

## SELECTED AFR RESEARCH PAPERS AND PUBLICATIONS

- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., Carlson, A. E., Hostetler, J. M., Espinosa, N. J., and Chullen, C., "Pressure-swing adsorption of trace contaminants using carbon sorbent monoliths," Proc. 50th International Conference on Environmental Systems (ICES), 12-15 July, 2021, technical paper No. ICES-2021-358, 2021.
- Cosgrove, J. E., Wójtowicz, M. A., Serio, M. A., and Lee, J. M., "Gas evolution from torrefaction processing of human solid wastes," Proc. 50th International Conference on Environmental Systems (ICES), 12-15 July, 2021, technical paper No. ICES-2021-346, 2021.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., and Lee, J. M., "An Equivalent System Mass (ESM) Analysis for the Universal Waste Management System (UWMS) with and without the Torrefaction Processing Unit (TPU)," Proc. International Conference on Environmental Systems (ICES), 12-16 July, 2020, technical paper No. ICES-2020-560, 2020.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., and Lee, J. M., "Optimization of a spacecraft Torrefaction Processing Unit (TPU) for human metabolic waste,"
   Proc. International Conference on Environmental Systems (ICES), 12-16 July, 2020, technical paper No. ICES-2020-507, 2020.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., Carlson, A., and Chullen, C., "Monolithic trace-contaminant sorbents fabricated from 3D-printed polymer precursors," *Proc.* 49th International Conference on Environmental Systems (ICES), Boston, Massachusetts, 7-11 July, 2019, technical paper No. ICES-2019-286, 2019.
- Serio, M. A., Wójtowicz, M. A., Cosgrove, J. E., Stapleton, T. J., Ewert, M. K., and Lee, J. M., "Operational data for a full-scale prototype Torrefaction Processing Unit (TPU) for spacecraft," **Proc. 49th International Conference on Environmental Systems (ICES)**, Boston, Massachusetts, 7-11 July, 2019, technical paper No. ICES-2019-291, 2019.
- Serio, M. A., Wójtowicz, M. A., Cosgrove, J. E., Stapleton, T. J., Torres, M. A., Ewert, M. K., and Lee, J. M., "A prototype torrefaction processing unit for human solid waste in space," Proc. 48th International Conference on Environmental Systems (ICES), Albuquerque, New Mexico, 8-12 July, 2018, technical paper No. ICES-2018-250, 2018.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., Nalette, T., Guerrero, S. V., Papale, W., and Wilburn, M. S., "Development of trace contaminant control prototypes for the Portable Life Support System (PLSS)," Proc. 47th International Conference on Environmental Systems (ICES), Charleston, South Carolina, 16-20 July, 2017, technical paper No. ICES-2017-270, 2017.
- Mason, P. E., Jones, J. M., Darvell, L. I., Williams, A., and Wójtowicz, M. A., "Studies on the effects of feedstock particle size in biomass torrefaction processes," International Bioenergy Conference 2017, Manchester, UK, March 22-23, 2017.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., Nalette, T., Guerrero, S. V.,



- Papale, W., and Wilburn, M. S., "Development of trace contaminant control prototypes for the Primary Life Support System (PLSS)," **Proc. 47th International Conference on Environmental Systems (ICES)**, Charleston, South Carolina, 16-20 July, 2017, technical paper No. ICES-2017-270, 2017.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Stapleton, T. J., Nalette, T. A., Ewert, M. K., Lee, J., and Fisher, J., "Measurement and modeling of torrefaction processing for human solid waste management in space," Proc. 47th International Conference on Environmental Systems (ICES), Charleston, South Carolina, 16-20 July, 2017, technical paper No. ICES-2017-335, 2017.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Stapleton, T. J., Nalette, T. A., Ewert, M. K., Lee, J., and Fisher, J., "Torrefaction processing for human solid waste management," Proc. 46th International Conference on Environmental Systems (ICES), Vienna, Austria, 10-14 July, 2016, technical paper No. ICES-2016-341, 2016.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., and Wilburn, M. S., "Co-adsorption of ammonia and formaldehyde on regenerable carbon sorbents for the Primary Life Support System (PLSS)," Proc. 46th International Conference on Environmental Systems (ICES), Vienna, Austria, 10-14 July, 2016, technical paper No. ICES-2016-345, 2016.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., and Wilburn, M. S., "Adsorption of ammonia on regenerable carbon sorbents," Proc. 45th International Conference on Environmental Systems (ICES), Bellevue, Washington, 12-16 July, 2015, technical paper No. ICES-2015-179, 2015.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Lee, J., Wignarajah, K., and Fisher, J., "Space applications of torrefaction processing," Proc. 45th International Conference on Environmental Systems (ICES), Bellevue, Washington, 12-16 July, 2015, technical paper No. ICES-2015-291, 2015.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., Manthina, V. Singh, P., and Chullen, C., "Carbon-based regenerable sorbents for the combined carbon dioxide and ammonia removal for the Primary Life Support System (PLSS)," Proc. 44th International Conference on Environmental Systems (ICES), Tucson, Arizona, 13-17 July 2014, technical paper No. ICES-2014-241, AIAA, 2014.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Lee, J., and Fisher, J., "Use of pyrolysis processing for trash to supply gas (TtSG)," Proc. 44th International Conference on Environmental Systems (ICES), Tucson, Arizona, 13-17 July 2014, technical paper No. ICES-2014-226, AIAA, 2014.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Lee, J., Wignarajah, K., and Fisher, J., "Torrefaction processing of spacecraft solid wastes," Proc. 44th International Conference on Environmental Systems (ICES), Tucson, Arizona, 13-17 July 2014, technical paper No. ICES-2014-211, AIAA, 2014.
- Markham, J.A., Cosgrove, J., Scire, Jr. J., Haldeman, C., and Agoos, I., "Aircraft engine-mounted camera system for long wavelength infrared imaging of inservice thermal barrier coated turbine blade," **Review of Scientific Instruments**,

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85, 124902, 2014.

- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Wignarajah, K. and Fisher, J., "A prototype microwave pyrolyzer for solid wastes," Proc. 43rd Int. Conf. on Environmental Systems (ICES), Vail, Colorado, July 14-18, technical paper No. AIAA-2013-3371, AIAA, 2013.
- Wójtowicz, M. A., Cosgrove, J. E., Serio, M. A., and Jennings, M. A., "Reversible ammonia sorption on carbon for the Primary Life Support System (PLSS)," Proc. 42nd Int. Conf. on Environmental Systems (ICES), San Diego, California, July 15-19, technical paper No. AIAA-2012-3437, AIAA, 2012.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Wignarajah, K. and Fisher, J., "Methane production from pyrolysis of mixed solid wastes," Proc. 42nd Int. Conf. on Environmental Systems (ICES), San Diego, California, July 15-19, technical paper No. AIAA-2012-3567, AIAA, 2012.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Wignarajah, K. and Fisher, J., "Pyrolysis yields from microwave-assisted heating of solid wastes," Proc. 42nd Int. Conf. on Environmental Systems (ICES), San Diego, California, July 15-19, technical paper No. AIAA-2012-3566, AIAA, 2012
- Zeppieri, S., Wójtowicz, M., Serio, M., Zaffaris, G., and Colket, M., "Iso-dodecane pyrolysis model development," Proc. 50th AIAA Aerospace Sciences Meeting, Nashville, Tennessee, 9-12 January, 2012; technical paper No. AIAA 2012-1277, AIAA, 2012.
- Drukier, G. A., Rubenstein, E. R., Solomon, P. R., Wójtowicz, M. A., and Serio, M. A., "Low Cost, Pervasive Detection of Radiation Threats," Proc. 2011 Int. Conf. on Technologies for Homeland Security (HST '11), pp. 365-371, IEEE, 15-17 November, 2011, Waltham, Massachusetts.
- Serio, M. A., Cosgrove, J. E., Wójtowicz, M. A., Wignarajah, K., and Fisher, J., "A compact, efficient pyrolysis/oxidation system for solid waste," Proc. 40th Int. Conf. on Environmental Systems (ICES), Barcelona, Spain, July 11–15, 2010, technical paper No. AIAA-2010-6009, AIAA, 2010.
- Saddawi, A., Jones, J. M., Williams, A., and Wójtowicz, M. A., "Kinetics of the thermal decomposition of biomass," **Energy & Fuels, 24** (2), 1274–1282, 2010.
- Serio, M. A. and Wójtowicz, M. A, "Methodology for identification and classification of biomass pyrolysis behavior," Proc. 39th Int. Conf. on Environmental Systems (ICES), Savannah, Georgia, July 12–16, 2009, SAE technical paper No. 2009-01-2384, SAE International, 2009.
- Serio, M., Kroo, E., Florczak, E., Wójtowicz, M., Wignarajah, K., Hogan, J., and Fisher, J., "Pyrolysis of mixed solid food, paper, and packaging wastes" Proc. 38th Int. Conf. on Environmental Systems (ICES), San Francisco, California, June 29–July 2, 2008, SAE technical paper No. 2008-01-2050, SAE International, 2008.
- Wójtowicz, M. A., Florczak, E., Kroo, E., Kroo, T., Serio, M. A., and Dombrowski, K., "Mercury removal from coal-combustion flue gas using activated carbon

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derived from waste tires," ACS Div. of Fuel Chem. Prepr. 52 (1), 157–159, 2007.

- Rubenstein, E. P., Wójtowicz, M. A., Florczak, E., Kroo, E., Gordon, J., Townsend, L. W., Wilkins, R., Gersey, B., and Atwell, W., "Structural and radiation shielding properties of non-parasitic, multi-functional microporous carbon for aerospace applications," Proc. 37th Int. Conf. on Environmental Systems (ICES), Chicago, Illinois, July 9-12, 2007, SAE technical paper No. ICES-2007-01-3111, SAE International, 2007.
- Wójtowicz, M. A., Florczak, E., and Serio, M. A., "Kinetics of carbon-dioxide activation of chars derived from waste tires," Proc. Carbon 2007 Conf., Seattle, Washington, July 15–20, 2007.
- Tsamba, A. J., Yang, W., Blasiak, W., and Wójtowicz, M. A., "Cashew nut shells pyrolysis: individual gas evolution rates and yields," Energy & Fuels 21 (4), 2357–2362, 2007.
- De Jong, W., Di Nola, G., Venneker, B. C. H., Spliethoff, H., and Wójtowicz, M. A., "TG-FTIR pyrolysis of coal and secondary biomass fuels: determination of pyrolysis kinetic parameters for main species and NO<sub>x</sub> precursors," Fuel 86 (15), 2367–2376, 2007.
- Wójtowicz, M. A. and Serio, M. A., "Pyrolysis modeling with enhanced predictive capabilities;" Proc. 44th Coal Science Conference, The Japan Institute of Energy, ix-x, Akita, Japan, 11–12 October, 2007.
- "Carbon Black Derived from Waste Tire Pyrolysis Oil," **Proc. Carbon 2004 Conf.**, Brown University, Providence, RI (July 11-15, 2004).
- "Pyrolysis of Miscanthus Giganteus and wood pellets: TG-FTIR analysis and reaction kinetics," **Fuel**, 82, 1139-1147, 2003.
- "Biomass Pyrolysis for Distributed Energy Generation," **ACS Division of Fuel Chemistry Preprints**, 48(2), 584, 2003.
- "Simultaneous Short and Long Wavelength Infrared Pyrometer Measurements in a Heavy-Duty Gas Turbine," Transactions of the ASME, 528, Vol 124 (July 2002).
- "Pyrolysis-Based Processing of Diesel Fuel," **ACS Division of Fuel Chemistry Preprints**, 46(2), 481, 2001.
- "A Prototype Pyrolyzer for Solid Waste Resource Recovery in Space," **SAE 2001-01-2349**, presented at the 31st International Conference on Environmental Systems, July 9-12, 2001, Orlando, Florida).
- "Pyrolysis processing of mixed solid waste streams," **ACS Div. of Fuel Chem. Prepr.**, **45** (3), 466–474, 2000.
- "Microporous Carbon Adsorbents for Hydrogen Storage," International Journal of the Society of Material Eng. for Resources, 7, 253-266, 1999.
- "Sensor for Performance Monitoring of Advanced Gas Turbines." SPIE



**Conference on Advanced Sensors**, Process Industries and the Environment, Boston, MA, (November 1998).

- "Pyrolysis Kinetics of the Waste-Tire Constituents: Extender Oil, Natural Rubber, and Styrene-Butadiene Rubber," ACS Div. of Fuel Chem. Preprints, 43(1), 185-191, 1998.
- "Modeling of Biomass Pyrolysis Kinetics," Twenty-Seventh Symposium (International) on Combustion /The Combustion Institute, pp. 1327-1334, 1998.
- "Mercury SO2 and NO Removal from Flue Gas by Adsorption on Activated Carbons," **Proc. Twenty-Third Biennial Conference on Carbon**, The Pennsylvania State University, II, 130-131 (1997, July 13-18).
- "A Coal Fired Heat Exchanger for an Externally Fired Gas Turbine," **ASME Transactions of the Journal of Eng. for Gas Turbine & Power**, 118, 1996.
- "Reprocessing of Used Tires into Activated Carbon and Other Products,"
   Industrial & Engineering Chemistry Research, 34, 3102-3111, 1995.
- "Pyrolysis," in **Encyclopedia of Energy Technology and the Environment** (A.Bisio and S.G. Boots, Eds.), John Wiley & Sons, New York, pp. 2281-2308, 1995.
- "An Instrument for Characterization of the Thermal and Optical Properties of Charring Polymeric Materials," **25th Int. Symposium on Combustion**, 1994.
- "Measurement and Modeling of Lignin Pyrolysis," **Journal of Biomass & Bioenergy** 7, 107, 1994.
- "On-Line FT-IR Analysis of Fossil-Fuel Fired Power Plants," Proc. of the Air and Waste Management Int. Symp. on Optical Sensing for Environmental Monitoring, Atlanta, GA, 1993.
- "A Characterization Method and Model for Predicting Coal Conversion Behavior,"
   Fuel, 72, 4, 469-488, 1993.
- "A Novel Test Instrument for Fuel Thermal Stability," Proc. SPIE-Int. Soc. Opt. Eng., 2069, 20-31, 1993.
- "The Prediction of Coal Char Reactivity Under Combustion Conditions," Proceedings of the Twenty-Fourth Symposium International on Combustion/The Combustion Institute, pp. 1189-1197, 1992.
- "Review of Coal Pyrolysis: Experiments, Kinetic Rates, and Mechanisms,"
   Progress in Energy and Combustion Science, 18, 133, 1992.
- "The Application of FT-IR Methods to the Characterization of Coal Liquefaction Process Streams," **ACS Div. of Fuel Chem.** Preprints, 37, 4, 1903, 1992.
- "Modeling of Mild Gasification Processes," 8th Annual Int. Pittsburgh Coal Conference, Pittsburgh, PA, 183-188, 1991.

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Conference, Pittsburgn, PA, 183-188, 1991.



- "Studies of Retrogressive Reactions in Direct Liquefaction," **1991 Int. Conf. on Coal Science**, New Castle, England, 1991.
- "Pyrolysis of Phenol-Formaldehyde Resin: Experiments and Modeling," **ACS Div.** of Fuel Chemistry Preprints, 36, 2, 664, 1991.
- "FT-IR Spectroscopy in Process Monitoring Part II: Applications," **Sensors**, 8, 13, 1991.
- "A Study of Thermal Stability of JP-5 Using FT-IR and FIMS," ACS Div. of Petroleum Chemistry, 34, 4, 816, 1989.
- "A General Model of Coal Devolatilization," **Energy and Fuel, 2,** 405, 1988.
- "Vapor Phase Cracking of Newly-Formed Coal Tars," **IEC Process Des. Dev., 26**, 1831, 1987.
- "Very Rapid Coal Pyrolysis," Fuel, 65, 182, 1986.

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