. Thiruvengadam, T. Patzias, Beneficiation Process for Fly Ash and the Utilization of Cleaned Fly Ash for Concrete Application," Proceedings: 11th International Symposium on Use & Management of Coal Combustion By-Products (CCBs), Vol. I, Orlando, Florida, Jan. 15-19, 1995, pp. 11-1 to 11-16.
- 1995 X. Huang, J. Y. Hwang, and R. Tieder, "Clean Ash as Fillers in Plastics," Proceedings: 11th International Symposium on Use & Management of Coal Combustion By-Products (CCBs), Vol. I, Orlando, Florida, Jan. 15-19, 1995, pp. 33-1 to 33-15.
- 1995 X. Liu, J.Y. Hwang, T.J. Hozeska and B. Kesling, "Microwave Heating Characteristics of Selected Sands and Binders Used in Foundry Operation", AFS Tranctions, Vol. 102, pp.427-432.
- 1995 X. Liu, J. Y. Hwang, M.O. Curtis, and A.C. Clishe, "Effect of Fly Ash Beneficiation Process on Quality of Processed Bottom Ash, ESP Fly Ash, Dust Collector Fly Ash, their Mixtures, and Performance of Concrete Containing these Processed Ash Samples," Proceedings: 11th International Symposium on Use & Management of Coal Combustion By-Products (CCBs), Vol. I, Orlando, Florida, Jan. 15-19, 1995, pp. 12-1 to 12-16.

- 1995 J. Y. Hwang, X. Liu, T. J. Hozeska and B. Kesling, "Reclamation of Foundry Sand Using Microwave Selective Heating," AFS Transactions, Vol. 102, pp.789-795.
- 1995 X. Huang, J.Y. Hwang, and B.C. Mutsuddy, "Properties of Mullite Synthesized from Fly Ash and Alumina Mixture," Interceram, Vol. 44, No. 2, 1995, pp. 65-71.
- 1996 G.D. Mendenhall, Y. Geng, and J.Y. Hwang, "Optimization of Long-Term Stability of Magnetic Fluids from Magnetite and Synthetic Polyelectrolytes," Journal of Colloid and Interface Science, 184, 1996, pp. 519-526.
- 1996 Z. Li, X. Wang, Q. Zhang, and J.Y. Hwang, "Recovery of Titanium from Blast-Furnace Slag - A Pyro-modification and Beneficiation Approach," Second International Symposium on Extraction and Processing for the Treatment and Minimization of Wastes, TMS, 1996, pp. 417-426.
- 1997 X.M. Song, J.Y. Hwang, and X. Liu, "Utilization of Beneficiated Low NO_x Fly Ash in Concrete and Concrete Block," Proceedings: 12th International Symposium on Coal Combustion By-Product (CCB) Management and Use, Vol. 1, EPRI TR-107055-V1, January 1997, pp. 30-1 to 30-16.
- 1997 X. Huang, J.Y. Hwang and J.M. Gillis, "Processed Low NO_x Fly Ash as a Filler in Plastics," Proceedings: 12th International Symposium on Coal Combustion By-Product (CCB) Management and Use, Vol. 1, EPRI TR-107055-V1, January 1997, pp. 22-1 to 22-24.
- 1997 X. Huang, J.Y. Hwang and X. Song, "High Performance Auto Parts Could be Produced Using CastCon Manufacturing Process," Proceedings of 1997 SAE International Congress & Exposition, Feb. 24-27, 1997, Cobo Center, Detroit, Paper No. 970429.
- 1997 X. Huang, J.Y. Hwang and X. Song, "CastCon-A Combination of Casting, Forging, P/M, Bonding and Coating to Produce High Performance Components," Proceedings of 5th International Conference on Advanced Particulate Materials and Processes, April 7-9, 1997, West Palm Beach, Florida.
- 1997 J.Y. Hwang, "Unburned Carbon from Fly Ash, A Hidden Treasure," 3rd Annual Conference on Unburned Carbon on Utility Fly Ash, U.S. Department of Energy, May 1997, Pittsburgh, Pennsylvania, FETC Publication, 1997 Conference Proceedings, pp.1-3 .
- 1997 J.Y. Hwang and X.M. Song, "Replacing Al Powder with Al Slag or Recycled Foil in Cellular Concrete," JOM V. 49, No. 8, pp. 29-30.
- 1997 J.Y. Hwang, "Powder Technology in Concrete," Powder Metallurgy, V. 40, No. 3, p. 160.
- 1997 J.Y. Hwang, "Aluminum Wastes Cut Cost of Cellular Concrete," Advanced Materials & Processes, 5/97, p. 9.
- 1997 X.M. Song and J.Y. Hwang, "A Study of the Microscopic Characteristics of Fracture Surface of MDI-Bonded Wood Fiber/Recycled Tire Rubber Composites Using Scanning Electron Microscopy," Wood and Fiber Science, 29(2), pp. 131-141.
- 1997 X. Huang, J.Y. Hwang and X. Song, "High Performance Auto Parts Could be Produced Using CastCon Manufacturing Process," Journal of Materials & Manufacturing, Vol. 106, Sec. 5, pp.446-451.
- 1998 J.Y. Hwang, "Utilization of Low NO_x Coal Combustion By-Products," Proceedings of the Advanced Coal-Based Power and Environmental Systems '98 Conference, July 21-23, 1998, DOE/FETC-98-1072, Paper 2B-5.

- 1999 J.Y. Hwang, X. Huang, J. Gillis, A. Hein, D. Popko, R. Tieder, and M. McKimpson, "Separation and Utilization Technologies of Low NO_x Ash," Proceedings: 13th International Symposium on Use and Management of Coal Combustion By-Products, Vol. 1, pp. 19-1 to 19-22.
- 1999 J.Y. Hwang and M. Lee Jeong, "Utilization of Microalgae to Mitigation CO₂," RITE NOW (33rd Issue), p 16.
- 1999 J.Y. Hwang, "Beneficial Use of Fly Ash," Proceedings: 13th U.S./Korea Joint Workshop on Energy and Environment, pp 373-396.
- 2000 J.Y. Hwang, R.C. Greenlund, M. Jeong, A.M. Hein, D.C. Popko, R. Peterson, and R. McChesney, "Eddy Current Separation of Aluminum Smelting By-Products," Fourth International Symposium on Recycling of Metals and Engineered Materials, edited by D.L. Steward, Jr., J.C. Paley, and R.L. Stephens, pp. 1181.
- 2000 J.Y. Hwang and X. Huang, "Processing High LOI Fly Ash for Plastic Applications," Proceedings: 17th Annual International Pittsburgh Coal Conference, paper 29-2
- 2001 Z. Xu, B.C. Cornilsen, D.C. Popko, W.D. Pennington, J.R. Wood, and J.Y Hwang, "Quantitative Mineral Analysis by FTIR Spectroscopy," J. Vibrational Spectroscopy, Vol. 5, No. 4, pp. 1-11.
- 2001 J.Y. Hwang and M. Jeong, "Separation and Quantification of Hazardous Wastes from Abrasive Blast Media," Journal of AOAC International, Vol. 84, No. 3, pp.1-7.
- 2001 X.M. Song and J.Y. Hwang, "Mechanical Properties of Wood Fiber/Recycled Tire Rubber Composites," Forest Products Journal, Vol. 51, No. 5, pp. 45-51.
- 2001 J.Y. Hwang, R.C. Greenlund, X. Huang, and M.L. Jeong, "Characterization of Eddy Current Separation Samples of Aluminum Smelting By-Products," SME Annual Meeting, Feb 26-28, Denver, Colorado, Preprint 01-89, pp.1-14.
- 2002 J.Y. Hwang, X. Sun, Z. Li, "Unburned Carbon from Fly Ash for Mercury Adsorption: I. Separation and Characterization of Unburned Carbon," Journal of Minerals and Materials Characterization and Engineering, V.1, No. 1, pp. 39-60.
- 2002 B. Li, S. Yu, J. Y. Hwang, and S. Shi, "Antibacterial Vermiculite Nano-Material," Journal of Minerals and Materials Characterization and Engineering, V.1, No. 1, pp. 61-68.
- 2002 J.Y. Hwang, X. Sun, Z. Li, "Unburned Carbon from Fly Ash for Mercury Adsorption: II. Adsorption Isotherms and Mechanisms," Journal of Minerals and Materials Characterization and Engineering, V.1, No. 2, pp. 79-96.
- 2002 J.Y. Hwang, S. Shi, Z. Xu, and X. Huang, "Oxygenated Leaching of Copper Sulfide Mineral Under Microwave Hydrothermal Conditions," Journal of Minerals and Materials Characterization and Engineering, V.1, No. 2, pp. 111-119.
- 2002 J. Y. Hwang, "Adsorption of Surfactant Dispersed Nanometer Magnetite," Journal of Minerals and Materials Characterization and Engineering, V. 1, No. 2, pp. 132-140.
- 2002 X. Huang, J.Y. Hwang, S. Shi, R.C. Greenlund, Z. Xu, A.M. Hein, "Potential Application of Microwaves in Steelmaking," 3rd World Congress on Microwave and Radio Frequency Applications, Sydney, Australia, September 2002
- 2003 X. Wang, J.Y. Hwang, R.C. Greenlund, A.M. Hein, X. Huang, "Effects of Flow Speed, Flow Pattern and Air Bubble on Pressure Loss in Slurry Handling", Minerals & Metallurgical Processing Journal and Transactions, Vol. 20, No. 1, Page 36-41.

- 2003 X. Huang, J.Y. Hwang, and J.M. Gillis, "Processed Low NO_x Fly Ash as a Filler in Plastics", *Journal of Minerals and Materials Characterization and Engineering*, V.2, No. 1, pp. 11-31.
- 2003 Z. Xu, J.Y. Hwang, R. Greenlund, X. Huang, J. Luo, and S. Anschuetz, "Quantitive Determination of Metallic Iron Content in Steel-Making Slag", *Journal of Minerals and Materials Characterization and Engineering*, V. 2, No. 1, pp. 65-70.
- 2003 J.Y. Hwang, S. Shi, Z. Xu and X. Huang, "Microwave Assisted Chalcocite Leaching in CuCl₂- NaCl Media Under Oxygen Pressure", *EPD Congress 2003*, Edited by M.E. Schlessinger, TMS Publications,, pp. 11-16.
- 2003 B. Li, J.Y. Hwang, X. Huang, Z. Xu and S. Yu, "Characterization of Copper Vermiculite Antibacterial Nanomaterial", *EPD Congress 2003*, Edited by M.E. Schlessinger, TMS Publications,, pp. 29-36.
- 2003 S. Shi and J.Y. Hwang, "Microwave-Assisted Wet Chemical Synthesis: Advantages, Significance, and Steps to Industrialization", *Journal of Minerals and Materials Characterization and Engineering*, V.2, No. 2, pp. 101-110.
- 2003 S. Shi and J.Y. Hwang, "Plasma Spray Fabrication of Near-Net-Shape Ceramic Objects", *Journal of Minerals and Materials Characterization and Engineering*, V. 2, No. 2, pp. 145-150.
- 2003 M.L. Jeong, J.M. Gillis, J.Y. Hwang, "Carbon Dioxide Mitigation by Microalgal Photosynthesis", *Bull. Korean Chem. Soc.*, V. 24, No. 12, pp. 1763-1766.
- 2004 J. Luo, A.M. Hein, and J.Y. Hwang, "Adsorption of Vapor Phase Mercury on Various Carbons", *Journal of Minerals and Materials Characterization and Engineering*, V. 3, No. 1, pp. 13-22.
- 2004 J. Luo, J.Y. Hwang, R.C. Greenlund, X.Sun, and Z. Xu, "Adsorption of Hg on Unburned Carbon with HF Leaching", *Journal of Minerals and Materials Characterization and Engineering*, V. 3, No. 1, pp. 41-51.
- 2004 J.Y. Hwang and X. Huang, "Microwave Production of Steels", *Proceedings of 2004 Conference of Structural Engineers Association of Texas*, Invited Speaker, Lakeway, Texas, pp. 1-10.
- 2004 J.Y. Hwang, S. Shi, Z. Xu and K.W. Peterson, "Synthesis of Monodispersed Iron Oxide Particles in a Large-Scale Microwave Reactor", *AICHe Annual Meeting, Proceedings Fourth World Congress on Microwave and Radio Frequency Applications*, p. 124.
- 2004 S. Shi, J.Y. Hwang, B. Li and X. Huang, "An Investigation into the Sintering of Magnesium Fluoride", *Journal of Minerals and Materials Characterization and Engineering*, V. 3, No. 2, pp. 105-108.
- 2004 B. Li, X. Huang, J.Y. Hwang, S. Qu, S. Shi, and Z. Xu, "Acceleration of Microwave Irradiation on the Melting of Fluorides", *AICHe Annual Meeting, Proceedings Fourth World Congress on Microwave and Radio Frequency Applications*, pp. 125-128.
- 2004 S. Shi, J.Y. Hwang, B. Li and X. Huang, "Microwave Sintering of Magnesium Fluoride", *AICHe Annual Meeting, Proceedings Fourth World Congress on Microwave and Radio Frequency Applications*, p. 200.
- 2004 Z. Xu, J. Luo, R. Greenlund, B. Li, J. Hwang, "Controlling Mercury Emissions with Spent Catalytic Converter", *JOM*, v.56, no.11, p.45.

- 2004 Z. Xu, N. Popko, R. Greenlund, J. Hwang, "Recycling of Steel-Making Slag", JOM v.56, no.11, p.322.
- 2004 B. Li, J.Y. Hwang, and S. Yu, "Storing Capacity of Copper Ions in Vermiculite and Its Relations to the Preparation Conditions", JOM, v.56, no.11, p.339.
- 2005 B. Li, J.Y. Hwang and X. Huang, "Effect of Microwave Irradiation on the Characteristics of Bentonite Particles", TMS Annual Meeting, EPD Congress 2005, Edited by M.E. Schlesinger, TMS Publications, pp.215-225.
- 2005 J.Y. Hwang and S. Shi, "Novel Perhydrides for Hydrogen Storage", in Materials for the Hydrogen Economy, edited by J.J. Petrovic et al, Materials Science and Technology 2005, pp. 43-47.
- 2005 J.Y. Hwang and B. Li, "Low Cost Antibacterial/Antifungal Coating Materials for Homeland Security Applications", Materials Science and Technology 2005, September, Pittsburgh, PA .
- 2005 S. Shi and J.Y. Hwang, "Miniaturize Chemical Plant With Microwave Heating Technology", Journal of Minerals and Materials Characterization and Engineering, V. 4, No. 1, pp. 61-66.
- 2005 X. Sun, J.Y. Hwang, X. Huang, B. Li, and S. Shi, "Effects Of Microwave On Molten Metals With Low Melting Temperatures", Journal of Minerals and Materials Characterization and Engineering, V. 4, No. 2, pp. 107-112.
- 2006 J.Y. Hwang, X. Huang, S. Qu, Y. Wang, S. Shi and G. Caneba, "Iron Oxide Reduction with Conventional and Microwave Heating Under CO and H₂ Atmospheres", EPD Congress 2006, edited by S.M. Howard et al, TMS Publications, pp. 219-227.
- 2006 B. Li, J.Y. Hwang and S. Shi, "Fibrous Reinforcement of Clay-Bonded Silicon Carbide Refractory Using Andalusite Powder", EPD Congress 2006, edited by S.M. Howard et al, TMS Publications, pp. 255-261.
- 2006 B. Li, J.Y. Hwang, A.M. Hein and Z. Xu, "Phase Transformation of Andalusite and Its Impacts on Refractory Brick Reinforcement", EPD Congress 2006, edited by S.M. Howard et al, TMS Publications, pp. 295-302.
- 2006 X. Sun, J.Y. Hwang, S. Shi, B. Li, and X. Huang, "Temperature Measurement in Microwave Heating", EPD Congress 2006, edited by S.M. Howard et al, TMS Publications, pp. 1123-1132.
- 2006 J.Y. Hwang, X. Huang and Z. Xu, "Recovery of Metals from Aluminum Dross and Saltcake", Journal of Minerals and Materials Characterization and Engineering, V. 5, No. 1, pp. 47-62.
- 2006 N. E. Altun, C. Hicyilmaz, J.Y. Hwang, and A.S. Bagci, "Beneficiation of Himmetoglu Oil Shale by Flotation as a Solid Fuel Substitute. Part 1. Materials Characteristics and Flotation Behavior", Energy and Fuels, v.20, pp. 214-221.
- 2006 N. E. Altun, C. Hicyilmaz, J.Y. Hwang, and A.S. Bagci, "Beneficiation of Himmetoglu Oil Shale by Flotation as a Solid Fuel Substitute. Part 2. Process Optimization by a Statistical Approach", Energy and Fuels, v.20, pp. 222-226.
- 2006 J.Y. Hwang, S. Shi, B. Li and X. Sun, "Storing Hydrogen with Perhydride", Advanced Materials for Energy Conversion III, edited by D.S. Chandra, TMS Publications, pp. 101-107.
- 2006 J.Y. Hwang, S. Shi, Z. Xu and K.W. Peterson, "Synthesis of Monodispersed Iron Oxide Particles by a Large-Scale Microwave Reactor", Chemical Engineering Communications, v.193, pp. 1586-1591.

- 2006 J.Y. Hwang, and X. Huang, "New Steel Production Technology with Microwave and Electric Arc Heating", ADVANCED PROCESSING OF METALS AND MATERIALS, VOLUME 5 - NEW, IMPROVED AND EXISTING TECHNOLOGIES: IRON AND STEEL and RECYCLING AND WASTE TREATMENT, Edited by F. Kongoli and R.G. Reddy, TMS, pp. 251-261.
- 2006 X. Sun, J.Y. Hwang, S. Shi, and X. Huang, "Homogeneous Heating in Microwave Processing", ADVANCED PROCESSING OF METALS AND MATERIALS, VOLUME 5 - NEW, IMPROVED AND EXISTING TECHNOLOGIES: IRON AND STEEL and RECYCLING AND WASTE TREATMENT, Edited by F. Kongoli and R.G. Reddy, TMS, pp. 171-180.
- 2006 N.E. Altun, C. Hicyilmaz, J.Y. Hwang, A.S. Bagei, "Evaluation of a Turkish low quality oil shale by flotation as a clean energy source: Material characterization and determination of flotation behavior", Fuel Processing Technology, v.87, issue 9, pp.783-791.
- 2006 J.Y. Hwang, X. Huang, A. Garkida and A. Hein, "Waste Colored Glass as Sintering Aid in Ceramic Tile Production", Journal of Minerals and Materials Characterization and Engineering, V. 5, No. 2, pp. 119-129.
- 2006 S. Shi, R.H. Scheicher, R. Pandey, and J.Y. Hwang, "Clustering of H₂ Molecules Around Alkaline Earth Metal Ions; A Systematic Density Functional Theory Study", International Symposium on Metal-Hydrogen Systems (MH2006), October 1-6, Maui, Hawaii.
- 2006 S. Shi, J.Y. Hwang, X. Sun, and B. Li, "Potentials of Metal Oxide Molecules for Binding Hydrogen into Clusters", Fuel Cells and Energy Storage Systems: Materials, Processing, Manufacturing and Power Management Technologies Symposium, MS&T 2006, Oct. 15-19, Cincinnati, OH.
- 2006 N.E. Altun, C. Hicyilmaz, J.Y. Hwang, A.S. Bagei, M.V. Kok, "Oil Shales in the World and Turkey; Reserves, Current Situation and Future Prospects: A Review", Oil Shale, v.23, no. 3, pp.211-227.
- 2007 S. Shi and J.Y. Hwang, "Research Frontiers on New Materials and Concepts for Hydrogen Storage" International Journal of Hydrogen Storage, v.32, issue 2, pp.224-228.
- 2007 P.A. Olubambi, J.H. Potgieter, J.Y. Hwang, S. Ndlovu, "Influence of microwave heating on the processing and dissolution behavior of low-grade complex sulfide ores", Hydrometallurgy, v.89, pp.127-135.
- 2007 B. Li, Z. Xu, J.Y. Hwang, "Effect of Particle Size and Exfoliation to Cation Exchange Capacity of Copper in Vermiculite", TMS Annual Meeting, Orlando, FL, March.
- 2007 B. Li, J.Y. Hwang, Z. Xu, "Interplanar Spacing and Expandability of Micron-sized Vermiculite", TMS Annual Meeting, Orlando, FL, March.
- 2007 J.Y. Hwang, X. Huang, A. Garkida, S. Shi, B. Li, "Utilization of Waste Glass in Alumina-Glass Composite", TMS Annual Meeting, Orlando, FL, March, EPD Congress 2007, ed. by B. Davis and M. free, pp.121-126.
- 2007 J.Y. Hwang, X. Huang, S. Shi, "Steel Production with Microwave Assisted Electric Arc Furnace Technology", TMS Annual Meeting, Orlando, FL, March.
- 2007 B. Li, X. Huang, J.Y. Hwang, "Solidification of Fluoride Solution in Aluminum Electrolyte", TMS Annual Meeting, Orlando, FL, March.
- 2007 B. Li, Y. Huang, J.Y. Hwang, "Preparation of Alkali Porous Ceramic with Fibrous Wollastonite", TMS Annual Meeting, Orlando, FL, March, EPD Congress, Materials Characterization, ed. by A. Gokhale, J. Li, and T. Okabe, pp. 109-116.

- 2007 J.Y. Hwang, X. Huang, S. Shi, "Steel Production with Microwave Assisted Electric Arc Furnace Technology", *Materials Processing under the Influence of External Fields*, ed. By Q. Han, G.M. Ludtke, and Q. Zhai, TMS Publication, pp. 225-234.
- 2007 Z. Xu, H. Wang, and J.Y. Hwang, "Complex Carbon Nanotube Superstructures Synthesized with Natural Mineral Catalysts", *CARBON*, v. 45, issue 4, pp. 873-879.
- 2008 B. Li, X. Huang and J.Y. Hwang, "Corrosion of Nickel-Based Superalloy in Molten Fluoride", TMS Annual Meeting, New Orleans, LA, March.
- 2008 B. Li and J.Y. Hwang, "Copper Release Velocity from Copper Vermiculite in Aquatic Environment", TMS Annual Meeting, New Orleans, LA, March.
- 2008 A. Garkida, J.Y. Hwang, X. Huang, C. Okuofu, B. Li, and A. Ahuwan, "The Shrinkage Behavior of Recycled Glass Compacts", TMS Annual Meeting, New Orleans, LA, March.
- 2008 B. Li, J.Y. Hwang, R. Nye, D.C. Popko, and P. O'Dovero, "Measurement of Leaching Rate of Heavy Metals from Copper Tailing", TMS Annual Meeting, New Orleans, LA, March.
- 2008 B. Li, J.Y. Hwang and S. Bagley, "Antibacterial Effects of Copper Vermiculite against *E. Coli*, *K. Pneumoniae*, and *S. Aureus*", TMS Annual Meeting, New Orleans, LA, March.
- 2008 Z. Xu, J.Y. Hwang, B. Li, X. Huang and H. Wang, "The Characterization of Various ZnO Nanostructures using Field Emission SEM", *JOM*, v.60, no. 4, pp. 29-32 (**Featured Article**).
- 2008 X. Sun, J.Y. Hwang and X. Huang, "The Microwave Processing of Electric Arc Furnace Dust", *JOM*, v.60, no. 10, pp. 26-30.
- 2009 N.E. Altun, J.Y. Hwang, C. Hicyilmaz, "Enhancement of flotation performance of oil shale cleaning by ultrasonic treatment", *International J. of Mineral Processing*, v.91, pp.1-13.
- 2009 B. Li, J.Y. Hwang, and S. Bagley, "Quantitative assessment of Antibacterial and Antifungal Activities of Copper Vermiculite", *JOM*, v.61, no.2, p.232.
- 2009 J.Y. Hwang, D. Popko, B. Li, J. Drelich, and S. Bagley, "Antimicrobial Property of Copper Stamp Sand", *JOM*, v.61, no.2, p.288.
- 2009 J. Drelich, X. Yin, J.Y. Hwang, "Mapping Charge-Mosaic Surfaces In Electrolyte Solutions Using Surface Charge Microscopy", *ISSHAC-7 Symposium (The Seventh International Symposium Effects of Surface Heterogeneity in Adsorption and Catalysis on Solids)*, July 5-11, 2009, Kazimierz Dolny, Poland.
- 2009 X. Sun, J.Y. Hwang, X. Huang, and B. Li, "Petroleum Coke Particle Size Effects on the treatment of EAF Dust through Microwave Heating", *Journal of Minerals and Materials Characterization and Engineering*, v.8, no.4, pp.249-259.
- 2009 Xuan Li, Jiann-Yang Hwang, Hee-Joon Jeon, Zheng Zhang, "Production of Autoclaved Cellular Concrete with Aluminum Salt Cake Residues", *AIChE 2009 Annual Meeting*, Nashville, November 11-15, 2009, Paper 553a.
- 2009 N.E. Altun, C. Xiao, J.Y. Hwang, "Separation of unburned carbon from fly ash using a concurrent flotation column", *Fuel Processing Technology*, v.90, pp.1464-1470.
- 2010 X. Li, J.Y. Hwang, S. Shi, X. Sun, and Z. Zhang, "Effects of Electric Potential on Hydrogen Adsorption", *CARBON*, Volume 48, Issue 3, pp. 876-880.

- 2010 S. Shi, J.Y. Hwang, X. Li, X. Sun, and B.I. Lee, “Enhanced Hydrogen Sorption on Carbonaceous Sorbents under Electric Field”, *International Journal of Hydrogen Energy*, Volume 35, Issue 2, pp. 629-631.
- 2010 Adele Garkida, Jiann-Yang Hwang, Xiaodi Huang, Allison Hein, “Glass Coating for Iron- Based Powder Metallurgy Components”, *Proceedings: International Symposium on High-Temperature Metallurgical Processing*, Volume 1, ed. by Jaroslaw Drelich, Jiann-Yang Hwang, Tao Jiang, Jerome Downey, TMS Publications, pp.441-447.
- 2010 Jiann-Yang Hwang, Xiang Sun, Xiaodi Huang, and Zhiwei Peng, “Recovery of Iron and Zinc from Electric Arc Furnace Dust using a Microwave Processing Method”, *Proceedings: International Symposium on High-Temperature Metallurgical Processing*, Volume 1, ed. by Jaroslaw Drelich, Jiann-Yang Hwang, Tao Jiang, Jerome Downey, TMS Publications, pp.473-480.
- 2010 Jiann-Yang Hwang, Shangzhao Shi, Xiang Sun, Stephen Hackney, Xuan Li, “Hydrogen Storage Using Electric Field Enhanced Adsorption”, *Proceedings: Materials in Clean Power Systems V: Clean Coal-, Hydrogen Based-Technologies, Fuel Cells, and Materials for Energy Storage*, Volume 2, TMS Publications, pp.413-420.
- 2010 Adele Garkida, Jiann-Yang Hwang, Xiaodi Huang, Bowen Li, “Evaluating the Compressive Strength and Microstructure of Recycled Glass Compacts”, *EPD Congress 2010, Recycling*, ed. by Joseph Pomykala, TMS Publications.
- 2010 J. Y. Hwang, X. Huang and Z. Peng. The Experiments and Prospects for Microwave Ironmaking in the USA. *ISIJ 2010-160th Annual Meeting- Proceedings*, Sapporo, Japan, 2010, pp.846-849.
- 2010 Xuan Li, Jiann-Yang Hwang, Hee-Joon Jeon, Matthew Andriese, Zheng Zhang, “Utilization of Aluminum Slag for the Expansion of Lightweight Concrete”, *EPD Congress 2010, Materials Characterization*, ed. by Ann Hagni, Sergio Monteiro, Jiann-Yang Hwang, TMS Publications, pp.279-286.
- 2010 X. Li, J.Y. Hwang, S. Shi, X. Sun, and Z. Zhang, “Effect of Piezoelectric Material on Hydrogen Adsorption”, *Fuel Processing Technology*, Volume 91, Issue 9, pp.1087-1089.
- 2010 X. Sun, J.Y. Hwang, S. Shi, “Hydrogen Storage in Mesoporous Metal Oxides with Catalyst and External Electric Field”, *J. Physical Chemistry C*, 114 (15), pp.7178–7184.
- 2010 Münir Taşdemir, Gerard T. Caneba, Bo Wang, and J.Y. Hwang, “Effects of Supercritical CO₂ on the properties of PP/Clay/ Mg (OH)₂ polymer composites”, *CELLMAT 2010, the International conference on Cellular Materials*, Dresden, Germany, Oct. 2010.
- 2010 Z. Peng, J.Y. Hwang, J. Mouris, R. Hutcheon, and X. Huang, “Microwave Penetration Depth in Materials with Non-zero Magnetic Susceptibility”, *ISIJ International*, Vol. 50, No. 11, pp. 1590–1596.
- 2010 M. Cai and J.Y. Hwang, “The Characterization of New and Next-Generation Materials”, *JOM*, Vol. 62, No. 12, p.79.
- 2010 B. Li, J.Y. Hwang, J. Drelich, D. Popko, S. Bagley, “Physical, Chemical and Antimicrobial Characterization of Copper-bearing Material”, *JOM*, Vol. 62, No. 12, pp.80-85.
- 2010 汪常明, 金正耀, Jiann-Yang Hwang, 陈彪, 北美自然铜矿铅含量分析及其考古意义初探[J]. *古代文明研究通讯 (北大考古文博学院内部刊物)* 第 47 期 (2010 年 12 月):40-47. (C. Wang, Z. Jin, J.Y. Hwang, B. Chen, “ Preliminary Investigation on the Lead content in the Native Copper

from North America and Its Archaeological Meaning”, *Ancient Culture Research Communications*, Vol.47, pp.40-47).

- 2011 S. Samanli, D. Cuhadaroglu, and J.Y. Hwang, “An Investigation of Particle Size Variation in Stirred mill In Terms of Breakage Kinetics”, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 1556-7230, Volume 33, Issue 6, 2011, Pages 549 – 561.
- 2011 Z. Peng, J. Hwang, X. Huang, M. Andriese, and W. Bell, “Microwave Field Attenuation Length and Half-Power Depth in Magnetic Materials”, 2nd International Symposium on High-Temperature Metallurgical Processing, ed. by J. Y. Hwang, Jaroslaw Drelich, Jerome Downey, Tao Jiang and Mark Cooksey, TMS 2011, Wiley Publication, pp.51-57.
- 2011 M.D. Andriese, J.Y. Hwang, W. Bell and Z. Peng, “Microwave Assisted Breakage of Metallic Sulfide Bearing Ore”, 2nd International Symposium on High-Temperature Metallurgical Processing, ed. by J. Y. Hwang, Jaroslaw Drelich, Jerome Downey, Tao Jiang and Mark Cooksey, TMS 2011, Wiley Publication, pp.379-386.
- 2011 Z. Peng, J. Hwang, W. Bell and M. Andriese, “Microwave Dielectric Properties of Pyrolyzed Carbon”, 2nd International Symposium on High-Temperature Metallurgical Processing, ed. by J. Y. Hwang, Jaroslaw Drelich, Jerome Downey, Tao Jiang and Mark Cooksey, TMS 2011, Wiley Publication, pp.77-83.
- 2011 X. Sun, J.Y. Hwang, S. Xie, “Density functional study of elemental mercury adsorption on surfactants”, *Fuel*, Vol. 90, pp.1061-1068.
- 2011 Zhiwei Peng, Jiann-Yang Hwang, Matthew Andriese, Wayne Bell, Xiaodi Huang and Xinli Wang, “Numerical Simulation of Heat Transfer during Microwave Heating of Magnetite”, *ISIJ International*, Vol. 51 (2011), No. 6, pp. 884–888.
- 2011 Zhiwei Peng, Jiann-Yang Hwang, Joe Mouris, Ron Hutcheon, and Xiang Sun, “Microwave Absorption Characteristics of Conventionally Heated Nonstoichiometric Ferrous Oxide”, *Metallurgical and Materials Transactions A*, Vol. 42, Issue 8, pp.2259-2263.
- 2011 Jaroslaw Drelich, Bowen Li, Patrick Bowen, Jiann-Yang Hwang, Owen Mills, Daniel Hoffman, “Vermiculite decorated with copper nanoparticles: Novel antibacterial hybrid material”, *Applied Surface Science*, DOI: 10.1016/j.apsusc.2011.06.027.
- 2011 Xiang Sun, Gongkai Wang, Jiann-Yang Hwang and Jie Lian, “Porous nickel oxide nano-sheets for high performance pseudocapacitance materials”, *Journal of Materials Chemistry*, Volume 21, issue 41, pp. 16581 – 16588.
- 2011 汪常明, 金正耀, Jiann-Yang Hwang, 陈彪。北美自然铜矿铅含量分析及其考古意义, *四川文物*, 2011, (6) :74-78, 92. (C. Wang, Z. Jin, J.Y. Hwang, B. Chen, “Lead content in the Native Copper from North America and Its Archaeological meaning”, *Shichuan Cultural Relics*, Vol.6, pp.74-78).
- 2011 Jiann-Yang Hwang*, Shangzhao Shi, Xiang Sun, Zheng Zhang, Chienyu Wen, “Electric charge and hydrogen storage”, *International Journal of Energy Research*, DOI: 10.1002/er.1856.
- 2012 Zhiwei Peng, Jiann-Yang Hwang, Chong-Lyuck Park, Byoung-Gon Kim, and Gerald Onyedika, “Numerical Analysis of Heat Transfer Characteristics in Microwave Heating of Magnetic Dielectrics”, *Metallurgical and Materials Transactions A*, Vol. 43, Issue 3, pp.1070-1078.

- 2012 Zhiwei Peng, Jiann-Yang Hwang, Matthew Andriese, "Magnetic Loss in Microwave Heating", *Applied Physics Express*, Vol. 5, Issue 2, p.027304.
- 2012 Zhiwei Peng, Jiann-Yang Hwang, Chong-Lyuck Park, Byoung-Gon Kim, and Xiaodi Huang, "Microwave Permittivity, Permeability, and Absorption Capability of Ferric Oxide", *ISIJ*, Vol.52, No.9, pp.1541-1544.
- 2012 Z. Peng, J. Y. Hwang, M. Andriese, Z. Zhang and X. Huang, "Heat Transfer Characteristics of Magnetite under Microwave Irradiation," *EPD Congress 2012, TMS*, pp.121-128.
- 2012 Z. Peng, J. Y. Hwang, Z. Zhang, M. Andriese and X. Huang, " Thermal Decomposition and Regeneration of Wustite," *3rd International Symposium on High-Temperature Metallurgical Processing* (Edited by T. Jiang, J. Y. Hwang, P. Masset, O. Yucel, R. Padilla and G. Zhou), *TMS 2012, Wiley Publications*, pp.147-156.
- 2012 M. D. Andriese, J.Y. Hwang, Z. Peng, "Liberation of Metallic-Bearing Minerals from Host Rock Using Microwave Energy", *3rd International Symposium on High-Temperature Metallurgical Processing, TMS 2012, Wiley Publications*, pp.383-390.
- 2012 Zheng Zhang, Xiang Sun, Zhiwei Peng, Jiann-Yang Hwang, "Characterization of Nickel Oxide Nanoparticles for Hydrogen Adsorption with External Electric Field", *Characterization of Minerals, Metals and Materials* (Edited by J.Y. Hwang, S.N. Monterio, C. Bai, J. Carpenter, M. Cai, D. Firrao, B.G. Kim), *Wiley Publications*, pp.285-291.
- 2012 Hongfei Fang, Jiann-Yang Hwang, Gaifeng Xue, Lijun Lu, "Concrete With Cementitious Steel Slag Composites And Its Applications", *Characterization of Minerals, Metals and Materials* (Edited by J.Y. Hwang, S.N. Monterio, C. Bai, J. Carpenter, M. Cai, D. Firrao, B.G. Kim), *Wiley Publications*, pp.211-219.
- 2012 L. Zhang, G. Xue, J.Y. Hwang, L. Wang, A. Duan, "An Experimental Study On Chemical Oxygen Demand Removal From Coking Wastewater Using A Three-Dimensional Electrode Reactor", *T.T. Chen Honorary Symposium on Hydrometallurgy, Electrometallurgy and Materials Characterization* (Edited by: Shijie Wang, John E. Dutrizac, Michael L. Free, James Y. Hwang, and Daniel Kim), *Wiley Publications*, pp.479-487.
- 2012 Jiann-Yang Hwang and Xiaowei Sun, "Removal of Ions from Water with Electrosorption Technology", *Water in Mineral Processing* (Edited by: Jaroslaw Drelich, Jiann-Yang Hwang, Jack Adams, D.R. Nagaraj, Xiaowei Sun, Zhenghe Xu), *SME Publications*, pp.87-95.
- 2012 Xiaowei Sun and Jiann-Yang Hwang, "Desalination of Coal Mine Water with Electrosorption", *Water in Mineral Processing* (Edited by: Jaroslaw Drelich, Jiann-Yang Hwang, Jack Adams, D.R. Nagaraj, Xiaowei Sun, Zhenghe Xu), *SME Publications*, pp.237-245.
- 2012 Zhiwei Peng, Jiann-Yang Hwang, Matthew Andriese, "Absorber Impedance Matching in Microwave Heating", *Applied Physics Express*, Vol. 5, p.077301.
- 2012 Zhiwei Peng, Jiann-Yang Hwang, Byoung-Gon Kim, Joe Mouris, and Ron Hutcheon, "Microwave Absorption Capability of High Volatile Bituminous Coal during Pyrolysis", *Energy & Fuels*, dx.doi.org/10.1021/ef300914f.

Patents and Invention Disclosures

- 1985 F.J. Friedlaender, M. Takayasu, J.Y. Hwang, L. Petrakis, "Magnetic Separation Method Utilizing a Colloid of Magnetic Particles," *U.S. Patent 4,526,681*.

- 1989 J.Y. Hwang, "Reagents for Magnetizing Nonmagnetic Materials", U.S. Patent 4,834,898 (Licensed).
- 1990 J.Y. Hwang, "Methods for the Adsorption of Magnetic Reagents", U.S. Patent 4,906,382.
- 1991 J.Y. Hwang, "Wet Process for Fly Ash Beneficiation", U.S. Patent 5,047,145 (Licensed).
- 1991 J.Y. Hwang, "Magnetic Solvent Extraction", U.S. Patent 5,043,070.
- 1992 J.Y. Hwang, "Froth Flotation", U.S. Patent 5,096,572.
- 1992 J.Y. Hwang, "Froth Flotation Apparatus", U.S. Patent 5,249,688.
- 1993 J.Y. Hwang, "Wet Process for Fly Ash Beneficiation", U.S. Patent 5,277,047 (Licensed).
- 1994 J.Y. Hwang, "Process for Deinking Paper Using Water-Soluble Alcohols", U.S. Patent 5,342,483.
- 1995 J.Y. Hwang, "Separation of Normally Hydrophobic Plastic Materials by Froth Flotation", U.S. Patent 5,377,844 (Licensed).
- 1996 J.Y. Hwang, "Reagents for Magnetizing Nonmagnetic Materials", Canada Patent 1321874.
- 1997 J.Y. Hwang and Z. Li, "Control of Mercury Emissions Using Unburned Carbon from Combustion By-Products", U.S. Patent 6,027,551 (Licensed).
- 1999 J.Y. Hwang and X. Huang, "Processed Fly Ash as a Filler in Plastics", US Patent File WO/1999/037592, International PCT/US1999/001545.
- 2000 R.W. Styron and J.Y. Hwang, "Method of Removing Carbon from Fly Ash", U.S. Patent 6,068,131 (Licensed).
- 2001 X. Huang and J.Y. Hwang, "Method for Direct Metal Making by Microwave Energy", U.S. Patent 6,277,168 (Licensed).
- 2002 J.Y. Hwang, "Method for Removal of Ammonia from Fly Ash", U.S. Patent 6,290,066 (Licensed).
- 2003 J.Y. Hwang and Z. Li, "Control of Mercury Emissions from Flu Gases", China Patent #ZL99813363.9.
- 2004 J.Y. Hwang and Z. Li, "Control of Mercury Emissions from Flu Gases", Israel Patent 142527.
- 2004 J.M. Gillis and J.Y. Hwang, "Method of Producing Glass and Using Glass in Cutting Materials", U.S. Patent 6,783,088.
- 2004 J.Y. Hwang and Z. Li, "Control of Mercury Emissions Using Unburned Carbon from Combustion By-Products", Australia Patent 774284.
- 2004 X. Huang and J.Y. Hwang, "Method for Direct Metal Making by Microwave Energy", Canada Patent 2,448,958.
- 2005 X. Huang and J.Y. Hwang, "Method for Direct Metal Making by Microwave Energy", China Patent 01823509 (2004), Hong Kong Patent 1070395 (2005), European Patent EP1409754 (2004), India Patent 2002/079529, 02015/DELNP/2003A (16/12/2005), Canada patent CA 2448958 (2002).

- 2007 J.Y. Hwang and X. Huang, "Microwave Heating Method and Apparatus for Iron Oxide Reduction", WO/2008/051356, PCT/US2007/021254, Australia AU2007309609.
- 2008 J.Y. Hwang, D.C. Popko, "Method of Imparting Antimicrobial and Antiviral Properties to Materials", US PTO 61/096.672.
- 2009 J.Y. Hwang, X. Huang, R. Kauppila, "Activated Carbon Separation and Reuse", US PTO 12/586.263.
- 2009 J.Y. Hwang, X. Huang, "Steel and Syngas Co-Production", International patents applied.
- 2010 J.M. Gillis, X. Huang, J.Y. Hwang, P. Larson, K.L. Paxton, D.C. Popko, Z. Xu, "PROCESSING OF STEEL MAKING SLAGS" WO/2008/079537, PCT/US2007/084125, US Patent 7,810,746 (2010).
- 2010 J.Y. Hwang, S. Shi, "Method for Hydrogen Storage", US Patent applied.
- 2011 B. Li and J.Y. Hwang, "Copper-Bearing Antimicrobial Vermiculite", U.S. Patent applied.
- 2012 X. Huang, J.Y. Hwang, Method and apparatus for coproduction of pig iron and high quality syngas. WO 2012/018394
- "Method and Apparatus for the Removal of Magnetic Smut Particles on a Metal Strip," Purdue University File, December 1983.
- "A Method for Alunite Beneficiation," Purdue University File, March 1984.
- "Reagents to Enhance the Separation of Gypsum from Flue Gas Desulfurization Sludge of Power Plant," Michigan Technological University File, (1988).
- "A Method to Separate Mingled Fibers," Michigan Technological File, October, 1989.
- "Continuous High Gradient Magnetic Separator," Michigan Technological University File, February 1990.
- "A Leaching Method for Iron and Steel Scrap Purification," Michigan Technological University File, May 1990.
- "Plastics Separation Methods," Michigan Technological University File, September 1990.
- "Flue Gas Desulfurization with Plasma," Michigan Technological University File, October 1990.
- "Magnetic Desulfurization Technology," Michigan Technological University File, October 1990.
- "A New Kind of Magnetic Reagent," Michigan Technological University, Filed October 1990.
- "Powder Cast-Forging," Michigan Technological University, Filed November 1990.
- "A Method to Remove or Recover Contaminants or Oils and the Like from Beach, Soils, Oil Shales, Tar Sands, etc.," Michigan Technological University, Filed April 1991.
- "A Method to Clean Lubricant Wastes," Michigan Technological University, Filed April 1991.
- "Sintering with Microwave," Michigan Technological University, Filed July 1991.

"Microwave Method for Volatile Removal, Gasification, Pyrolysis," Michigan Technological University, Filed July 1991.

"Microwave Method for Vitrification," Michigan Technological University, Filed July 1991.

"Rubber-Plastic Composites of Recycled Materials," Michigan Technological University, Filed September 1991.

"A Method of Direct Steelmaking," Michigan Technological University, Filed December 1991.

"Metal Recovery Methods from Plating Waste Sludges," Michigan Technological University, Filed March 1992.

"Rubber Combustion Methods and Applications," Michigan Technological University, Filed March 1992.

"Activated Carbon Preparation Methods," Michigan Technological University, Filed August 1992.

"A Medical Waste Sterilization Method," Michigan Technological University, Filed November 1992.

"Method for magnetic removal of polyvalent solutes," Michigan Technological University, File #9606, Filed January 1996.

"Discontinuously Reinforced Composite Materials Produced With Coal Fly Ash As A Ceramic Reinforcement," Michigan Technological University, File #9602, Filed January, 1996.

"Wood Fiber/ASR Plastic Composites," Michigan Technological University, File #9610, Filed May, 1996.

"Method of Utilizing Fly Ash as Fillers," Michigan Technological University, File #9613, Filed September, 1996.

"Method of Fly Ash Utilization in Ceramic Products," Michigan Technological University, File #9614, Filed September, 1996.

"Method of Fly Ash Size Classification," Michigan Technological University, File #9615, Filed September, 1996.

"Trac + Deicer, an environmentally safe deicer produced from recycled glass and acetate based deicer," Michigan Technological University, File #9620, Filed November 1996.

"Jet-Stream, an abrasive media produced from recycled glass," Michigan Technological University, File #9622, Filed November 1996.

"AccuBlast, an abrasive media produced from recycled glass," Michigan Technological University, File #9621, Filed November 1996.

"Process for Production of Cellular Concrete Utilizing Aluminum Smelting Residues as a Foaming Agent," Michigan Technological University, File #9705, Filed April, 1997.

"A Process for Beneficiating Iron and Steel Slag and a Method of Analyzing for Metallic Iron on the Finished Product," Michigan Technological University, File #9709, Filed June, 1997.

"Aluminum Salt Cake Processing and Emission Prevention," Michigan Technological University, File #9912, (1999).

“Diamond Composite Synthesis and Consolidation,” Michigan Technological University, File#200107 (2001).

“SiC Spheres Synthesis,” Michigan Technological University, (2001).

“Wear Resistant Products,” Michigan Technological University, (2001).

“Method of Smelting Fine Metal Particles”, Michigan Tech File #200124 (2001).

Method and apparatus for microwave assisted electrometallurgical extraction”, Michigan Tech file #200127 (2001)

“Microwave-Hydrothermal-Mechanochemical (MHMC) Hybrid Process for Synthesis of Advanced Ceramic powders and MHMC Hybrid Reactor for Carrying out the process”, Michigan Tech File #200215.00 (2002)

“Structure of Water-Cooled Small Magnetrons and their Integration in large sized microwave reactors and other microwave heating”, Michigan Tech File #200223.00 (2002)

“Mercury capture for emission control by spent catalysts”, Michigan Tech File #200303.00 (2003)

“High Temperature-High Pressure Mechanical Mill”, Michigan Tech File #200322.00 (2003)

“Mercury Removal from Gases”, MichiganTech File #0446.00 (2004)

“Method of microwave assisted EAF dust and BOF dust treatment”, MichiganTech File #0501.00 (2005)

“Copper Stamp Sands Processing and Utilization”, Michigan Tech File #0640.00 (2006)

“Method of Concurrent Production of Steel and Syngas by Microwave Assisted Heating”, Michigan Tech File #0715.00 (2007)

“Phosphorous and sulfur removal for iron and steelmaking”, Michigan Tech File #0627.00 (2006)
“Microwave Assisted Syngas Production from Steelmaking and Other Spent Gases”, Michigan Tech File #0738.00 (2007)

“Activated Carbon Recovery and Reuse after Mercury adsorption”, Michigan Tech File #0804.00 (2008)

“A Method for Hydrogen Storage”, Michigan Tech File #0827.00 (2008)

“Exfoliated copper vermiculite antimicrobial additive”, Michigan Tech File #0935.00 (2009)

Government and Industrial Sponsored Research

1984 "Mineralogical Examination of Glassmaking Sands," Best Sand Corp., PI.

1984 "Electron Microprobe Study of Diamond ore Minerals," Jack Murphy Associates, PI.

1984 "Mineralogical Study of Hudvam Mine Drill Cores," Hudson Bay Mining and Smelting Co., PI.

1985 "Fluorine Sources in the Eveleth Ore," Eveleth Mines, PI.

- 1985 "Development and Demonstration of a Flotation System," PI, D.C. Yang, Co-PI, J.Y. Hwang, Dept. of Energy, DE-AC22-85PC81210, \$434,846.
- 1985 "Mineralogy and Liberation Studies of Namew Lake Ni-Cu Ore," Hudson Bay Mining and Smelting Co., PI.
- 1986 "X-ray Diffraction Study of the Tilden Pellet Samples," Cleveland-Cliffs Iron Co., PI.
- 1986 "Mineralogical Analysis of Namew Lake Ore Flotation Products," Hudson Bay Mining and Smelting Co., PI.
- 1986 "SEM Examination of Process Samples," Peinsula Copper Industries Inc., PI.
- 1986 "Gold Occurrence of Farley Lake Ore," Hudson Bay Mining and Smelting Co., PI.
- 1986 "Petrography of Serpentinities," Langill & Associates, PI.
- 1987 "Titanium Ore Beneficiation," DuPont Co., PI, D.C. Yang, Co-PI, J.Y. Hwang.
- 1987 "Preliminary Evaluation of the Calcining Behavior of Dolomite from the Cedarville Quarry," Michigan Limestone Operations Limited, PI.
- 1987 "Gallium in Bauxite," POBA International, PI.
- 1987 "A Mineralogical and Chemical Study of the Graphitic Lower Slate Member, Michigamme Formation, Marquette and Baraga Counties, Michigan," Michigan Department of Natural Resources, PI.
- 1988 "Surface Magnetic Enhancement for Coal Cleaning," DOE, Contract DE-AC22-88PC88856, \$285,497, PI.
- 1988 "Mixing of Cement-Fly Ash Blends," Michigan Energy and Resource Research Association, PI.
- 1988 "Beneficiation of Gypsum From Flue Gas Desulfurization Product," Georgia Pacific Corp, PI.
- 1988 "Magnetic Separation of TVA Paradise Plant Hydrocyclone Classified FGD Sludge and Their Radioactivity," Georgia Pacific Corp., PI.
- 1988 "Pyrite Occurrences," Process Technology, Inc., PI.
- 1988 "Pathfinder Minerals," I-Chem Research, PI.
- 1988 "Silicon Carbide Whisker Beneficiation with Magnetic Reagent, Lab Study," Advanced Composite Materials Corp., PI.
- 1989 "Mineralogical and Laboratory Beneficiation Studies on FENI Nickel Ore from Kavadarci, Yugoslavia," Falconbridge, Ltd., PI.
- 1989 "Pilot Plant Study of SiC_w Purification Using Magnetic Reagent," Advanced Composite Materials Corp., PI.
- 1989 "Diamond Exploration," Crystal Exploration, Inc. (DOW Chemical), PI.
- 1989 "Mineralogical Analysis of an Ore," I-Chem Research, PI.
- 1989 "Automobile Shredding Residues Study," NIMCO Shredding, \$250,000, PI.

- 1989 "Coal Column Flotation Round Robin Tests and Cost Data Analysis," Kaiser Engineers, Inc., PI.
- 1989 "Olivine and Garnet Mineralogical Study," Carl Brink and Associates, PI.
- 1989 "Leaching Products Characterization," Peninsula Copper Industries, Inc., PI.
- 1990 "Lubricant Cleaning and Recycling Process Development," Alcan, PI.
- 1990 "Phosphorous Occurrences Study," LTV Steel, PI.
- 1990 "Mineralogical Study of Phosphorous in Some Iron Ores," Pickands-Mather, PI.
- 1990 "Talc Ore Study," Pfizer, Inc., PI.
- 1990 "Implant Sample Characterization," Bio-Coat, Inc., PI.
- 1990 "Attapulgate Clay Study," ARO Products, Inc., PI.
- 1990 "Pilot Scale Advanced Flotation," Department of Energy/ICF Kaiser/Process Technology, Inc., DE-AC22-88PC88881, \$74,277, PI.
- 1990 "Michigan Basin Regional Aquifer Systems Analysis," U.S. Geological Survey, Contract No. 14-08-0001-23528, \$28,876, PI.
- 1990 "Advanced Cycloning Technology Development," Department of Energy/Coal Technology Corp./Process Technology, Inc., DE-AC22-90PC90177, \$85,965, PI.
- 1991 "Magnetic Properties of IGC Ferrofluids," Coal Technology Corp., PI.
- 1991 "Anatase Evaluation," Mineral Technology International, Inc., PI.
- 1991 "Steel Foundry Sand Reclamation Process Development," Michigan Department of Commerce and Natural Resources, \$292,564, PI.
- 1991 "Heavy Liquid Filtrate Study," Coal Technology Corp., PI.
- 1991 "Magnetic Reagent Preparation and Safety Datasheet," EXPORTech Co., Inc., PI.
- 1991 "Column Flotation Exploratory Research" Mineral Technology International, Inc., PI.
- 1991 "Washing Fluid Study," Materials Processing Analytical Services, PI.
- 1991 "Recovery of Coal Fines from Preparation Plant Effluents," Illinois State Geological Survey, Center for Research on Sulfur in Coal, \$109,549, PI.
- 1991 "Development of Technical Information for Selected Deposits, Mines, Beneficiation Plants, and Extraction Plants in China," U.S. Bureau of Mines, Contract JO219006, \$236,264, PI.
- 1992 "Rutile Ore Study," Mineral Technologies International, Inc., PI.
- 1992 "Clean Up Study of Cold Rolling Mill Lubricant," Alcan Rolled Products, PI.
- 1992 "Filtration Products Evaluation," Coal Technology Corp., PI.
- 1992 "Kraft Paper Wastewater Discoloring," Calgon Corp., PI.

- 1992 "Calcium Nitrate Recovery," Coal Technology Corp., PI.
- 1992 "Fly Ash Processing and Utilization," Michigan Department of Natural Resources, Contract MDRD-1-31-20025, \$285,770, PI.
- 1992 "Tire and Wood Fiber Composites Technology Development," Michigan Department of Natural Resources, Grant MDRD-1-31-20024, \$260,350, PI.
- 1992 "Pyromet Process Development for Plating Waste Sludges, Phase I," Envirite Corp., PI.
- 1992 "Fine Coal Cleaning Using Coarsely Packed Column," Mineral Technologies International, PI.
- 1992 "Concrete Application for Magnetic Sand Waste from Steel Foundries," DOE Innovative Concepts Program, Contract DEFG5192R0202, \$19,508, PI.
- 1992 "Mercury Occurrence in Ore," Copper Range Company, PI.
- 1992 "Pyromet Process Development for Plating Sludge Wastes, Phase II," Envirite Corp., PI.
- 1993 "SiC Separation," GM Powertrain, PI.
- 1993 "Alternative Granular Molding Media," U.S. DOE, DE-FC07-93ID13231, \$147,766, PI.
- 1993 "Visual Display of Reservoir Parameters Affecting Enhanced Oil Recovery," Co-PI, U.S. DOE, DE-AC22-93BC14892, \$1,023,103, PI.
- 1993 "Lithium Tungstate Heavy Liquid for Coal Washability," Process Tech., Inc., PI.
- 1993 "Native Copper Ore," Noranda Exploration Co., PI.
- 1994 "Development of Products from Scrap Glasses," Michigan Department of Natural Resources/Acustar/City of Ewart/Consumers Power, \$373,156, PI.
- 1994 "Efficient Materials Utilization," EPA CenCitt, \$50,000, PI.
- 1994 "Recovery of Bypassed Oil in the Dundee Formation Using Horizontal Drains," PI, J. Wood, Co-PI, J.Y. Hwang, U.S. DOE, DE-FC22-94BC14983, \$2,616,818.
- 1994 "Implant Porous Coating," PenTech Bio, Inc., \$62,400, PI.
- 1994 "Ash/SO_x/NO_x/Hg Emission Control," Michigan Energy Resources Research Association, Detroit Edison, Consumers Power, \$50,000, PI.
- 1994 "Utilization of Low NO_x Coal Combustion By-Products," U.S. DOE, DE-FC21-94MC31174, \$865,087, PI.
- 1995 "Development of Laboratory Procedures for Micromag Coal Processing," Custom Coals Corporation/U.S. DOE, \$90,000, PI.
- 1995 "Wood Ash Evaluation," Weyerhaeuser, PI.
- 1995 "Fly Ash Processing," Michigan State REEDF, \$44,750, PI.
- 1996 "Utilization of Recycled and Unrecoverable Aluminum Scraps in Manufacturing Cellular Concrete," DOE Innovative Concepts Program, Contract #316708-A-A5, \$22,000, PI.

- 1996 “Automobile Plastics Recycling,” VRP and APC, PI.
- 1997 “Dolomite Separation,” Chemical Lime Company, PI.
- 1997 “Abrasive Blast Media Treatability Studies,” U.S. Air Force, Warner Robins Air Logistics Center, F09650-97-C-0221, \$136,300, PI.
- 1997 “Copper Based Wood Preservatives MEA Solubility Study,” Peninsula Copper Industries, PI.
- 1997 “Mineralogical Studies,” Great Lakes Calcium Corp., PI.
- 1998 “Low NO_x Fly Ash,” U.S. Department of Energy, \$250,000, PI.
- 1998 “Recycling and Reuse of Aluminum Wastes,” U.S. Department of Energy, DE-FC07-98ID13663, \$1,671,486, PI.
- 1998 “Low Cost BioScrubber for Greenhouse Gas Control: Phase 1,” U.S. Department of Energy, \$49,615, PI.
- 1999 “Limestone Mineralogy,” Great Lakes Calcium, Inc., PI.
- 1999 “Copper Oxide Manufacturing,” Peninsula Copper Industries, PI.
- 2001 “Novel Direct Steelmaking by Combining Microwave, Electric Arc, and Exothermal Heating Technologies,” U.S. Department of Energy, DE-FC07-01ID14209, \$599,170.
- 2001 “Verification of Steelmaking Slag Iron Content, Recycle and Reuse of Steel Slags” U.S. Department of Energy, DE-FC07-01ID14046, \$750,000, PI. J.Y. Hwang, Co-PI, K. Kawatra.
- 2002 “Grinding Swarf Processing,” Cannon-Muskegon Corporation, \$15,057, PI.
- 2002 “Enabling Tool for Innovative Glass Applications,” U.S. Department of Energy, DE-FG36-02GO12062, PI, J.M. Gillis, Co-PI, J.Y. Hwang, \$200,000.
- 2003 “Microwave Assisted Electrolyte Cell with Inert Anode and Wetted Cathode for Primary Aluminum Production,” U.S. Department of Energy, DE-FC07-02ID14402, PI, X. Huang, Co-PI, J.Y. Hwang, \$375,000.
- 2003 “Polyurethane Characterization”, Oshkosh Trucks, \$10,000, PI.
- 2004 “Fly Ash Samples Characterization and Processing”, CEMEX International, \$6,250, PI.
- 2004 “Turquoise Materials Processing”, R.T. Research. Corp., \$5,000, PI.
- 2004 “Injection Molding Study of Fly Ash”, CEMEX International, \$10,000, PI.
- 2005 “Preliminary Investigation into Surface Treatment of Talc”, RheTech Inc., \$5,200, PI.
- 2005 “Sand Evaluation”, Cardinal Corp. \$8,100, PI.
- 2005 “Novel Metal Perhydride for Hydrogen Storage”, U.S. Department of Energy, DE-PS36-03GO93013, PI, J.Y. Hwang, Co-PIs, S. Shi, S. Hackney, D. Swenson, \$2,171,234 (Phase I: 2005-2009).

- 2005 “Microwave Steel Production”, Michigan Public Service Commission, \$540,000 (\$217,800 UP Steel), PI.
- 2005 “Cation Exchange”, Chemtron, \$1,400.
- 2006 “Sand Evaluation”, Cardinal Corp. \$5,160, PI.
- 2006 “Fabrication and Characterization of Metal Alloy H2 Separation Membrane”, Aspen Products Group, \$17,000, PI.
- 2007 “Utilization of Stamp Sand for Antibacterial Roof Granules Production”, EPA SBIR from Lesktech, \$25,000, PI.
- 2007 “Robust, Low Cost Membranes for Hydrogen Production from Coal-Derived Syngas”, DOE Phase II SBIR, Aspen Products Group, \$100,001, co-PI.
- 2008 “Separation of Ni and Cu from Sulfide Ore”, Kennecott, \$28,000, PI.
- 2008 “Rare Earth Elements Separation”, Great Western Minerals, \$78,000, co-PI.
- 2009 “Optimization of Microwave Steelmaking”, Michigan Public Service Commission, UP Steel, \$1,540,000, PI.
- 2010 “Hydrogen Storage”, US DOE, \$76,000, PI.
- 2010 “Recovery of Alloying Elements from Grinding Swarfs”, Casting Services Group, \$25,000, PI.
- 2011 “Desulfurization and Drying of Low-Rank Coal by Microwave Application”, Korea Institute of Geoscience and Minerals (KIGAM), \$50,000, PI.
- 2012 “Desulfurization and Drying of Low-Rank Coal by Microwave Application, 2nd Year”, Korea Institute of Geoscience and Minerals (KIGAM), \$50,000,000 Korean Won, PI.

Proposal Review (Recent)

Department of Energy
 National Science of Foundation
 U.S. Department of Agriculture
 Environmental Protection Agency
 U.S. Civilian Research and Development Foundation
 U.S. Department of State
 Kentucky Science and Engineering Foundation
 Indiana 21st Century Research and Technology Fund
 International Copper Association
 American Association for the Advancement of Science
 Maine Technology Institute
 Qatar National Research Fund

Manuscript Review (Recent)

IEEE Transactions on Magnetics
 Journal of Microwave Power and Electromagnetic Energy
 International Journal of Mineral Processing
 Journal of Mineral and Metallurgical Processing
 Journal of Materials Processing Technology
 Metallurgical and Materials Transactions A
 CRC Press- Materials Processing Handbook (Book Review)
 Chemosphere

Waste Management
Fuel Processing Technology
Solid State Electronics
Journal of Alloys and Compounds

Recent Recognitions

Science Slashdot, "Microwave Steelmaking", January 25, 2004
wissenschaft.de (Germany), "Stahl aus der Mikrowelle", January 27, 2004
United Press International, High Beam Research, "Microwaves can make steel fast and cheap", January 29, 2004
Science Daily, "Microwave Steel: Faster, Cleaner Cheaper", January 26, 2004
Washington Times, "Microwaves can make steel fast and cheap", January 28, 2004
Mirror (German), "Microwave Steelmaking", January 28, 2004
Hutnictvi Zeleza, A.S. (Czech), "Technologický vývoj", January 28, 2004
NASA Techbriefs, "Steel-Making Process", January 29, 2004
Beijing Evening News (China), "American Professor's Wild Thought, Microwave Steel for Energy Saving, Environmental Protection and Cheaper", January 30, 2004
Sina.com Tech News (China), "Microwave Steel", January 30, 2004
High Beam Research, "Microwave Steel, Faster, Cleaner, Cheaper", January 23, 2004
Ottawa Citizen Newspaper (Canada), "Microwave Steel", January 30, 2004
Canadian Broadcasting Network (Canada), "Microwave steel", January 30, 2004
Chinainfo.gov.cn (China), "Microwave steel", February 1, 2004.
Blogalia, "La nueva revolucion?", February 4, 2004
The Instrumentation, System and Automation Society, "Steel mill in a microwave", Feb 4, 2004
geneura.ugr.es (Spain), "Acero Al Microondas", February 4, 2004
Shanghai Science and Technology (stcsm.gov.cn), China, "Microwave steel", February 4, 2004
NBC TV6 News (Marquette), "Microwave Steelmaking", February 15, 2004
Michigan Radio, Stateside Program, "Microwave Steel", February 18, 2004
Science Update, Washinton DC Radio, "microwave Steel", February 25, 2004
World Journal, "Microwave Steelmaking", February 27, 2004
Materials Performance, "Microwaving Steel", March 2004.
Industrial Engineer Magazine, "Half-price steel production", March 2004
Machine Design, "Microwave Steel", April, 2004
Natuur Wetenschap & Techniek (Netherland), "IJzer in de magnetron", April 4, 2004.
Advanced Materials & Processes, "Microwaves reduce iron ore to iron in a few minutes", April 2004
Michigan Tech Alumnus, "Microwave Magic: Zapping Iron Oxide to Steel", April, 2004.
La Science d'ici et d'ailleurs (Canada), "Produire de l'acier au micro-ondes", May 3, 2004
Mechanical Engineering, The American Society of Mechanical Engineers, "Zapping Iron", May 2004
MarsBlog, "Microwave Steel", May, 2004
NBC TV6 News (Marquette), "Jim Hwang, Michigan Tech, Hydrogen Research", May 10, 2004
Michigan Tech Alumnus, "Tech Shares in Hydrogen Research Initiatives", August 2004
Pills & News (Italy), "ALTERNATIVE ALL'ACCIAIO", August, 2004
Cutting Tool Engineering, "Steel Measurements, Nugget Know-how", November, 2004
Industrial Heating, "Special Focus, Advancements in Microwave Heating Technology", January 2005
Fortune Magazine, "Microwave Smelting", May 2005, Industrial edition.
Detroit News, "Microwave steel process may revolutionize market", August 3, 2005.
Michiganadvocate.com, "Microwave steel process could lead to U.P. jobs", August 10, 2005
Purchasing.com, "Pilot mill in Michigan aims to make metal cheaper, cleaner", September 1, 2005
Michigan Tech Lode, "The next steel revolution", December 7, 2005.
Pharmaceutical Technology, "Gaining Microwave Speed", October 13, 2008,
<http://www.pharmaceutical-technology.com/features/feature43413/>

Invited Presentations (recent)

Wuhan Iron and Steel Company, “Microwave Steel Making and Research”, April, 2012.
Huazhong University of Science and Technology, “Materials and Environmental Engineering”, April, 2012.
Iron and Steel Institute Japan, “Advances of Microwave Ironmaking in USA”, Oct., 2010.
US Department of Energy, Albany Research Center, “Sustainable Syngas and Steel Co-Production”, 2010.
American Chemical Society, San Francisco, “Charge Effect on Hydrogen Storage”, 2010.
Iron and Steel Industries of Japan, “The Experiments and Prospects for Microwave Ironmaking in USA”, 2010.
Kunming University of Science and Technology, “Microwave Assisted Steel Production”, 2010.
International Symposium on Microwave Applications in Materials Processing and Metallurgical Engineering, “Microwave Applications on Iron and Steel Making”, 2009.
Chongqing University, “Materials, Energy, and Environment”, 2009.
Xiamen University, “Material Processing for Environmental Engineering”, 2009.
Indian Institute of Technology-Kanpur, “Microwave Steel Production”, March, 2009.
US-Indo Microwave Workshop, “Advancement in Microwave Steel Production”, Mumbai, Feb. 2009.
University of Utah, “Enabling Technologies for Future Energy”, 2008.
Kean University, “Technology Transfer of Fly Ash Recycling Technology”, Union, NJ, 2006.
Victoria Coal Resources, “Microwave Technology for Steel Production”, September, 2006
India-US Workshop on Microwave Technology for Materials Processing "A Promising Option for Tomorrow", Mumbai, India, 2006.
Workshop on Recycling Opportunities for Fly Ash and Other Coal Combustion Products in Concrete and Construction Materials, "Applications of Fly Ash in Plastic Fillers and Mining", Michigan, 2006
Dana Corporation, "Microwave Applications on Materials Processing", Farmington Hill, Michigan, 2005.
Michigan Public Service Commission, “Microwave Technology for Steel Production”, August, 2005.
Department of Energy, “Novel Metal Perhydrides for Hydrogen Storage”, March 2005.
Cleveland Cliffs Iron, “Microwave Production of Steels”, February 2005.
Steel Dynamics, “Microwave Production of Steels”, December, 2004.
Cleveland Cliffs Iron, “Microwave Production of Steels”, November, 2004.
NISSAN Automobile, “Perhydride Hydrogen Storage Materials”, October, 2004.
Structure Engineers Association of Texas, “Microwave Production of Steels”, October, 2004.
CEMEX International, “Fly Ash Beneficiation and Utilization”, September, 2004.
Department of Energy, “Recycling and Reuse of Steel Slags”, September, 2004.