

Curriculum Vitae Marco J. Castaldi, Ph.D.

Education

- Ph.D. Chemical Engineering, 1997, University of California, Los Angeles
Advisor: Selim M. Senkan
- M.S. Chemical Engineering, 1994, University of California, Los Angeles
Advisor: Selim M. Senkan
- B.S. Chemical Engineering, Magna Cum Laude, 1992, Manhattan College

Employment Experience

- 2017-present Professor, Chemical Engineering, City College of New York/CUNY
- 2015-present Director, Earth System Science and Environmental Engineering, CCNY
- 2012 – 2017 Associate Professor, Chemical Engineering, City College of New York/CUNY
- 2012 – Associate Professor, Earth & Environmental Engineering, Columbia University
- 2004-2012 Assistant Professor, Earth & Environmental Engineering, Columbia University.
- 2001-2004 Manager, Fuel Processor Comp. Dev., Precision Combustion Inc., New Haven, CT. Initiated the fuel cell fuel processor work in 1997. Principal investigator on NSF grants and commercial contracts with industrial fuel cell partners totaling \$3 MM. Responsible for developing fuel processor components exceeding DOE's PNGV 2004 targets for size, weight, response time, turndown, and durability. Focused on cost reduction of system and long-term durability. Interfaced with commercial customers for prudent and efficient design and testing
- 1997-2001 Research and Development Engineer, Precision Combustion Inc., New Haven, CT. Lead researcher on catalyst development for gas turbine applications using natural gas, biomass and liquid fuels. Responsible for \$2 MM development program. Conducted demonstration tests at industrial partners' sites on catalytic combustion devices for gas turbine applications. Introduced and developed analytical techniques using GC to further understanding of current reactor systems under development (catalytic and non-catalytic). Initiated and completed model development of PCI's SCT substrate reactor which encompasses kinetic and transport fundamentals. Designed and conducted experiments to determine kinetics of lean liquid fuel catalytic combustion, the results of which have been incorporated into a proprietary model. Initiated and implemented unattended testing capability for catalyst life testing. Achieved the first 1000 hour catalytic reactor demonstration.
- 1995 Internship at Sandia National Laboratory, Livermore California, Combustion Research Facility. Collaborated with research group to develop a REMPI TOF mass spectrometry analysis of co-flow hydrocarbon diffusion flames.
- 1992-1997 Graduate Student Research Assistant, Department of Chemical Engineering, UCLA. Initiated work on PAH detection and understanding for hydrocarbon and chlorinated fuel rich premixed and diffusion flames. Conducted limited

interdepartmental research in Fullerene experimentation and aerosol agglomeration.

Awards/Recognition

2016	Fulbright Fellow; Global Award
2015	National Academies' Intelligence Science & Technology Expert Group
2014	National Research Council, Panel Member Appointment
2012	Fellow, National Academy of Engineering Frontiers of Eng. Ed.
2010	ACS Environmental Division Best Paper Presentation
2010	Honorary Professor: ChongQing University of Science & Technology
2009	National Science Foundation CAREER Award
2009	International Precious Metal Institute Student Advisor Award
2007	Nominated for Dreyfus Foundation; Teachers Scholar Award
2006	Columbia University, SEAS Distinguished Faculty Teaching Award
2005	ASME, Gas Turbine Award
2004	SAE, Nominated for the Max Bentele Award
2004	ASME, Best Applications Paper Award
2002	Manhattan College, Top 10 Engineering Professors
1994-1997	USDOEd Fellowship, Pollution Prevention Committee
1992	UCLA Center for Clean Technology, Arco Fellowship
1991-1992	American Cyanamid Scholarship
1988-1992	Amalgamated Lithographers Scholarship

Society Memberships

American Institute of Chemical Engineers (AIChE)
2010 Vice-Chair, Research and New Technology Council (RANTC)

American Institute of Chemical Engineers (AIChE)
Sustainability Steward – 2007-present

North American Catalysis Society; New York Metropolitan Section
President (2010-2011)

American Chemical Society (ACS)

American Society of Mechanical Engineers (ASME)
Editor; Solid Waste Processing Division Proceedings – 2006-present
Executive Committee: Treasurer (2010)

American Society of Environmental Engineering Professionals (ASEEP)

American Society of Engineering Education (ASEE)
Officer Tau Beta Pi Engineering Honor Society, New York Xi Chapter
Omega Chi Epsilon Chemical Engineering Honor Society
Epsilon Sigma Pi College Honor Society

Services to profession

1. American Association for the Advancement of Science (AAAS) proposal review board
2. President 2011, North American Catalysis Society, Metro New York Section
3. School of Engineering Dean's Committee on Faculty Mentoring

4. Selected for *The Programme of Introducing Talents of Discipline to Universities* (111 program) Zhejiang University: China – 5 year visiting scholar position
5. Editorial Board of journal *Catalysts* (ISSN 2073-4344)
6. President 2010, North American Catalysis Society, Metro New York Section
7. President-elect 2009, North American Catalysis Society, Metro New York Section
8. Founded the Order of the Engineer Chapter at Columbia in April 2009
9. Proceedings Editor, North American Waste to Energy Conference, ASME International
10. American Institute of Chemical Engineers Sustainability Steward (2005 – present)
11. Editorial Board Member: *Waste and Biomass Valorization* Journal, Springer
12. Executive Committee Member – ASME Solid Waste Processing Division
13. **Plenary Lecture:** International Thermal Treatment Technologies (IT3) Annual Conference (June 2007)
14. **Keynote Lecture:** *Joint Conference American Chemical Society & American Institute of Chemical Engineers Annual Conference (ACS/AIChE)*, (April 2008)
15. **Invited Lecture:** New York Academy of Sciences - *Carbon Management: Reducing U.S. Greenhouse Gas Emissions Symposium* (February 2008)
16. **Invited Lecture:** American Institute of Chemical Engineers & American Chemical Society (AIChE/ACS), *Second Annual Energy & Resources Conference* (December 2007)
17. **Invited Lecture:** University of Florida, Gainesville, Departmental Symposium Series – Environmentally Benign Energy Technologies, (November 2007)
18. **Invited Lecture:** Engineering Annual Fund Presentation, February 2008.
19. High School Mentoring Program: Outreach to high school students to interest them in science and engineering – program attracts more than 50% women and more than 50% underrepresented groups (2005 – present)
20. Undergraduate curriculum development committee for Department of Earth & Environmental Engineering (2004 – present)
21. Chair, Graduate Program, Department of Earth & Environmental Engineering (2006 – present)
22. Chair, Earth & Environmental Engineering Seminar Series (2004 – 2006)
23. Director of Experimental Research, Waste to Energy Research Technology Council (WTERT) (2006 – present)
24. Academic liaison to ASME Energy & Environmental Research Division (2006 – present)
25. Session Chair, 15th North American Waste-to-Energy Conference (NAWTEC), Tampa, FL.
26. Consulted on high pressure methane extraction system project – World Energy Systems, LLC.
27. Reviewer for *Industrial Chemical & Engineering Research*, *Environmental Science and Technology*, *Combustion and Flame*, *International Journal of Hydrogen Energy*, *Energy and Fuels*, *Chemical Engineering Journal*, *Catalysis Today*, *Applied Catalysis*, *Chemical Engineering Education*, *Fuels*.

Publications

Peer-reviewed archived journals

Publications as Faculty Member

1. M Castaldi, et al. "Progress and Prospects in the Field of Biomass and Waste to Energy and Added-Value Materials" *Waste and Biomass Valorization*, 1-10
2. Hao, Zisu, Mei Sun, Joel Ducoste, Craig H. Benson, Scott Luettich, Marco J. Castaldi, and Morton A. Barlaz. "Heat Generation and Accumulation in Municipal Solid Waste Landfills." *Environmental Science & Technology* (2017).
3. LeBlanc, Jeffrey, John Quanci, and Marco J. Castaldi. "Investigating Secondary Pyrolysis Reactions of Coal Tar via Mass Spectrometry Techniques." *Energy & Fuels* 31, no. 2 (2017): 1269-1275.
4. Tupsakhare, Swanand S., Samhita Kattakola, and Marco J. Castaldi. "An Application of the Results from the Large-Scale Thermal Stimulation Method of Methane Hydrate Dissociation to the Field Tests." *Industrial & Engineering Chemistry Research* 56, no. 15 (2017): 4588-4599.
5. Maldonado, C.S., De la Rosa, J.R., Lucio-Ortiz, C.J., Valente, J.S. and Castaldi, M.J., Synthesis and characterization of functionalized alumina catalysts with thiol and sulfonic groups and their performance in producing 5-hydroxymethylfurfural from fructose. *Fuel* 198, 134-144.
6. LeBlanc J, Uchimiya M, Ramakrishnan G, Castaldi MJ, Orlov A. Across-Phase Biomass Pyrolysis Stoichiometry, Energy Balance, and Product Formation Kinetics. *Energy & Fuels*. 2016 Aug 9;30(8):6537-46.
7. LeBlanc, J., Quanci, J., & Castaldi, M. J. (2016). Experimental Investigation of Reaction Confinement Effects on Coke Yield in Coal Pyrolysis. *Energy & Fuels*, 30(8), 6249-6256.
8. Castellani, B., Rossetti, G., Tupsakhare, S., Rossi, F., Nicolini, A., & Castaldi, M. J. (2016). Simulation of CO₂ storage and methane gas production from gas hydrates in a large scale laboratory reactor. *Journal of Petroleum Science and Engineering*. 147, 515-527.
9. Tupsakhare, S. S., Fitzgerald, G. C., & Castaldi, M. J. (2016). Thermally Assisted Dissociation of Methane Hydrates and the Impact of CO₂ Injection. *Industrial & Engineering Chemistry Research*, 55(39), 10465-10476.
10. Crowley, Stephen, and Marco J. Castaldi. "Mechanistic Insights into Catalytic Ethanol Steam Reforming Using Isotope-Labeled Reactants." *Angewandte Chemie International Edition* 55.36 (2016): 10650-10655.
11. Simson, A., Crowley, S. and Castaldi, M.J., The Impact of Sulfur on Ethanol Steam Reforming. *Catalysis Letters* 2016, pp.1-12.
12. Sandoval-Rangel, L., Castaldi, M.J., Lucio-Ortiz, C.J. and de la Rosa, J.R., 2016. Selective catalytic reduction of NO_x with NH₃ using ZSM5 with low content of copper. *Superficies y vacío*, 29(1), pp.1-8.
13. Jones, K., Ramakrishnan, G., Uchimiya, M., Orlov, A., Castaldi, M.J., LeBlanc, J., Hiradate, S., Fate of Higher-Mass Elements and Surface Functional Groups during the Pyrolysis of Waste Pecan Shell. *Energy & Fuels* 2015, 29 (12), 8095-8101
14. Zhao, S., Li, Y., Stavitski, E., Tappero, R., Crowley, S., Castaldi, M.J., Zakharov, D.N., Nuzzo, R.G., Frenkel, A.I., Stach, E.A., Operando Characterization of Catalysts through use of a Portable Microreactor. *ChemCatChem* 2015, 7 (22), 3683-3691
15. Ducouso, M., Weiss-Hortala, E., Nzihou, A., Castaldi, M.J., Reactivity enhancement of gasification biochars for catalytic applications. *Fuel* 2015, 159, 491-499

16. Klinghoffer, N.B., Castaldi, M.J., Nzihou, A. Influence of char composition and inorganics on catalytic activity of char from biomass gasification. *Fuel* 2015, 157, 37-47
17. Patuzzi, F. Ciuta, S. Castaldi, M.J., Baratieri, M., Intraparticle gas sampling during wood particle pyrolysis: Methodology assessment by means of thermofluidynamic modeling. *Journal of Analytical and Applied Pyrolysis* 2015, 113, 638-64
18. Rangel, L.S., de la Rosa, J.R., Ortiz, C.J.L., Castaldi, M.J., Pyrolysis of urea and guanidinium salts to be used as ammonia precursors for selective catalytic reduction of NOx. *Journal of Analytical and Applied Pyrolysis* 2015, 113, 564-574
19. Butterman, H. C.; Castaldi, M. J.; Gelix, F.; Borrut, D.; Nicol, F.; Lefebvre, B., Biomass and RDF Gasification Using Ballistic Heating TGA Analysis. *Waste and Biomass Valorization* **2014**, 5 (4), 607-623.
20. Prabowo, B.; Umeki, K.; Yan, M.; Nakamura, M. R.; Castaldi, M. J.; Yoshikawa, K., CO₂-steam mixture for direct and indirect gasification of rice straw in a downdraft gasifier: laboratory-scale experiments and performance prediction. *Applied Energy* **2014**, 113, 670-679;
21. Lusardi, M. R.; Kohn, M.; Themelis, N. J.; Castaldi, M. J., Technical assessment of the CLEERGAS moving grate-based process for energy generation from municipal solid waste. *Waste Management & Research* **2014**, 0734242X14543813;
22. Kohn, M. P.; Castaldi, M. J.; Farrauto, R. J., Biogas reforming for syngas production: The effect of methyl chloride. *Applied Catalysis B: Environmental* **2014**, 144, 353-361;
23. Klinghoffer, N. B.; Castaldi, M. J., Gasification and Pyrolysis of Municipal Solid Waste (MSW). *ChemInform* **2014**, 45 (15);
24. Frank, A.; Castaldi, M. J., CFD analysis of municipal solid waste combustion using detailed chemical kinetic modelling. *Waste Management & Research* **2014**, 32 (8), 745-754;
25. Fitzgerald, G. C.; Castaldi, M. J.; Schicks, J. M., Methane Hydrate Formation and Thermal Based Dissociation Behavior in Silica Glass Bead Porous Media. *Industrial & Engineering Chemistry Research* **2014**, 53 (16), 6840-6854;
26. Ciuta, S.; Patuzzi, F.; Baratieri, M.; Castaldi, M. J., Biomass energy behavior study during pyrolysis process by intraparticle gas sampling. *Journal of Analytical and Applied Pyrolysis* **2014**, 108, 316-322;
27. Castaldi, M. J., Perspectives on Sustainable Waste Management. *Annual review of chemical and biomolecular engineering* **2014**, 5, 547-562.
28. Duyar, M.S., Farrauto, R.J., Castaldi, M.J., Yegulalp, T.M., In-Situ CO₂ Capture Using CaO/ γ -Al₂O₃ Washcoated Monoliths for Sorption Enhanced Water Gas Shift Reaction *Ind. & Eng. Chem. Res* **2013**,
29. Kwon, E.E., Jeon, E.C., Castaldi M.J., Effect of carbon dioxide on the thermal degradation of lignocellulosic biomass, *Environ. Sci. Technol*, **2013**, 47 (18), 10541-10547
30. Fitzgerald, G.C., Castaldi, M.J., Thermal Stimulation Based Methane Production from Hydrate Bearing Quartz Sediment, *Ind. & Eng. Chem. Res*, **2013**, 52 (19), 6571-6581
31. Mohammadi, P., Tabatabaei, M., Nikbakht, A.M., Farhadi, K., Castaldi M.J., Simultaneous Energy Recovery from Waste Polymers in Biodiesel and Improving Fuel Properties, *Waste & Bio. Valor.*, **2013**, 4 (1), 105-116
32. Kwon, E.E., Castaldi M.J., Urban energy mining from municipal solid waste (MSW) via the enhanced thermo-chemical process by carbon dioxide CO₂ as a reaction medium, *Biores. Tech.*, **2012**, 125, 23-29

33. Kwon, E.E., Castaldi M.J., Mechanistic understanding of polycyclic aromatic hydrocarbons (PAHs) from the thermal degradation of tires under various oxygen concentration atmospheres, *Env. Sci. Tech.*, **2012**, 46 (23), 12921-12926
34. Fitzgerald, G.C., Castaldi, M.J., Zhou, Y., Large scale reactor details and results for the formation and decomposition of methane hydrates via thermal stimulation dissociation *J. Petr. Sci. Eng.*, **2012**, 94, 19-27
35. Klinghoffer, N.B., Castaldi, M.J., Nzihou A., Catalyst properties and catalytic performance of char from biomass gasification, *Ind. & Eng. Chem. Res.*, **2012**, 51 (40), 13113-13122
36. Kwon, E.E., Yi, H., Castaldi M.J., Utilizing carbon dioxide as a reaction medium to mitigate production of polycyclic aromatic hydrocarbons from the thermal decomposition of styrene butadiene rubber, *Env. Sci. Tech.* **2012**, 46 (19), 10752-10757
37. Butterman, H.C.; Castaldi, M.J., Experimental Investigation of Lignin Decomposition and Char Structure During CO₂ and H₂O/N₂ Gasification; *Waste Bio. Valor.* **2011**, 3 (1), 49-60
38. Leylegian, J., Chinitz, W., Benel, G., Castaldi, M.J., Investigation of Short Contact Time Reactors for Regeneratively Cooled Hypersonic Vehicles; *J. Prop. Power*, **2011**, 28 (2), 412-422
39. Simson, A., Farrauto, R., Castaldi, M.J., Steam reforming of ethanol/gasoline mixtures: Deactivation, regeneration and stable performance; *App. Catal. B: Environ*, **2011** 106 (3-4), pp. 295-303.
40. Walker, M.E., Abbasian, J., Chmielewski, D.J., Castaldi, M.J.; Dry gasification oxy-combustion power cycle; *Energy and Fuels.* **2011** 25(5): 2258-2266
41. Klinghoffer, N.B., Barraï, F., Castaldi, M.J.; Autothermal reforming of JP8 on a Pt/Rh catalyst: Catalyst durability studies and effects of sulfur; *J. Power Source.* **2011**, 196(15): 6374-6381
42. Gruene, P; Belova, A.G; Yegulalp, T.M; Farrauto, R.J; Castaldi, M.J, Dispersed Calcium Oxide as a Reversible and Efficient CO₂-Sorbent at Intermediate Temperatures, *Ind. Eng. Chem. Res.* **2011**, 50(7): 4042-4049
43. Kohn, M; Lee, J; Basinger, M.L; Castaldi, M.J., Performance of an Internal Combustion Engine Operating on Landfill Gas and the Effect of Syngas Addition, *Ind. Eng. Chem. Res.* **2011**, 50 (6): 3570–3579
44. Butterman, H.C.; Castaldi, M.J., Biomass to Fuels: Impact of Reaction Medium and Heating Rate, *Env. Eng. Sci.*, **2010**, 27(7): 539-555
45. Barraï, F., Castaldi, M.J., “Experimental investigation of a JP8 Fuel Processor: ATR and CO-cleanup train.” *Ind. Eng. Chem. Res.*, 49 (4), 2010, 1577–1587
46. Castaldi, M.J., and Themelis, N.J., The Case for Increasing the Global Capacity for Waste to Energy (WTE)” *Waste Biomass Valor*, 1 (1), **2010**, pp. 91-105.
47. Kohn, M., Castaldi M.J., and Farrauto, R.J., “Auto-thermal and Dry Reforming of landfill gas over a Rh/ γ -Al₂O₃ monolith catalyst.” *App. Catal. B: Environ*, (94), **2010**, 125-133.
48. Nakamura, M.R., Castaldi, M.J., Themelis, N.J., “Stochastic and physical modeling of motion of municipal solid waste (MSW) particles on a waste-to-energy (WTE) moving grate.” *International Journal of Thermal Sciences*, 49, (6), **2010**, 984-992.
49. Butterman, H. C.; Castaldi, M.J., “CO₂ as a Carbon Neutral Fuel Source via Enhanced Biomass Gasification.” *Environ. Sci. Technol.*, **2009**, 43 (23), pp 9030–9037.
50. Butterman, H. C.; Castaldi, M. J., “Syngas Production via CO₂ Enhanced Gasification of Biomass Fuels”. *Environmental Engineering Science* **2009**, 26, (4), 703-713

51. Zhou, Y.; Castaldi, M.J.; Yegulalp, T.M., "Experimental investigation of methane gas production from methane hydrate": *Industrial & Engineering Chemistry Research* **2009**, *48*, 3142–3149
52. Xu, Cheng-Yuan; Griffin, Kevin L.; Blazier, John C.; Craig, Elizabeth C.; Gilbert, Dominique S.; Sritrairat, Sanpisa; Anderson, O. Roger; Castaldi, Marco J.; Beaumont, Larry. The growth response of *Alternanthera philoxeroides* in a simulated post-combustion emission with ultrahigh [CO₂] and acidic pollutants. *Environmental Pollution*, **2009**, *157*(7), 2118-2125.
53. Eichelbaum, M, Farrauto, R.J. Castaldi, M.J., "The Impact of Urea on the Performance of Fe-Exchanged Beta Zeolites for the Selective Catalytic Reduction of NO_x I. Pyrolysis and Hydrolysis of Urea over Zeolite Catalysts" – *Applied Catalysis B: Environmental*, **2010**, (97), 90-97
54. Eichelbaum, M, Siemerb, A.B., Farrauto, R.J. Castaldi, M.J., "The Impact of Urea on the Performance of Fe-Beta Zeolites for the Selective Catalytic Reduction of NO_x II. Catalytic Studies" – *Applied Catalysis B: Environmental*, **2010**, (97), 98-107
55. Castaldi, M.J; Zhou, Y.; Yegulalp, T.M.; "Large scale reactor results for the formation and decomposition of methane hydrates", **2008**, in-review - *J. Pet. Sci. Eng*
56. Nakamura, M.; Castaldi, M.J.; Themelis, N.J.; "A 2-dimensional stochastic model for Municipal Solid Waste (MSW) particle mixing within a waste-to-energy (WTE) combustion bed" **2008**, *International Journal of Thermal Sciences*, in review
57. Kwon, Eilhann; Castaldi, Marco J.. Fundamental Understanding of the Thermal Degradation Mechanisms of Waste Tires and Their Air Pollutant Generation in a N₂ Atmosphere. *Environ. Sci. Technol.* **2009**, *43*(15), 5996-6002.
58. Simson, A., Waterman, E., Farrauto, R.J., Castaldi, M.J. "Kinetic and process study for ethanol reforming using a Rh/Pt washcoated monolith catalyst." *Applied Catalysis B: Environmental*, *89*, (1-2), 2009, 58-64
59. McLaughlin, N. M., and Castaldi, M.J, **(2008) In-Situ Measurement Techniques in Catalysis for Mechanism Development**, Chapter in Catalysis Series, Royal Society of Chemistry. RSC Publishing, Ed. Spivey, J.J.
60. Dorazio, L., Ruettinger, W., Castaldi, M.J, Farrauto, B.F., "Deactivation, Regeneration, and Stable Performance of a Platinum-Molybdenum-Rhenium Water Gas Shift Catalyst for on-Site Hydrogen Generation," *Topics in Catalysis*, **2008**, *51* (1-4), pp. 68-75.
61. Zeman, F.; Castaldi, M., An investigation of synthetic fuel production via chemical looping. *Environmental Science & Technology*, **2008**, *42*, (8), 2723-2727.
62. Kwon, E.; Castaldi, M.J, "Investigation of Mechanisms of Polycyclic Aromatic Hydrocarbons (PAHs) Initiated from the Thermal Degradation of Styrene Butadiene Rubber (SBR) in N₂ Atmosphere", *Environ. Sci. Technol.*, **2008**, *42*, (6), 2175-2180.
63. Kaufman, S.; Krishnan, N.; Kwon, E.; Castaldi, M.; Themelis, N.; Rechberger, H., Examination of the Fate of Carbon in Waste Management Systems through Statistical Entropy and Life Cycle Analysis. *Environ. Sci. Technol.* **2008**, *42*, (22), 8558-8563
64. Castaldi, M.J; Kwon, E.; Weiss, B., Beneficial Use of Waste Tires: An Integrated Gasification and Combustion Process Design via Thermo-Gravimetric Analysis (TGA) of Styrene-Butadiene Rubber (SBR) and Poly-Isoprene (IR). *Environ. Eng. Sci.* **2007**, *24*, (8), 1160-1178. **(Invited Paper)**

65. Castaldi, M.J, (2007), "Removal of Trace Contaminants from Fuel Processing Reformate: Preferential Oxidation (Prox)." Chapter for Hydrogen and Syngas, John Wiley. Eds. Subramani, V., Song, C., Liu, K.
66. Barrai, F.; Jackson, T.; Whitmore, N.; Castaldi, M.J, "The role of carbon deposition on precious metal catalyst activity during dry reforming of biogas." *Catalysis Today* **2007**, 129, (3-4), 391-396.
67. Butterman, H. C.; Castaldi, M.J, "Influence of CO₂ Injection on Biomass Gasification." *Industrial & Engineering Chemistry Research* **2007**, 46, (26), 8875-8886.
68. Castaldi, M.J; Barrai, F., "An investigation into water and thermal balance for a liquid fueled fuel processor." *Catalysis Today* **2007**, 129, (3-4), 397-406.
69. Castaldi, M.J; Zhou, Y.; Yegulalp, T. M., Down-hole combustion method for gas production from methane hydrates. *J. Pet. Sci. Eng.* **2007**, 56, (1-3), 176-185, (**Invited Paper**).
70. Castaldi, M.J; Doohar, J. P., Investigation into a catalytically controlled reaction gasifier (CCRG) for coal to hydrogen. *Int. J. Hydrogen Energy* **2007**, 32, (17), 4170-4179.
71. Kwon, E.; Castaldi, M.J, "An Investigation into the Mechanisms for Styrene-Butadiene Copolymer (SBR) Conversion in Combustion and Gasification Environments." *International Journal of Green Energy* **2007**, 4, 45-63.
72. Dorazio, L. D. and Castaldi, M.J, "Autothermal reforming of tetradecane (C₁₄H₃₀): A mechanistic approach" *Catalysis Today*, **2008**, 136 (3-4), 273-280.
73. Lee, S.-H.; Themelis, N. J.; Castaldi, M. J., High-temperature corrosion in waste-to-energy boilers. *J. Therm. Spray Technol.* **2007**, 16, (1), 104-110.
74. Mohan, M. A.; May, N.; Assaf-Anid, N. M.; Castaldi, M.J, "Biomass as a sustainable energy source: an illustration of ChE thermodynamic concepts." *Chemical Engineering Education* **2006**, 40, (4), 259-267.
75. Schiff, D. M.; Castaldi, M.J, "An affordable diesel exhaust particulate matter removal unit for developing countries." *Chemical Engineering Education* **2006**, in revision.
76. Weiss, B.; Castaldi, M. J., "A tire gasification senior design project that integrates laboratory experiments and computer simulation." *Chemical Engineering Education* **2006**, 40, (3), 203-210.
77. Smith, L. L.; Karim, H.; Castaldi, M.J; Etemad, S.; Pfefferle, W. C., "Rich-Catalytic Lean-burn combustion for fuel-flexible operation with ultra low emissions." *Catalysis Today* **2006**, 117, (4), 438-446.
78. Smith, L. L.; Karim, H.; Castaldi, M. J.; Etemad, S.; Pfefferle, W. C.; Khanna, V.; Smith, K. O., Rich-Catalytic Lean-Burn Combustion for Low-Single-Digit NO_x Gas Turbines. *J. Eng. Gas Turbines Power* **2005**, 127, (1), 27-35. (**Best Applications Paper Award**)
79. Roychoudhury, S.; Castaldi, M.; Lyubovsky, M.; LaPierre, R.; Ahmed, S., "Microlith catalytic reactors for reforming iso-octane-based fuels into hydrogen." *Journal of Power Sources* **2005**, 152, 75-86.
80. Castaldi, M.J; LaPierre, R.; Lyubovski, M.; Pfefferle, W.; Roychoudhury, S., "Effect of water on performance and sizing of fuel-processing reactors." *Catalysis Today* **2005**, 99, (3-4), 339-346.
81. Castaldi, M.J; Dorazio, L.; Assaf-Anid, N., "Relating abstract chemical thermodynamic concepts to real-world problems." *Chemical Engineering Education* **2004**, 38, (4), 268-271.

82. Castaldi, M. J., Senkan, S.M., "Combustion." In *Ullman's Encyclopedia, 6th Ed*, Ullman's, Ed. Ullmans: **2004**.

Publications as Industrial Author

1. Smith, L. L., Karim, Hasan, Castaldi, Marco J., Etemad, S., Pfefferle, W. C., Khanna, V. K., Smith, K.O., "Rich-Catalytic Lean-Burn Combustion for Low-Single-Digit NO_x Gas Turbines." *ASME Turbo Expo: Power for Land, Sea & Air*; **2003**.
2. Lyubovsky, M.; Smith, L. L.; Castaldi, M.; Karim, H.; Nentwick, B.; Etemad, S.; LaPierre, R.; Pfefferle, W. C., "Catalytic combustion over platinum group catalysts: fuel-lean versus fuel-rich operation." *Catalysis Today* **2003**, 83, (1-4), 71-84.
3. Castaldi, M. J., Roychoudhury, S., Boorse, R.S., Karim, H., LaPierre, R., Pfefferle, W.C. "Compact, Lightweight Preferential CO Oxidation (PROX) Reactor Development and Design for PEM Automotive Fuel Cell Applications.", Fuel Processing Session I, *Proceedings from the 2003 Spring National Meeting and Process Industries Exposition*, New Orleans, LA, March 30 - April 3, 2003; AIChE, Ed.
4. Castaldi, M. J., Lyubovsky, M., LaPierre, R., Pfefferle, W.C., and Roychoudhury, S., "Performance of Microlith Based Catalytic Reactors for an Isooctane Reforming System." *SAE Technical Paper* **2003**, (2003-01-1366).
5. Pfefferle, W. C.; Castaldi, M.; Etemad, S.; Karim, H.; Lyubovsky, M.; Roychoudhury, S.; Smith, L., "Catalysts for improved process efficiency." *223rd ACS National Meeting, Orlando, FL, United States, April 7-11, 2002* **2002**, CATL-018.
6. Castaldi, M. J., Boorse, Samuel, R., Roychoudhury, S., Menacherry, P., Pfefferle, W.C. "Lightweight, Compact, Ultra-fast Short Contact Time Preferential Oxidation Reactor for Automotive PEM Fuel Cell Applications.", *NSF National Meeting*, San Juan, Puerto Rico, January, **2002**.

Publications as Doctoral Student

1. Marinov, N. M.; Pitz, W. J.; Westbrook, C. K.; Vincitore, A. M.; Castaldi, M. J.; Senkan, S. M.; Melius, C. F., "Aromatic and polycyclic aromatic hydrocarbon formation in a laminar premixed n-butane flame." *Combustion and Flame* **1998**, 114, (1/2), 192-213.
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Media Coverage

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2. History Channel, Engineering Disaster Series: San Bruno Natural Gas Pipeline Explosion, 2015
3. History Channel, Engineering Disaster Series: Montreal fireworks explosion, 2015

4. History Channel, Engineering Disaster Series: Fuel Storage Explosion, 2015
5. Metro's Let's Talk Trash event series; June 3, 2014
6. Columbia Researchers Explore New Process to Create Greener Fuels - According to a new study, peanut shells and other materials, such as tree bark and grass, can be turned from biomass—a renewable energy derived from a recently living source—into fuel. *Margaux Groux, Columbia Spectator, December 11, 2009*
7. «Sauberer» Biosprit dank CO₂ - Es wirkt wie das Perpetuum Mobile des Klimaschutzes: Die Herstellung von Biotreibstoff mit Hilfe von CO₂. *Neues Verfahren Greenswitzerland.ch, December 4, 2009*
8. New Technology Cleans Up Coal with CO₂ - The world has taken a step closer to "clean coal," thanks to new technology that actually uses CO₂ to make power generation more efficient. *Matt Ford, CNN, November 30, 2009*
9. Study: Carbon Dioxide in Biomass Gasification Increases Efficiency - When carbon dioxide is used in biomass gasification, it increases the conversion efficiency and offers a solution for processing carbon dioxide on a global scale, according to a recent study by Columbia University researchers. *Lisa Gibson, Biomass Magazine, November 18, 2009*
10. Scientists Find Key to Creating Clean Fuel from Coal and Waste - 'Gasification' process enhanced to save millions of tonnes of carbon and provide energy. *Alok Jha, The Observer, U.K. November 15, 2009*
11. Researchers Discover Use for Carbon Dioxide in Conversion of Biomass Into Biofuel - Researchers at Columbia University have successfully discovered a beneficial use for carbon dioxide in the conversion of organic materials, such as grass and bark, into fuel. *Columbia University November 11, 2009*
12. Scientists Try Tapping 'Ice That Burns' - Researchers may have found a way to extract large amounts of natural gas from methane hydrates -- ice-like structures that might contain more energy than all the world's coal, oil and conventional natural gas combined. *Katie Howell, The New York Times April 6, 2009*

Technical Conference and Symposia Presentations

North American Waste to Energy Conference (NAWTEC)

1. Thermo-Gravimetric Analysis (TGA) of Combustion and Gasification of Styrene-Butadiene Copolymer (SBR) *paper# 13-3149*
2. Polycyclic Aromatic Hydrocarbon (PAH) Formation in thermal Degradation of Styrene Butadiene Copolymer, *paper# 14-3188*
3. Combating Corrosion in WTE Facilities: Theory and Experience, *paper# 14-3198*
4. Numerical analysis of size reduction of municipal solid waste particles on the traveling grate of a waste-to-energy combustion chamber." *paper #14-3193*
5. Investigation of Thermo-Gravimetric Analysis(TGA) on Waste tires and Chemical Analysis Including Light Hydrocarbons, Substituted Aromatics and Polycyclic Aromatic Hydrocarbon (PAH) *paper# 15-3218*
6. High Temperature Corrosion Resistance of Different Commercial Alloys Under Various Corrosive Environments *paper# 15-3221*
7. The Effects of Varied Hydrogen Chloride Gas Concentrations on Corrosion Rates of Commercial Tube Alloys Under Simulated Environment of WTE Facilities *paper#16-1916*

8. An Investigation of the Thermal Degradation Mechanisms of Waste Tire Through Chemical Analysis Including Light Hydrocarbons, Benzene Derivatives, and Polycyclic Aromatic Hydrocarbons (PAHs) at High Temperature *paper# 16-1914*
9. CO₂ Enhanced Steam Gasification of Biomass Fuels *paper# 16-1949*
10. Use of Statistical Entropy and Life Cycle Analysis to Evaluate Global Warming Potential of Waste Management Systems *paper# 16-1915*
11. The Center for Sustainable Use of Resources: Quantifying Climate Change Impacts of Managing Wastes *paper# 17-2356*
12. An Investigation Into the Syngas Production From Municipal Solid Waste (MSW) Gasification Under Various Pressures and CO₂ Concentration Atmospheres *paper# 17-2351*
13. Quantitative Analysis of the Flow, Mixing, and Size Segregation Phenomena of Municipal Solid Waste Particles on Traveling Grate of Waste-to-Energy (WTE) Combustion Chamber *paper# 17-2367*

American Institute of Chemical Engineers (AIChE)

14. Down-Hole Combustion Method for Gas Production from Methane Hydrate *paper #63a*
15. Hydrogen Production Via Gasification of Solid Carbon Fuels *paper #94b*
16. CO₂ Enhanced Gasification Of Biomass Fuel *paper #9b*
17. ATR Reforming Of Tetradecane (C₁₄H₃₀): A Mechanistic Explanation For Hydrogen And Carbon Formation *paper #646g*
18. Autothermal Reforming of Landfill gases *paper #29d*
19. Autothermal Reforming of JP8 using a 10 kW_{th} finned Wall Reactor *paper #75f*
20. Effect of Urea and Urea Decomposition Byproducts on Zeolite Activity for Selective Catalytic Reduction *paper #83d*
21. Catalytic Shock Tube #152e
22. Deactivation, Regeneration and Stable Performance of a Platinum-Molybdenum-Rhenium Water Gas Shift Catalyst for on-Site Hydrogen Generation *paper #138a*
23. Kinetic and Process Study for Ethanol Reforming using a Pt/Rh Washcoated Monolith Catalyst *paper #209b*
24. A Comparison of Monoliths and Short Contact Time Supports for Selective Catalytic Oxidation: Performance and Steady-State Multiplicity *paper #222d*
25. Scrap Tires in Waste-to-Energy Plants: Treatment and Emissions Control *paper #265d*
26. Experimental Investigation of Methane Gas from Methane Hydrates *paper #330g*
27. An Investigation of High Temperature Corrosion Phenomena in Waste to Energy Boilers *paper #512f*
28. Experimental Kinetic Analysis of Steam and CO₂ Gasification of Biomass Fuels *paper #563d*
29. Biomass decomposition reaction sequence analysis using simultaneous gas sampling and temperature measurements Simona Ciuta, Francesco Patuzzi, Marco J. Castaldi and Marco Baratieri 2014 Annual Meeting #30e

American Chemical Society (ACS)

30. The role of carbon deposition on precious metal catalyst activity during dry reforming of biogas *paper# PETR-37*

31. An Investigation into Water and Heat Balance Issues for Liquid Fueled Portable Fuel Processors *paper# PETR-50*
32. Biomass to Hydrogen & Electricity, *paper # FUEL-42*
33. Waste Tire Conversion: Understanding the Mechanism of Decomposition, *paper# FUEL-57*
34. ATR Reforming of Tetradecane (C₁₄H₃₀): A Mechanistic Explanation, *paper # FUEL-117*
35. Gas production from methane hydrates, *paper # FUEL-64*

International Thermal Treatment Technologies (IT3)

36. Investigation into the properties of ash from biomass gasification (2011) Air and Waste Management Association - International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors 2011, pp. 52-58.
37. Research and application of wastes fluidized bed incineration technology at Zhejiang University (2011) Air and Waste Management Association - International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors 2011, pp. 13-23.
38. Particle-based bed modeling on mixing diffusion of municipal solid waste particles by the motion of a grate system (2011) Air and Waste Management Association - International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors 2011, pp. 161-174.
39. Landfill gas reforming for synthesis gas generation (2011) Air and Waste Management Association - International Conference on Thermal Treatment Technologies and Hazardous Waste Combustors 2011, pp. 108-117.
40. Novel Integrated Process for Beneficial Use of Waste Tires: Generation of synthesis gas and electricity, *paper # 2*
41. Thermo-gravimetric Analysis (TGA) of Combustion and Gasification of Major Constituents of Waste Tire: Comparison between Styrene-Butadiene Rubber (SBR) and Poly-Isoprene (IR), *paper # 11*
42. Polycyclic Aromatic Hydrocarbon (PAH) Formation from Combustion and Gasification of Tires: Mechanistic understanding and reduction potential, *paper #83*
43. Hydrogen Production via Gasification of Biomass Fuels, *paper #64*
44. CO₂ Impact on Biomass Gasification: ASPENTM Simulation Compared to Experimental Data, *paper #80*
45. An Investigation of the Thermal Degradation Mechanism of Waste Tires Through Chemical Analysis in High Temperature, *paper #37*
46. Extension of the Statistical Entropy and Substance Concentrating Efficiency Function to the Analysis of Carbon Species in Waste Treatment Systems, *paper #92*
47. An Investigation into the Syngas Production Enhancement of Municipal solid Waste Gasification under Various CO₂ Concentration Atmosphere, *paper # 46*
48. Biomass to Fuels: The Impact of Reaction Medium and Heating Rate, *paper # 57*
49. A Comparison of Landfill Gas to Energy Technologies, *paper # 120*

North American Catalysis Society, bi-Annual Meeting

50. Greenhouse Gas Dry Reforming using monolithic catalysts for enhanced reactor design, *June, 2007*
51. Auto-thermal Reforming of Landfill Gas for Synthesis Gas Generation *June, 2009*
52. Catalytic reforming of ethanol/gasoline blends for fuel cell vehicles *June, 2009*

53. Urea-SCR for NO_x Diesel Emission Control: The influence of urea and its decomposition products on the SCR activity of zeolites *June, 2009*

Society of Mining Engineering

54. Thermogravimetric Study of Carbon dioxide Adsorption on Alumina-Supported Calcium Oxide, *February 2007*
55. Carbon Neutral, Energy efficient Method for Gas Production from Methane Hydrates, *February 2007.*
56. Pre-Combustion Capture of CO₂ from Coal Gasification Gases: case of CaO on Gamma Al₂O₃, *February 2009.*
57. Experimental Investigation of CH₄ Production from Methane Hydrate, *February. 2009.*

Clearwater Coal Conference

58. Physio-Chemical Properties of Low Rank Coal/Liquid CO₂ Slurries as Gasifier Feedstocks
59. CO₂ Enhanced Steam Gasification of Biomass Fuels

Others

60. CO₂ Enhanced Gasification of Biomass Fuel – *2nd International Conference on Engineering for Waste Valorization, June 2008, Patras Greece*
61. Waste to Energy for Electric Power Plants – *11th Annual Electric Power Conference May 2009 Chicago, IL*
62. CO₂ Enhanced Gasification of Biomass Fuels - *2008 Advanced Energy and Technology Conference, November 2008, Long Island, NY*
63. Waste to Energy: Worldwide Developments to a Novel Technology – *3rd Annual Alternative Energy NOW Conference January, 2009, Lake Buena Vista, FL*
64. An Energy Efficient, Environmentally Sound Gas Production Process from Methane Hydrates, *paper #WR38 - International Mining Conference (IMCET), June, 2005 Izmir, Turkey*
65. Solid carbon feedstock gasification using CO₂: simulation and experiment *paper # D201 - International Conference on Power Engineering (ICOPE-09) November 2009 Kobe, Japan*
66. Methane Hydrates - Research for an Efficient Gas Production Process, *20th World Mining Congress and Expo, Tehran, Iran, November, 2005.*
67. A System for Generating Hydrogen from Coal and Separating Carbon Dioxide , *Proceedings, 21st World Mining Congress, Poland.*
68. Pollution Prevention via Fundamental Understanding, March 25th 2005, *Chemistry Lecture Series, Columbia University*
69. Chemistry Impacts on the Environment, December 13th, *2004 Chemistry Lecture Series, Columbia University*
70. Solid Carbon Conversion (Biomass, MSW and Coal) via CO₂ – *8th World Congress of Chemical Engineering, August 2009, Montreal, Canada*
71. Development of an Affordable, Simple, Robust Diesel Exhaust Particulate Removal Unit for Diesel Trucks and Buses – *Air & Waste Management Association 100th Annual Conference & Exhibition, June 2007.*

Other Invited Presentations

1. National Institute of Standards and Technology “*State of Catalysis; Real vs Experimental*”

2. Rutgers University Institute for Advanced Materials, Devices and Nanotechnology “*Development of Environmentally Benign Energy Technologies*”.
3. Plenary Presentation, 26th Annual International Conference Incineration & Thermal Treatment Technologies (IT3) “*Current State of Development, Acceptance and Implementation of Controlled Combustion Technologies in the US and Worldwide*”
4. Rowan University, Department of Chemical Engineering, Glasboro, NJ, “*Environmentally Benign Energy Technologies*”
5. National Energy Technology Laboratories (NETL) Morgantown, VA “*Environmentally Benign Energy Technologies*”
6. Adelphi University–Dept of Physics and Environmental Sciences – Garden City, NY “*Environmentally Benign Energy Technologies*”
7. Cytec Industries – Professional Seminar Lecture Series – Stamford, CT “*Environmentally Benign Energy Technologies*”
8. American Chemical Society (ACS) – Symposium on “Hydrogen from Renewable Sources and Refinery Applications” “*The role of carbon deposition on precious metal catalyst activity during dry reforming of biogas*”

Synergistic Activities

1. High School Mentoring Program: Outreach to high school students to interest them in science and engineering – program attracts more than 50% women and more than 50% underrepresented groups
2. Undergraduate curriculum development committee for Department of Earth & Environmental Engineering
3. Director of Experimental Activities, Waste to Energy Research Technology (WERT) Council
4. Session Chair for New York Academy of Sciences Seminar - *Energy For A New Century - Beyond Petroleum Alternative Energy Symposium*
5. Advisor to Undergraduate Research Internship Program (URIP)
6. Academic liaison to ASME Solid Waste Processing Division
7. Member of AIChE Research and New Technology Committee (RANTC)
8. Session Chair, 14th North American Waste-to-Energy Conference (NAWTEC), Tampa, Fl.
9. Co-Chair of 33rd Mid-Atlantic Industrial Waste Conference, Riverdale, New York.

Research Group (4 current)

PhD Students Graduated (15)

Swanand Tupsakhare – PhD 2017 “Simulation of In-situ combustion in gas hydrate systems for methane production and carbon sequestration.”

Stephen Crowley – PhD 2016 “*Morphology Dynamics of Precious Metal Catalysts for the Steam Reforming of Oxygenated Fuels*”

Jeffrey R. Leblanc – PhD 2016 “*Slow Pyrolysis Reaction Experiments for High Yields of Solid Carbon*”

Marion Ducouso – PhD 2016 (co-Advised with Prof. Nzihou) “*Gasification biochar reactivity toward methane cracking*”

Timothy Sharobem – PhD 2015 “*Mitigation of High Temperature Corrosion in Waste-to-Energy Power Plants*”

Francesco Patuzzi – PhD 2014 (co-advised with Prof. Baratieri) “*Modeling and experimental characterization of biomass thermal treatment: torrefaction and pyrolysis applied to wetland and grass biomasses*”

Garrett Fitzgerald – PhD October 2013

“Multiscale analysis of CH₄ gas hydrate formation and dissociation via point source thermal stimulation and CO₂ exchange”

Naomi Klinghoffer – PhD April 2013

“Utilization of char from biomass gasification in catalytic applications”

Amanda Simson – PhD September 2012

“Steam reforming of ethanol/gasoline mixtures: Deactivation, regeneration and stable performance”

McKenzie P. Kohn – PhD April 2012

“Catalytic Reforming of Biogas for Syngas Production”

Masato Nakamura – PhD December 2007 (co-advisor with Themelis)

“Mathematical and Physical Modeling of Mixing and Flow Phenomena of Municipal Solid Waste Particles on a Reverse Acting Grate”

Scott Kaufman – PhD June 2008 (co-advisor with Themelis)

“A New Metric to Measure the Sustainability of Municipal Solid Waste Management”

Eilhann Kwon – PhD June 2008

“An Investigation into the Combustion and Pyrolysis of Waste Tires and an Analysis of Air Pollution Formation Mechanisms”

Yue (Forrest) Zhou – PhD December 2008

“An investigation into gas production from methane hydrate via down-hole combustion”

Shang-Hsiu Lee - PhD Spring 2009 (co-advisor with Themelis)

“High-Temperature Corrosion Phenomena in Waste-to-Energy Boilers”

Lucas Dorazio – DES Fall 2009

“Stability and Deactivation Regimes of a Trimetallic Platinum-Rhenium-Molybdenum Water Gas Shift Catalyst for On-Site Hydrogen Generation”

Federico Barrai – PhD Spring 2010

“The Interaction between Transport Processes and Chemical Kinetics in Selective Catalytic Reactors”

MS Students Graduated

Alex Whitworth – MS June 2005

Kimberly Llewellyn – MS June 2006

Tracy Jackson – MS June 2006

Noah Whitworth – MS June 2007

Federico Barrai – MS June 2007, PhD 2010

Amanda Simson – MS June 2008

Nora McLaughlin – MS June 2009

McKenzie Primerano – MS October 2009

Jechan Lee – MS February 2010

Naomi Klinghoffer – MS October 2010

Aaron (Alex) Frank – MS 2012

Jacky Ho – MS 2013

Nour Awad – MS 2014

Liubov Melnikova – MS 2014

Giacomo Rossetti – MS 2014

Abdurahman Ajumobi – MS 2015

Michael Pimentel-Lugo Title – MS 2016

Post-Doctoral Researchers

Tim Sharobem – June 2015 – May 2017

Simona Ciuta – February 2013 – September 2015
Naomi Klinghoffer – May 2013 – September 2014
McKenzie Kohn – May 2012 – May 2013
Bjorn Brandt – November 2010 – April 2011
Philipp Gruene – November 2009 – August 2010
Eilhann Kwon - June 2008 – August 2010
Maik Eichelbaum - June 2008 – June 2010
Heidi Butterman – Research Staff (August 2006 – June 2010)
Nancy Landau – Research Associate (June 2005 – August 2007)

Visiting Scholars

Professor Juray DeWilde - Université Catholique de Louvain (2015 – 2016)
Professor Ange Nzihou – Ecole des Mines, France (continuous from 2008)
Professor Jin Yuqi – Zhejiang University (July 2010 – January 2011)
Professor Junhu Zhou – Zhejiang University (February 2007 – May 2007)
Professor Zhixiao Zhang – Hangzhou University (September 2008 – June 2009)
Professor John Dooher – Adelphi University (September 2008 – December 2008)