AHMED F. GHONIEM

Robert C. Crane Professor of Mechanical Engineering
Director, Center for Energy and Propulsion Research
Director, Reacting Gas Dynamics Laboratory
Massachusetts Institute of Technology

Address: 77 Mass. Ave, Rm 3-344, Cambridge, MA 02139
Telephone: 1-617-253-2295,   Fax: 1-617-253-5981
Cell Phone: 1-617-513-3504   Email: ghoniem@mit.edu
Web: http://web.mit.edu/rgd/www/ | http://meche.mit.edu/people/index.html?id=28

PROFESSIONAL AND ACADEMIC INTERESTS

1. Energy Conversion science and engineering, including combustion, thermochemical and electro-thermochemical processes and their integration, including biofuels and solar fuels.
2. High-performance computing, science discovery, computational mathematics, application to turbulence, combustion, dense multiphase flow, supercritical flow and electrochemistry.
3. Carbon-capture research, including gasification and reforming, oxy-combustion, ITM and chemical looping processes and reactors. CO_2 reuse.
4. Renewable energy sources and conversion including biomass to gas and solids via thermochemical pathways, hybrid CSP, and solar reforming and fuels production.
5. Combustion fundamentals and modeling, dynamics and thermos-acoustic instability, noise, emissions and performance. Active control.
6. Electro-thermochemical processes and their simulations, solid oxide fuel cell and electrolysis, ITM reactors and oxygen carrier for redox processes.
7. Environmental footprint of energy production including CO_2 and water consumption.

WORK

Department of Mechanical Engineering, *Massachusetts Institute of Technology.*
        Professor, 1992, associate professor, 1986, assistant professor, 1983.
Lawrence Berkeley Laboratory, *University of California, Berkeley.*
        Research Scientist, November 80-July 83.
Department of Mechanical Engineering, *University of California, Berkeley.*
        Research/Teaching Assistant, January 77-March 80.
Mechanical Engineering Department, *Calgary University, Alberta, Canada.*
        Research/Teaching Assistant, September 75-September 76.
Mechanical Engineering Department, *Cairo University, Egypt.*
        Research/Teaching Assistant, October 73-September 75.

EDUCATION

Ph.D.   Mechanical Engineering, University of California, Berkeley, June 1980.
M.Sc.   Mechanical Engineering, Cairo University, Egypt, October 1975.

B.Sc.   Mechanical Engineering, Cairo University, Egypt, July 1973.

PROFESSIONAL SOCIETIES (current)

American Society of Mechanical Engineers, Fellow
American Physical Society, Fellow
The Combustion Institute, Fellow
American Institute of Aeronautics and Astronautics, Associate Fellow
Society of Automotive Engineers, member

HONORS

Fellow of the Combustion Institute, 2018
"Committed to Caring Professor" at MIT, 2016
Fellow of the American Physical Society (APS), 2016
AIAA Propellants and Combustion Award, 2016
ASME James Harry Potter Gold Medal, 2015
KAUST Investigator Award, 2008-2015.
Robert C. Crane Professor, MIT, since 2006
Fellow of American Society of Mechanical Engineers (ASME)
Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA)
Society of Automotive Engineering, Ralph R. Teetor Educational Award
Edgerton Professorship, Massachusetts Institute of Technology
Certificate of Recognition, NASA
Research Initiation Award, National Science Foundation
Pi Tau Sigma Award, Excellent Teaching, U. of California, Berkeley
Egyptian Ministry of Higher Education Scholarship for five years

SPONSORED RESEARCH AWARDS

1. NASA Lewis Research Center, 1980–1983
    Numerical Modeling of Turbulent Combustion.
2. National Science Foundation, 1984–1986
    Stable and Transient Behavior of Turbulent Premixed Flames.
3. Air Force Office of Scientific Research, 1984-1992
    Simulation of Turbulent Flames Using Vortex Dynamics.
4. Air Force Office of Scientific Research, 1984-1985
    Vector Computing in Turbulent Combustion.
5. Sloan Basic Research Grant, 1984-1985
    Vector Computing in Turbulent Combustion.
6. Department of Energy, 1985-1990
    Investigation of Turbulent Flame Propagation and Lean Engine Efficiency.
7. M.I.T. Edgerton Development Fund, 1985-1987
    Unrestricted fund.
8. National Science Foundation, 1987-1990
    Turbulence-Combustion Interactions in Diffusion Flames.
9. Ford Motor Co, 1988

Application of the Transport Element Method to Engine Combustion.
10. <u>Ford Motor Co.</u> 1990-1994
Numerical Simulation of Engine Intake Flow.
11. <u>G.I.E. PSA-Renault</u>, 1989-1990
Modeling of Flame Propagation in Closed Ducts.
12. <u>National Institute of Standards and Technology</u>, 1990-1993
Numerical Simulation of Dispersion and Deposition of Smoke Plumes.
13. <u>Northwest Fuel Development</u>, 1992-1993
Ultra-Lean Combustion in Gas Turbine.
14. <u>Air Force Office of Scientific Research,</u> 1993-1995
Reaction Zone Models for Turbulent Combustion.
15. <u>Ford Motor Co</u>, 1994-1998
Computation of Turbulent Combustion in Engines.
16. <u>Egyptian Government</u>, 1993-1997
Adaptive Control of Combustion.
17. <u>National Institute of Standards and Technology</u>, 1993-1996
Development of a Computational Model for Large Fire Plumes.
18. <u>Gas Research</u> Institute, 1994-1998
Simulations in Gas Fueled Internal Combustion Engines.
19. <u>General Electric</u>, 1995-1999
Simulation of Turbulent Combustion in High Performance, Low NO_X Engines.
20. <u>Sandia National Laboratory</u>, 1996-1999
Lagrangian Simulation of Radiative Heat Transfer in Large Fires.
21. <u>Department of</u> Energy, 1998–2000
Flame Embedding Techniques for LES of Turbulent Combustion.
22. <u>National Science Foundation</u>, 1998–2002
Active Control of Combustion
23. <u>Office of Naval Research</u>, 1999-2002
Optimal Active Control Strategies for Liquid-Fueled Combustion
24. <u>Department of Energy</u>, 2000–2003
Lagrangian Simulation of Combustion
25. <u>Air Force Office of Scientific Research</u>, 2000–2001
Reduced Order Modeling of Combustion Dynamics
26. <u>Army Research Office</u>, 2001
Equipment Grant, Control of Distributed, Thermal-fluid Processes.
27. <u>Office of Naval Research</u>, 2002-2004
Active Control of Liquid Fueled Combustion
28. <u>SOE Curriculum Development Grant</u>, 2002
Fundamentals of Advanced Energy Conversion
29. <u>Department of Energy, Office of Science</u>, 2003–2007
Lagrangian Simulation of Combustion
30. <u>Office of Naval Research</u>, 2005-2009
Optimal Combustion of Energetic Fuels
31. <u>Department of Energy, University Turbine Systems Research</u>, 2005-2008
Fundamental Studies in Syngas Premixed Combustion Dynamics,
32. <u>Ford Motor Company</u>, 2005-2007
Advance Control Techniques for Complex Engine Technology
33. <u>Office of Naval Research</u>, 2005-2007
Advanced Simulation Methodology for Mixing of Complex Fluids
34. <u>Bosch RTC</u>, 2006-2009
Physics-based Flame Dynamics Modeling & Development of Stability Analysis Tools

35. British Petroleum, 2007-2012
Conversion of High-Carbon/Low-Value Feedstock into Fuel and Electricity: Modeling and Simulations of Mixed Feedstock Gasification and Biomass Torrefaction.
36. Ford Motor Company, 2007-2009
Active Control of After-treatment Systems.
37. ENEL, 2007-2012
Center for Clean Energy Technology: Oxy-coal combustion for carbon Capture, Systems analysis and Optimization and Combustion Simulations.
38. MASDAR Institute Energy Program, 2007-2010
Renewable Energy and Renewable Fuels from Waste; thermochemical Pathways and gasification modeling.
39. KAUST Global Research Partnership, Investigator Award, 2008-2015 ($10M)
Advanced Energy Conversion Systems Laboratory. Research on Clean Combustion, Dynamics, kinetics and Diagnostics. Carbon Capture using Oxy-combustion, membranes and Hydrogen. Advanced Simulations including uncertainty, and high temperature fuel cells.
40. ENEL, 2008-2010
Integrated Technologies for Renewable Energy Generation in Developing Countries: PV-CSP systems
41. Center of Clean Energy and Clean Water @ MIT and KFUPM, 2008-2014
Oxy-combustion of Natural Gas: ITM Reactor for Carbon capture, thermochemistry, system's analysis and materials
42. Air Force Office of Scientific Research, 2009
Physics-based Control Technologies for Augmentor Screech Suppression, PI.
43. Saudi ARAMCO, 2009-2014
Whole Crude Desulfurization using Supercritical Water Treatment: phase separation, chemistry and high-pressure phenomena
44. BP, 2010-2012
The Global Sustainability Project: The Energy-Water Nexus
45. Center of Clean Energy and Clean Water @ KFUPM and MIT, 2009-2015
Hybrid Concentrated Solar-Fossil Electric Power Generation: Solar Reforming, Thermochemistry and Clean Combustion, and System's Analysis. PI.
46. MASDAR Institute Energy Program, 2010-2013
CO_2 Capture using Chemical Looping Combustion (CLC), system's analysis and reactor modeling, PI.
47. Center of Clean Energy and Clean Water @ KFUPM and MIT, 2010-2012
Development of A School-wide Energy Curriculum, including courses of energy conversion fundamentals and PV systems, PI.
48. Low Carbon Energy University Alliance, 2011-2013
Electrochemical Conversion of De-ashed Coal in Solid Oxide Direct Conversion Fuel Cells, PI.
49. Shell, 2011-2013
High-temperature Membranes for CO_2 capture and Reuse, PI.
50. BP, 2012-2016
Multiscale Modeling of Biomass Conversion, PI.
51. Siemens, 2012-2015
Oxy-fuel Combustion of Sour Gas for EOR, PI.
52. Shell, 2012-2014
Hybrid concentrated solar system for co-generation in developing countries, PI.
53. Tata Center for Technology and Design, 2013-2016
Biomass Torrefaction, Reactor Design and Scaling, PI.
54. BP, 2013-2016
CO_2 Separation and Reduction using Ceria-based Thermochemical Cycles, PIU.

55. Department of Energy, NETL, 2014-2015 (unspent)
   Coal-CO_2 Slurry Feeding System for Pressurized Gasifiers, PI.
56. Saudi ARAMCO, 2014-2018
   Production of Chemicals from SCW Treatment of Crude or Refinery Streams. Co-PI.
57. SABIC, 2016-2017
   Scaling-up the Use of Ion Transport Membranes in Syngas Production and Oxidative
   Dehydrogenation of Ethane, PI..
58. DOE-NETL, 2016-2018
   Grid Independence and Uncertainty Quantification in Gas-Solid Flow Simulation, PI.
59. Exelon, 2016-2019
   Co-production of Hydrogen and Syngas using Electrolysis, membrane reactors and chemical
   looping processes, PI.
60. Tata Center for Technology and Design, 2017-2019
   Biomass Gasification for Nitrogen-free Syngas Production and Energy Storage, PI.
61. Tata Center for Technology and Design, 2017-2018
   Renewable Gas Production from Cavitation-assisted Biomass Anaerobic Digestion, PI.
62. SABIC, 2018-2019
   Design and Testing of a Novel Reactor for Combustion Pyrolysis of Methane, PI.
63. Shell, 2018-2020
   Oxidative Coupling of Methane using Ion-Transport Membranes, PI.
64. J-WAFS, 2018-2019
   Decentralized Biomass Torrefaction for Small-Scale Production of High-Yield, Irrigation-Saving
   Fertilizer, PI.
65. NASA/ FGC Plasma 2018-2019
   Plasma assisted active combustion control, PI.
66. Department of Energy/ FGC Plasma 2018-2019
   Plasma control of combustion instability, PI.
67. MISTIE Global Fund, 2019-2020
   Solar gasification of biomass and waste in a novel integrated system for renewable fuel production
   (SOLGASBI), PI.
68. MISTIE Global Fund, 2019-2020
   Decentralized biomass torrefaction for small scale high yield production, PI.
69. BP, 2019-2021
   MSW gasification: experimental characterization and reactor modeling, PI.
70. Pratt, 2019-2020
   Role of fluid dynamic models in Swirl stabilized combustion simulations, PI.
71. US Agency of International Development 2019-2020
   Center of Excellence in Energy Research and Entrepreneurship, PI.
72. Department of Energy/FGC Plasma, 2019-2020
   Large volume plasma generation for CO_2 processing, PI.
73. Department of Energy – Office of Science/FGC Plasma, 2019-2023
   Control of static and dynamic stability of lean combustion via plasma actuation, PI.
74. Center for Mech Eng. Research and Education at MIT and SUSTech, 2020-2023
   Efficient production of solar fuels via thermochemical H_2O/CO_2 co-reduction using redox
   cycles, PI.
75. MathWorks, 2020-2022
   Understanding and suppressing flammability in Li-ion batteries for safe electric vehicles,
   co-PI.
76. Skoltech, 2020-2022

Co-production of value-added chemicals and electricity via electrochemical oxidative coupling of methane, co-PI.

77. MIT-Portugal Partnership , 2021-2023
    Inverse design and Modeling of Plasma-Assisted CO_2-conversion Technologies (IMPACT), co-PI.
78. Department of Energy/ FGC Plasma 2021-2023
    Plasma control of combustion instability, PI.
79. MITie, 2021-2023
    Electrosynthesis of "Blue" Ammonia from Methane using Protonic Ceramic Electrolyzers, PI.

CONSULTING

1.   *Ain Shams University in Egypt,* 1984-1987, United States A.I.D.
2.   *Cairo University in Egypt,* 1983-1986, United States A.I.D.
3.   *Flow Industries Inc.*, Kent, Washington, 1987-1988.
4.   *R & D Associates,* Marina del Rey, California, 1987-1989.
5.   *Bolt-Beranek and Newmann,* Cambridge, Massachusetts, 1987.
6.   *Altex Corporation*, San Jose, California, 1987-1991.
7.   *The S.S.P.,* Battelle, for the U.S. Army Atmospheric Sciences Laboratory, 1988-1992.
8.   *Allison Gas Turbine Division General Motors Corporation*, 1989-1991.
9.   *Shell Oil Company,* Houston, TX, 1989.
10. U.S. Government, *N.I.S.T.,* Center for Fire Research, Washington, D.C., 1989.
11. *General Electric Corporation*, 1988-1993.
12. *Altex Corporation*, San Jose, California, 1981-1995.
13. *Northwest Fuel Development, Inc.*, Portland, Or, 1990-1991.
14. *Chm Michelson Institute*, Norway, 1991.
15. *AMTI*, Newton, MA, 1993.
16. *Hinton and Alfert Law Offices*, Walnut Creek, CA, 1994.
17. *United Technologies*, East Hartford, CT, 1995-98.
18. *Sandia National Laboratories*, Albuquerque, NM, 1995.
19. *Euppi*, Cairo, Egypt, 1997.
20. *United States Golf Association,* Far Hills N.J., 1999.
21. *Radian* Tech, 1998.
22. *United Technology Research Center,* East Hartford, CT, 1998-2001.
23. *Draper Laboratories*, Cambridge, MA, 2000, April-August, 2000.
24. *Delta Search laboratories*, Cambridge, MA, Member of the Board, 2000-.
25. *EXO New Energy,* The Netherlands, 2000-1.
26. *Fish and Anderson Law Offices,* Boston, MA, 2001.
27. *Delta Search lab,* senior scientist 2001-2004.
28. *United Technology Research Center*, 2003-2005.
29. *Mechanology, Inc*., 2004.
30. *Morrison and Mahoney*, LLC, 2005-2006.
31. Creare, 2007.
32. KAUST, Technical Advisory Committee 2007-2008.
33. TECOGEN, Inc., MA, member of the Board, 2009-.
34. Chair, IAB for KFUPM Center of Research Excellence in Renewable Energy, 2009-2012.
35. Ilios Dynamics, Inc., MA, member of the Board, 2010-2016.
36. VALE/VSE, member of the advisory committee, 2009.
37. Eurosite Inc., member of the board, 2010.
38. VALE/VEL, member of the Technical Advisory Committee, 2010-2012.

39.   ARAMCO Research and Development Center, CAC, 2011-2015.
40.   Babcock-Thermo Clean Combustion LLC, member of the Board, 2011.
41.   Unity Power Alliance, member of the Board, 2012.
42.   Alstom Power, 2014.
43.   UltraTek, consultant and member of the board, 2015-2017.

PROFESSIONAL ACTIVITIES

1.   Member of the Program Subcommittee of the 20th-34th Symposia (International) on Combustion.
2.   Member of the Department of Mechanical Engineering, M.I.T., Graduate Committee 1984-1986, Admission Committee, 1987-1992, Curriculum Committee, 1994.
3.   Reviewer of papers for Combustion and Flame, Journal of Computational Physics, Journal of Fluid Mechanics, Physics of Fluids, Combustion Science and Technology, AIAA Journals, ASME Journals, Progress in Energy and Combustion Science, Computers in Fluids, International Journal of Computational Methods in Fluids, SIAM Journals, SAE Transactions, International Journal of Computational Fluid Dynamics, and the Reacting Gas Dynamics Colloquia 1985-1991. Reviewer of proposals for the National Science Foundation, Department of Energy, Department of Defense, and Department of Commerce.
4.   Invited lecturer and member of panels discussing current research and development in computational fluid dynamics and turbulent reacting flow in conferences and workshops sponsored by NSF, NASA, DOE, DOD, AIAA, ASME, AMS, APS, ARO, Sandia and Los Alamos Laboratories and other institutions in the U.S., Soviet Union, Japan and Europe.
5.   Member of the interdisciplinary group for the establishment of the M.I.T. Program on Environmental Engineering Education and Research, 1991-1992.
6.   Organized and taught an AIAA professional course on Computational Methods in Combustion; Gas Turbines, Ramjets and Scramjets, 1990, 1993 and 1995.   Organized the Propellant and Combustion Sessions (12 sessions) for the 1987 and 1991 AIAA/SAE/ASME/ASEE Joint Propulsion Conferences. Organized sessions of Computational Combustion for the AIAA Aerospace Sciences Meetings 1984-1991. Member of the AIAA Technical Committee on Propellant and Combustion since 1984. Chairman of the AIAA Standard committee on Propellant and Combustion.
7.   Visiting professor, Nagoya University, and Institute of Computational Fluid Dynamics, Tokyo, Japan, April 1990.
8.   Visiting professor, Lawrence Berkeley Laboratory, University of California, Berkeley, CA, 1990.
9.   Member of the National Research Council Committee, Research Directions in Computational Mechanics, 1990-1991.
10. Chairman, *ad hoc* committees on faculty promotion, Mechanical Engineering, M.I.T., 1991.
11. Chairman, Faculty Search and Promotion Committees, 1990-1995.
12. Associate Editor, ASME Journal of Fluids Engineering. 1992-1996.
13. Member of DoE Panel to review funded research on combustion. 1993.
14. Member, Peer Review Panel, NCSA and the Pittsburgh Supercomputer Center. 1993-1996
15. Member of the Committee on Undergraduate Program, (CUP). 1995-1998.
16. Member, User's Advisory Board for the National Computer Science Alliance, NSF, 1999-.
17. Head, Thermal fluids Sciences Division, MIT Mechanical Engineering, 1996 - 2001.
18. Distinguished Visiting Professor, American University in Cairo. Spring 1997.
19. Chair. Committee on Curricula, MIT, 2000-2002-.
20. Member of NERSC, National Energy Research Supercomputing Center Advisory group 2000-2003.
21. Member of Pittsburgh Supercomputer Center Advisory Board 2000-.
22. Member of the MIT Faculty Policy Committee, 2002-2005.
23. Chaired the School of Engineering ME-OE Merger Planning Committee, 2005.
24. Chaired the Energy Search Committee, 2005-6.

25. Chaired the MIT Committee to review Engineering Systems Division, 2005-2007.
26. Head, Energy Science and Engineering Division, ME, 2005-2010.
27. Co-director, then Director of the Center for 21st Century Energy, ME, 2005-2010.
28. Chairman, organizing committee of the Keenan Symposium "Meeting the Entropy Challenge" 2007.
29. Member, Technical Advisory Committee, KAUST, 2007.
30. Member of the Energy Education Task Force, part of the MIT Energy Initiative, 2008-2013.
31. Chaired the MIT MASDAR Institute effort on establishing an Energy Program.
32. Member of the MIT Middle East Studies Working Group, 2008-10.
33. Member of the MIT Task Force on Promotion and Tenure, 2009.
34. Member of the ME Graduate Program Review Committee, 2009-2010.
35. Scientific Director, Cariplo Faculty Exchange Program 2008-2013.
36. Member of the IAB for Oxford Center for Collaborative Applied Mathematics 2008-2013.
37. Mentored six junior faculty in the Department, 2010.
38. Member of the Editorial Board, J. of Applied Mathematics and Computational Science, 2010-
39. Member of the NSE Department Strategic Review Committee 2010.
40. Member of the ME/OE Merger Review Committee 2010.
41. Chair of the Center of Research Excellence in Renewable Energy at KFUPM, 2009-2012.
42. Founding Executive director, Center for Energy and Propulsion Research, 2010.
43. Chair of the Center Advisory Committee of the ARAMCO Research and Development Center 2011-
44. Member, Strategic Planning Committee, ME, 2011.
45. Member, ME Faculty Awards Committee, 2011-2013.
46. Member, Ocean Engineering faculty Search Committee, ME, 2012.
47. Member of the Mechanical Eng. Council, Spring 2012.
48. Visiting Professor, KAUST, Spring 2013.
49. Member of Executive Committee, MIT-KFUPM Center for Clean Energy and Clean Water, 2008-.
50. Energy Faculty search committee, 2013-2014
51. ETH, Evaluation Board, 2013.
52. Co-chair of the Graduate Qualifying Exam, 2014.
53. Environmental Solutions Initiative at MIT, 2015, member of the advisory board.
54. MIT-AFRICA Advisory Committee.
55. Thermal Science Faculty Search, 2016-2017.
56. MITie Energy Faculty Search Committee, 2018-19
57. Director and PI, Center of Excellence in Energy, 2019-2020.
58. Mechanical Engineering/College of Computing Faculty Search, 2020-2021.

PATENTS and DISCLOSURES

1. SWIRL-COUNTER-SWIRL MICROJETS FOR THERMOACOUSTIC INSTABILITY SUPPRESSION. Ahmed F. Ghoniem, Santosh Janardhan Shanbhogue, Zachary Alexander LaBry, and Raymond l. Speth, Patent No.: US 8,708,696 B2. Approval Jan 2014.
2. INTEGRATED POLYMERIC-CERAMIC MEMBRANE BASED OXY-FUEL COMBUSTOR. M. A. Habib, K. Mezghani, R. Ben-Mansour, A. F. Ghoniem, Y. Shao-Horn and A. Mitsos, US Patent number 9,004,909. Published 4/14/2015.
3. NOX REDUCTION WITHOUT UREA USING A DUAL STAGE CATALYST SYSTEM WITH INTERCOOLING IN VEHICLE GASOLINE ENGINES. Ahmed F Ghoniem and Jean Roy, US Patent 10,774,720, granted on 9/15/2020.
4. DUAL STAGE INTERNAL COMBUSTION ENGINE AFTERTREATMENT SYSTEM USING EXHUAST GAS INTERCOOLING AND CHARGE-DRIVEN EJECTOR. Ahmed F. Ghoniem, Robert Panora, Jean Roy and Joseph Gehret. US Patent number 10,774,724, granted on Sept 15, 2020.

5.   DEHUMIDIFICATION AND COOLING USING WATER AND ENERGY RECUPERATION. Omar Labban, Tianyi Chen, John H. Lienhard, Leslie K. Norford, and Ahmed F. Ghoniem. US provisional patent application No 62/502,899.
6.   ASSEMBLIES AND METHODS FOR REDUCING PARTICUALTE MATTER, HYDROCARBONS AND GASEOUS OXIDES FROM INTERNAL COMBUSTION ENGINE EXHAUST. Ahmed F. Ghoniem, Jean Roy and Joseph Gehret. Patent Application US 2019/0234282 A1, Pub Date Aug. 1, 2019.
7.   BIOMASS CONVERSION REACTORS AND ASSOCIATED SYSTEMS AND METHODS. Kevin Kung, Santosh Shanbhogue, Alex Slocum, Robert Stoner and Ahmed F Ghoniem. U.S. Patent Application No. US2018/033007, May 16, 2018.
8.   DUAL STAGE INTERNAL COMBUSTION ENGINE AFTERTREATMENT SYSTEM USING COMMON RADIATOR COOLING FLUID CIRCUIT FOR EXHAUST INTECOOLONG AND CHARGE DRIVEN EJECTOR. Ahmed F Ghoneim, US Patent Application 15/658,998.
9.   METHOD FOR IN-SITU EXSOLUTION OF SELECTIVE CATALYSTS FROM PEROVKITE OXIDES USED FOR THE PRODUCTION OF ADDED-VALUE CHEMICALS WITHIN ION TRANSPORT MEMBRANE REACTORS. Georgios Dimitrakopoulos, Bilge Yildiz and Ahmed Ghoniem. MIT Tec Disclosure case 21137.
10.   METHANE UPGRADE TO ETHANE AND ETHYLENE WITHIN CERAMIC MEMBRANE REACTORS, by Georgios Theodoros. Dimitrakopolos, Ahmed F. Ghoniem and Bilge Yildiz, MIT Tech disclosure case 22915, patent application num 17/243,219
11.   RADIATIVELY RECUPERATED REACTOR SYSTEM FOR TEMPERATURE SWING CHEMICAL LOOPING FULE PRODUCTION PROCESSES, Aniket Patakar, Xioayu Wu, Wonjae Choi, Harry Tuller and Ahmed Ghoniem, MIT-22359-PR. Application serial num 63229946.
12.   COMBINED CYCLE POWER SYSTEM, A. Henry, AF Ghoniem, M Bichnevicius, M Pishahang and S Haile, US Patent App 17/192.160.

JOURNAL PUBLICATIONS

1.   Kamel, M. M., Ghoniem, A. F., Rashed, M. I., and Oppenheim, A.K., Blast waves in real gases, *Acta Astronautica*, 4, pp. 439-458, 1977.
2.   Ghoniem, A.F., Chorin, A. J., and Oppenheim, A. K., Numerical modeling of turbulent combustion in premixed gases, *18th Symposium (International) on Combustion, The Combustion Institute, Pittsburgh, PA*, pp. 1375-1383, 1981.
3.   Keller, J. O., Vaneveld, L., Krochlet, D., Hubbard, G. L., Ghoniem, A. F., Daily, J. W., and Oppenheim, A. K., Mechanisms of instabilities leading to flash back, *AIAA Journal*, 20, pp. 254-262, 1982.
4.   Ghoniem, A. F., Kamel, M. M., Berger, S. I., and Oppenheim, A. K., Self-similar blast waves with internal heat transfer, *Journal of Fluid Mech.*, 117, pp. 463-491, 1982.
5.   Ghoniem, A. F., Chorin, A. J., and Oppenheim, A. K., Numerical modeling of turbulent flow in a combustion tunnel, *Phil. Trans. Roy. Soc. London*, A304, pp. 303-325, 1982.
6.   Ghoniem, A. F. and Oppenheim, A. K., Numerical solution of the problem of flame propagation by the use of the random element method, *AIAA Journal*, 22, pp. 1429-1435, 1984.
7.   Hsaio, C. C., Ghoniem, A. F., Chorin, A. J., and Oppenheim, A. K., Numerical simulation of a turbulent flame stabilized behind a rearward-facing step, *The 20th Symposium (International) on Combustion,* The Combustion Institute, Pittsburgh, PA, pp. 494-504, 1985.
8.   Ghoniem, A. F. and Sherman, F. S., Grid-free simulation of diffusion using random walk, *J. Comput. Phys.*, 61, pp. 1-37, 1985.

9.	Ghoniem, A. F., Chen, D. Y., and Oppenheim, A. K., Formation and inflammation of a turbulent jet, *AIAA Journal*, 24, pp. 224-229, 1986.

10.	Ghoniem, A. F., Effect of large scale structures on turbulent flame propagation, *Combust. Flame*, 64, pp. 321-336, 1986.

11.	Ghoniem, A.F., and Knio, O.M., Numerical simulation of flame propagation in constant volume chambers, *the 21st Symposium (International) on Combustion*, the Combustion Institute, Pittsburgh, PA, 1986, pp. 1313-1320.

12.	Ghoniem, A. F. and Gagnon, Y., Vortex simulation of laminar recirculating flow, *J. Computational Phys.*, 68, pp. 346-377, 1987.

13.	Ghoniem, A. F. and Sethian, J. A., Dynamics and structure of recirculating flow, *AIAA Journal,* 25, pp. 168-171, 1987.

14.	Ghoniem A. F., and Ng, K. K., Numerical study of the dynamics of a forced shear layer, *Physics Fluids*, 30, pp. 706-721, 1987.

15.	Sethian, J. A., and Ghoniem, A. F., Validation of the vortex method, *J. Computational Phys*, 74, pp. 283-317, 1988.

16.	Ghoniem, A.F. and Krishnan, A., Origin and manifestation of flow-combustion interactions in a premixed shear layer, *The 22nd Symposium (International) on Combustion*, the Combustion Institute, Pittsburgh, PA, 1988, pp. 665-675.

17.	Ghoniem, A.F., Heidarinejad, G. and Krishnan, A., Numerical simulation of a thermally stratified shear layer using the vortex element method, *J. Computational Phys*, 79, pp. 135-166, 1988.

18.	Ghoniem, A.F., and Givi, P., Lagrangian simulation of a reacting shear layer at low heat release, *AIAA Journal,* 26, pp. 690-697. 1988.

19.	Ghoniem, A.F., Knio, O.M., and Krishnan, A., Lagrangian simulation of the early stages in a reacting jet, *the 23rd Symposium (International) on Combustion*, The Combustion Institute, Pittsburgh, PA, pp. 699-705, 1990.

20.	Knio, O.M. and Ghoniem, A.F., Numerical study of a three-dimensional vortex method, *J. Comput. Phys.*, 86, pp. 75-106 (1990).

21.	Ghoniem, A. F. and Heidarinejad, G., Effect of Two-Dimensional Shear Layer Dynamics on Mixing and Combustion at Low Heat Release, *Combust. Sci. and Tech.*, Vol. 72, pp. 79-99, March 1990.

22.	Ghoniem, A.F., and Heidarinejad, G., Effect of Damkohler number on the reaction zone in a reacting shear layer, *Combust. Flame*, 83, pp. 1-17, 1991.

23.	Najm, H. and Ghoniem, A.F., "Vortex simulation of the convective instability in a dump, *AIAA Journal,* 29, 6, pp. 911-919, 1991.

24.	Knio, O.M. and Ghoniem, A.F., Three-dimensional vortex simulation of roll-up and entrainment in a shear layer, *J. Computational Phys.*, 97, pp. 172-223, Nov. 1991.

25.	Martins, L.-F. and Ghoniem, A.F., Vortex simulation of the intake flow in a planar piston-chamber device, *Int. J. for Num. Meth. in Fluids*, 12, pp. 237-260, 1991.

26.	Ghoniem, A.F., Soteriou, M.C. and Knio, O.M. Effect of steady and periodic strain on unsteady flamelet combustion, Proceedings of the *24th Symposium (International) on Combustion*, July 5-10, 1992, the Combustion Institute, Pittsburgh, PA, 1992, pp. 223-230.

27.	Knio, O.M., and Ghoniem, The three-dimensional structure of periodic vorticity layers under non-symmetric conditions, *J. Fluid Mech.*, Vol. 243, pp. 353-392, Nov 1992.

28.	Krishnan, A. and Ghoniem, A.F., Simulation of the roll-up and mixing in Rayleigh-Taylor flow using the vortex/transport element method, *J. Computational Phys.*, 99, 1992, pp. 1-27.

29.	Ghoniem, A.F. and Martins, L.-F., Effect of the velocity ratio on the wake flow behind an axisymmetric bluff-body, *AIAA Journal*, 30, No 8, August 92, pp. 2166-2168.

30.	Knio, O.M. and Ghoniem, A.F., Vortex Simulation of a Three-Dimensional Reacting Shear Layer with Infinite-Rate Kinetics, *AIAA Journal*, 30, pp. 474-484, January 1992.

31. Ghoniem, A.F., Zhang, X.M., Knio, O.M., Baum, H.R. and Rehm, R.G., Dispersion and deposition of dense smoke plumes resulting from massive fires, *J. Hazardous Materials*, 1992, 33, 275-293 (1993).
32. Martins, L.-F., and Ghoniem, A.F., Numerical simulation of the non-reacting flow in a bluff-body burner; effect of the diameter ratio, *ASME, J. Fluid Eng*., 115, pp.474-484, 1993.
33. Zhang, X.M. and Ghoniem, A.F., A computational model for the rise and dispersion of wind-blown, buoyancy-driven plume, Part I: Neutrally stratified atmosphere, *Atmospheric Environment,* **27A**, 15, pp. 2295-2311 (1993).
34. Najm, H., and Ghoniem, A.F., Modeling pulsating combustion due to the flow-flame interactions in vortex stabilized pre-mixed flames, *Combust Sci. Tech,* 1993, 94, 259-178, 1993.
35. Zhang, X.M. and Ghoniem, A.F., A computational model for the rise and dispersion of wind-blown, buoyancy-driven plumes, Part II: Linearly stratified atmosphere, *Atmospheric Environment,* Vol. 28, No. 18, pp. 3005-3018, 1994.
36. Zhang, X.M. and Ghoniem, A.F., A computational model for the rise and dispersion of wind-blown, buoyancy-driven plumes, Part III: Inversion Layer, *Atmospheric Environment,* Vol. 28, No. 18, pp. 3019-3032, 1994.
37. Najm, H. and Ghoniem, A.F., Coupling between vorticity and pressure oscillations in combustion instability, AIAA *J. Propulsion and Power*, Vol. 10, No. 6, pp. 769-772, Nov.-Dec. 1994.
38. Soteriou, M.C. and Ghoniem, A.F., Vorticity dynamics of an exothermic spatially developing, forced, reacting shear layer, Proceedings of the *25th Symposium (International) on Combustion*, The Combustion Institute, pp. 1265-1272, 1995.
39. Petrov, C. and Ghoniem, A.F., The Transient response of strained laminar-premixed flames, *Combust. Flame*, 102: 401-417 (1995).
40. Soteriou, M.C. and Ghoniem, A.F., On the application of the infinite reaction rate model in the simulation of the dynamics of exothermic mixing layers, *Combust. Sci. and Tech*., Vol. 105, pp. 377-397, 1995.
41. Annaswamy, A. and Ghoniem, A.F., Active Control in Combustion Systems, *IEEE Control Systems Magazine*, Issue on Emerging Technology, pp. 49-63, December 1995.
42. Soteriou, M. and Ghoniem, A.F., Effects of the free-stream density ratio on free and forced spatially-developing shear layers, *Phys. Fluids,* 7, 2036-2050 (1995). http://dx.doi.org/ 10.1063/1.868451
43. Ghoniem, A.F., Lakkis, I. and Soteriou, M., Numerical simulation of the dynamics of large fire plumes and the phenomenon of puffing, the *Twenty-sixth Symposium (International) on Combustion*, The Combustion Institute, Pittsburgh, pp. 1531-1540, 1996.
44. Knio, O.M. Shi, X. and Ghoniem, A.F., Lagrangian simulation of a thin non-premixed flame in the field of an asymmetric layer, *Combust. Flame*, 106: 41-61, 1996.
45. Fleifil, M., Annaswamy, A.M., Ghoniem, Z.A. and Ghoniem, A.F., Response of a laminar premixed flame to flow oscillations: a kinematic model and thermo-acoustic instability results, *Combust. Flame*, 106: 487-510 (1996).
46. Gharakhani, A. and Ghoniem, A.F., BEM solution of the 3-D internal Newmann problem and a regularized formulation for the potential velocity gradients, *International J. for Numerical Methods in Fluids,* 24, 81-100 (1997).
47. Annaswamy, A.M., Fleifil, M., Hathout, J.P. and Ghoniem, A.F., Impact of linear coupling on the design of active controllers for the thermo-acoustic instability *Combust. Sci. Tech*., Vol. 128: p. 130-180 (1997). http://dx.doi.org/10.1080/00102209708935707
48. Gharakhani, A. and Ghoniem, A.F., Three-dimensional vortex simulations of time dependent incompressible internal viscous flows, *J. Comput. Phys*., Vol. 134, No. 1, pp. 75-95, 1997.
49. Petrov, C. and Ghoniem, A.F., An uniform strain model of elemental flame for turbulent combustion simulation *Combust. Flame*, 111:47-64 (1997).
99. Petrov, C. and Ghoniem, A.F., Dynamics and structure of interacting diffusion flames, *Combust. Flame*, 115:180-194 (1998).

100. Gharakhani, A. and Ghoniem, A.F., 3D vortex simulation of intake flow in an off centered port and cylinder with a moving piston, *ASME J. Fluids Eng.*, 120:319-326 (1998).
101. Fleifil, M., Annaswamy, A.M., Hathaout, J.P., and Ghoniem, A.F., "The Origin of secondary peaks with active control of thermo-acoustic instability," *Combust. Sci. Tech.,* 133, 4-6, 227-265, 1998. http://dx.doi.org/10.1080/00102209808952036
102. Annaswamy, A.M., El-Rifai, O.M., Fleifil, M., Hathout, J.P. and Ghoniem, A.F., A model-based, self-tuning controller for thermo-acoustic instability, *Combust. Sci. Tech*, 135, 1-6, 213-240, 1998. http://dx.doi.org/10.1080/00102209808924158
103. Soteriou, M., and Ghoniem, A.F., On the effect of the Inlet boundary condition on the mixing and burning in reacting shear layers, *Combust. Flame*, 112:4040-417 (1998).
104. Hathout, J.P., Annaswamy, A.M., Fleifil, M. and Ghoniem, A.F., A Model-based active control design for thermoacoustic Instability, *Combust. Sci. Tech.,* 132, 1-6, pp. 99-138, 1998. http://dx.doi.org/10.1080/00102209808952012
105. Marzouk, Y.M., Ghoniem, A.F. and Najm, H.N., Dynamic response of strained premixed flames to equivalence ratio gradients, *Proceedings of the Combustion Institute*, Vol. 28, 2000, 1859-1866, the Combustion Institute, Pittsburgh, PA.
106. Hathout, J.P., Fleifel, M., Annaswamy, A.M. and Ghoniem, A.F, Heat-release actuation for control of mixture inhomogeneity driven combustion instability, *Proceedings of the Combustion Institute*, Vol. 21, 2000, 721-730, the Combustion Institute, Pittsburgh, PA.
107. Hathout, J.P., Fleifil, M., Annaswamy, A.M. and Ghoniem, A.F. "he role of actuation in combustion control, *Combust. Sci. Tech*, 167, 2001, pp. 1-26. http://dx.doi.org/10.1080/00102200108952177
108. Hathout, J.P., Fleifil, M. Annaswamy, A.M. and Ghoniem, A.F, Modeling and control of combustion instability using fuel injection, *AIAA J. of Propulsion and Power*, 18, 2, 2002, 390-399.
109. Prasanth, R., Annaswamy, A., Hathout, J.P., and Ghoniem, A.F., "When do open loop strategies for combustion control work, AIAA J Propulsion and Power, 18, 3, 2002, pp. 658-668.
110. Park, S, Annaswamy, A., and Ghoniem, A.F., Heat release dynamics modeling for combustion instability analysis in a kinetically controlled burning, *Combustion and Flame*, 128: 217-231 (2002).
111. Annaswamy A.M. and Ghoniem, A.F., Active control of combustion instability: theory and practice. IEEE Control Systems Magazine, Vol. 22, No. 6, pp. 37-54, Dec 2002.
112. Hathout, J.P., Fleifil, M., Annaswamy, A.M., and Ghoniem, A.F., Combustion instability and active control using periodic fuel injection, *AIAA J Propulsion and Power*, 18, 2, 390 -399, 2002.
113. Ghoniem, A.F., Annaswamy, A., Wee, D., Yi, T., and Park, S., Shear flow driven combustion instability; evidence, simulation and modeling. *Proceedings of the Combustion Institute*, Vol. 29, 2002, pp. 53-60.
114. Marzouk, Y.M. Ghoniem, A.F., and Najm, H.N., Towards a flame embedding model for turbulent combustion simulation, *AIAA Journal*, Vol. 41, No 4, April 2003, pp. 641-652.
115. Lakkis, I. and Ghoniem, A.F., Axisymmetric vortex method for low-Mach number, diffusion-controlled combustion, *J. Computational Phys*., Vol. 184: 435-475, 2003.
116. Wee, D.H., Yi, Y., Annaswamy, A. and Ghoniem, A.F., Self-sustained oscillations and vortex shedding in backward-facing step flows: simulation and linear instability analysis. *Phys. Fluids,* 16, pp. 3361-3373, 2004.
117. Ghoniem, A.F., Park, S., Wachsman, A., Annaswamy, A. Wee, D. and Altay, M., Mechanism of combustion dynamics in a backward-facing step stabilized premixed flame, *Proceedings of the Combustion Institute*, Vol. 30, 2004, 1783-1790.
118. Ghoniem, A.F., Annaswamy, A., Park, S., and Sobhani, Z., Stability and emissions control using air injection and H2 addition in premixed combustion. *Proceedings of the Combustion Institute*, Vol. 30, 2004, p. 1765-1774.

119. Marzouk, Y.M., and Ghoniem, A.F., K-mean clustering for partition and dynamic load balance of parallel hierarchical n-body simulations. *J. Computational Phys*ics, Vol. 207, 2005, 493-528. http://dx.doi.org/j.jcp.2005.01.021

120. Wee, D.H., and Ghoniem, A.F., Modified interpolation kernels and treating diffusion and remeshing in vortex methods. *J. Computational Physics,* 213, 2006, pp. 239-263. http://dx.doi.org/j.jcp.2005.08.009

121. Marzouk, Y.M. and Ghoniem, A.F., Vorticity structure and evolution in a transverse jet. *J. Fluid Mech.,* 575:267-305, 2007. http://dx.doi.org/10.1017/S0022112006004411

122. Schlegel, F., Wee, D.H, and Ghoniem, A.F., A fast 3d particle method for simulations of buoyant flows. *J. Computational Physics*, 227, 21, 2008, pp. 9063-9090. http://dx.doi.org/10.1016/j.jcp.2008.03.039

123. Altay, H.M., Park, S., Wee, D, Annaswamy, A., and Ghoniem, A.F, Modeling of the dynamic response of a burner-stabilized flame. *Proceedings of the Combustion Institute*, 32 (2009) 1359-1366, Elsevier Pubs. http://dx.doi.org/10.1016/j.proci.2008.06.099

124. Lakkis, I., and Ghoniem, A.F., A high-resolution spatially adaptive vortex method for separating flows, Part I: two-dimensional domains. *J. Computational Physics*, 228, 2, 2009, pp. 491-515. http://dx.doi.org/10.1016/j.jcp.2008.09.025

125. Speth, R.L and Ghoniem, A.F., Using a strained flame model to collapse model data in a swirl stabilized syngas combustor. *Proceedings of the Combustion Institute*, 32 (2009) 2993-3000. http://dx.doi.org/10.1016/j.proci.2008.05.072

126. Lee, Won Yong, Wee, D.H., and Ghoniem, A.F. An improved one-dimensional membrane electrode assembly model to predict the performance of solid oxide fuel cells including the limiting current density, *Journal of Power Sources*, 186, 2009, pp. 417-427. http://dx.doi.org/10.1016/j.jpowersour.2008.10.009

127. Wee, D.H., Schlegel, F., Marzouk, Y. and Ghoniem, A.F., "A tree-code algorithm for a high order algebraic kernel in vortex methods," *SIAM J. on Scientific Computing*, Vol. 31, No 4, 2009. http://dx.doi.org/10.1137/080726872

128. Altay, H.M., Speth, R., Hudgins, D. and Ghoniem, A.F., Flame-vortex interaction driven combustion dynamics in a backward facing step combustor, *Combustion and Flame*, 2009, 156, 3, pp. 1111-1125. http://dx.doi.org/10.1016/j.combustflame.2009.02.003

129. Hong, J, Chaudhury, G., Brisson, J.B., Field, R., Gazzino, M., and Ghoniem, A.F., Analysis of Oxy-fuel combustion power cycle utilizing a pressurized coal combustor, *Energy*, 34 (2009) 1332-1340. http://dx.doi.org/10.1016/j.energy.2009.05.015

130. Altay, H.M., Speth, R., Hudgins, D. and Ghoniem, A.F., The impact of equivalence ratio oscillations on combustion dynamics in a backward facing step combustor, *Combustion and Flame*, 156, (2009) 2106-2116. http://dx.doi.org/10.1016/j.combustflame.2009.07.024

131. Altay, H.M., Speth, R., Hudgins, D., Annaswamy, A., and Ghoniem, A.F., Mitigation of thermo-acoustic instability utilizing steady air injection near the flame anchoring zone, *Combustion and Flame*, 157 (2010) 686-700. http://dx.doi.org/10.1016/j.combustflame.2010.01.012

132. Altay, H.M., Kedia, J. S., Speth, R.L., and Ghoniem, A.F, Two dimensional Simulations of steady perforated plate stabilized Premixed flames, *Combustion Theory and Modeling*, Vol. 14, No 1, 2010, 125-154. http://dx.doi.org/10.1080/13647831003660859

133. Hong, JS., Field, R., Gazzino, M. and Ghoniem, A.F., Operating pressure dependence of the pressurized oxy-fuel combustion power cycle, *Energy*, 35 (2010) 5391-5399. http://dx.doi.org/10.1016/j.energy.2010.07.016

134. LaBry, Z. A., Shanbhogue, S.J., Speth, R.L. and Ghoniem, A.F., Flow Structures in a lean premixed swirl stabilized combustor with microjet air injection, *Proceedings of the Combustion Institute*, Vol. 33, 2011, 1113-1120. http://dx.doi.org/10.1016/j.proci.2010.06.092

135. Kedia, K., Altay, H.M. and Ghoniem, A.F., Impact of wall-flame interactions of premixed flame transfer function, *Proceedings of the Combustion Institute*, Vol. 33, 2011, 1113-1120. http://dx.doi.org/10.1016/j.proci.2010.06.132

136. Ghoniem, A.F., Needs, resources and climate change: Clean and efficient conversion technologies, *Progress in Energy and Combustion Science*, 37, 2011, pp. 15-51. http://dx.doi.org/10.1016/j.pecs.2010.02.006

137. Singer, S. and Ghoniem, A.F., "Adaptive random pore model (ARPM) for multimodal-pore structure evolution during char conversion", *Energy and Fuels*, 2011, 25 (4), pp. 1423-1437, http://dx.doi.org/10.1021/ef101532u .

138. Habib, M.A., Badr, H.M., Ahmed, S.F., Ben-Mansour, R., Mezghani, K., Imashuku, S., La O', G.J., Shao-Horn, Y., Mancini, N., Mitsos, A., Kirchen, P., and Ghoniem, A.F., A review of recent developments in carbon capture utilizing oxy-fuel combustion in conventional and ion transport membrane systems, *Int. Journal of Energy Research*, (2011), Vol 35, 9, pp. 741-764. http://dx.doi.org/10.1002/er.1798

139. Schlegel, F., Wee, DH, Marzouk, Y.M. and Ghoniem, A.F., Contributions of the wall boundary layer to the formation of counter-rotating vortex pair in transverse jets, *J. Fluid Mechanics*, Vol. 676, 2011, pp. 461-490. http://dx.doi.org/10.1017/jfm.2011.59

140. Chen, Lei, Yong, S.Z. and Ghoniem, A.F., Oxy-fuel combustion of coal for carbon capture; characterization, fundamentals, stabilization and CFD modeling. *Progress in Energy and Combustion Sciences,* 38 (2012) 156-214. http://dx.doi.org/10.1016/j.pecs.2011.09.003

141. Kedia, K. and Ghoniem, A.F., Mechanisms of stabilization and blowoff of a premixed flame downstream of a heat-conducting perforated plate, *Combustion and Flame*, 159 (2012) 1055-1069. http://dx.doi.org/10.1016/j.combustflame.2011.10.014

142. Monaghan, R.F. and Ghoniem, A.F., A dynamic reduced order model for simulating entrained flow gasifier. Part 1: Model development and description, *Fuel*, 91, 2012, 61-80. http://dx.doi.org/10.1016/j.fuel.2011.07.015

143. Monaghan, R.F. and Ghoniem, A.F., A dynamic reduced order model for simulating entrained flow gasifier. Part 2: Validation, *Fuel*, 2012, 94, pp. 280-297. http://dx.doi.org/10.1016/j.fuel.2011.08.046

144. Yong, S.Z., Gazzino, M. and Ghoniem, A.F., Modeling the slag layer in solid fuel gasification and combustion- formulation and sensitivity analysis, *Fuel,* 92, 2012, 162-170. http://dx.doi.org/10.1016/j.fuel.2011.06.062

145. Wee, Daehyun, Park, Sungbae, Ghoniem, A.F., Impact of curvature on the kinematic response of small flames, *J. Engineering Math*, 74, 1, 37-52 (2012). http://dx.doi.org/10.1007/s10665-011-9481-5

146. Kumar, Mayank, and Ghoniem, A.F., Multi-physics simulations of entrained flow gasification. Part I: validating the non-reacting flow solver and the particle turbulent dispersion model, *Energy and Fuels*, 2012, 26(1) pp. 451-463, http://dx.doi.org/10.1021/ef200884j .

147. Kumar, Mayank, and Ghoniem, A.F., Multi-physics simulations of entrained flow. Part II constructing and validating the overall model, *Energy and Fuels*, 2012, 26(1) pp. 464-479, http://dx.doi.org/10.1021/ef2008858 .

148. Yong, S.Z., and Ghoniem, A.F., Multiphase slag models in solid fuel gasification and combustion- Two way coupling with CFD, *Fuel*, 97 (2012) 457-466. http://dx.doi.org/10.1016/j.fuel.2012.02.063

149. Dabiri, S., Wu, G., Timko, M. and Ghoniem, A.F., Mixing of single component hydrocarbon droplets in supercritical water, *J Supercritical Fluids*, 67 (2012) 29-40. http://dx.doi.org/10.1016/j.supflu.2012.02.014

150. Habib, M.A., Mansour, R.B., Badr, H.M., Ahmed, S.F., Ghoniem, A.F., Characteristics of oxy-fuel and air-fuel combustion in water tube boilers, *Computers and Fluids*, 56, 2012, 152-165.

151. Monaghan, R. and Ghoniem, A.F., Simulation of a commercial scale entrained flow gasifier using a dynamic reduced order model, *Energy and Fuels*, 2012, 26(2), 1089-1106, http://dx.doi.org/10.1021/ef201551m .

152. Beretta, G.P., Iora, P. and Ghoniem, A.F., Novel approach for fair allocation of primary energy

consumption among cogenerated energy intensive products based on the actual local area production scenario, *Energy*, 44 (2012) 1107-1120. http://dx.doi.org/10.1016/j.energy.2013.07.047

153. Hong, J.S., Kirchen, P. and Ghoniem, A.F., Numerical simulation of ion-transport membrane reactors: oxygen permeation and transport and fuel conversion, *J. Membrane Science*, 407-408, 2012, pp. 71-85. http://dx.doi.org/10.1016/j.memsci.2012.03.018

154. Chen, L. and Ghoniem, A.F., Simulation of oxy-coal combustion using RANS and LES, a validation study, *Energy and Fuels*, 2012, 26(8), 4783-4798, http://dx.doi.org/10.1021/ef3006993

155. Bates, Richard and Ghoniem, A.F., Biomass torrefaction: modeling of volatiles and solid product evolution kinetics, *Bioresource Technology*, 124 (2012) 460-469. http://dx.doi.org/10.1016/j.biortech.2012.07.018

156. Shroll, A.P., Shanbhogue, S.J. and Ghoniem, A.F., Dynamic stability characteristics of premixed methane oxy-combustion, *J. of Eng. For Gas Turbines and Power*, May 2012, Vol 134/051504-1-10. http://dx.doi.org/10.1115/1.4004737 .

157. Botero, C., Brasington, R., Field, R., Herzog, H. and Ghoniem, A.F., Performance of an IGCC plant with carbon capture and coal-CO2-slurry feed: impact of coal rank, slurry loading and syngas cooling technology, *Industrial & Eng. Chemistry Research*, 51(36) (2012) 11778-11790. http://dx.doi.org/10.1021/ie3018093

158. Wu, G., Dabiri, S., Timko, M.T., and Ghoniem, A.F., Fractionation of multicomponent hydrocarbon droplet in water at supercritical and near-critical conditions. *J. Supercritical Fluids*, 72 (2012) 150-160. http://dx.doi.org/10.1016/j.supflu.2012.08.021

159. Beretta, G.P., Iora, P., and Ghoniem, A.F., Allocating electricity production from a hybrid fossil-renewable power plant among its multi primary resources consumption, *Energy*, 60 (2013) 344-360. http://dx.doi.org/10.1016/j.energy.2013.07.047

160. Kedia, K. and Ghoniem, A.F., An analytical model for the prediction of the dynamic response of premixed flames stabilized on a heat-conducting perforated plate, *Proceedings of the Combustion Institute*, Vol. 34, 2013, 921-9928. http://dx.doi.org/10.1016/j.proci.2012.06.146

161. Singer, S., Chen, L. and Ghoniem, A.F., The influence of char particle trajectory and conversion on char gasification reactions during oxy-combustion and gasification, *Proceedings of the Combustion Institute*, Vol. 34, 2, 2013, 3471-3478. http://dx.doi.org/10.1016/j.proci.2012.07.042.

162. Kirchen, P., Apo, D.J., Hunt, A., and Ghoniem, A.F., A novel ion transport membrane reactor for fundamental investigations of oxygen permeation and oxy-combustion under reactive flow conditions, *Proceedings of the Combustion Institute*, Vol. 34, 2, 2013, 3463-3470. http://dx.doi.org/10.1016/j.proci.2012.07.076.

163. Botero, C., Herzog, H. and Ghoniem, A.F., Coal-CO_2 slurry feed for pressurized gasifiers, slurry preparation system characterization and economics, *Energy Procedia*, 37, 2013, 2212-2223. http://dx.doi.org/10.1016/j.egypro.2013.06.101.

164. Hong, JS, Kirchen, P. and Ghoniem, A.F., Interaction between oxygen permeation and homogeneous-phase fuel conversion on the sweep side of an ion transport membrane, *J. Membrane Sci.,* 428, Feb 2013, 309-322. http://dx.doi.org/10.1016/j.memsci.2012.10.055

165. Abani. N., and Ghoniem, A.F., Large-eddy simulation of coal gasification in an entrained flow gasifier, *Fuel*, Vol. 104, Feb 2013, pp. 664-680. http://dx.doi.org/10.1016/j.fuel.2012.06.006

166. Singer, S. and Ghoniem, A.F. comprehensive single particle conversion model, *Combustion and Flame*, Vol. 160, no. 1, 2013, pp. 120-137. http://dx.doi.org/10.1016/j.combustflame.2012.09.007

167. Gazzani, M., Manzolini, G., Macchi, E., and Ghoniem, A.F., Reduced order modeling is the Shell-Prenflo entrained flow gasifier, *Fuel*, Vol. 104, Feb 2013, pp. 822-837. http://dx.doi.org/10.1016/j.fuel.2012.06.117

168. Botero, C., Field, R.P., Herzog, H.J. and Ghoniem, A.F., Impact of finite-rate kinetics on carbon conversion in a high-pressure single-stage entrained flow gasifier with coal-CO_2 slurry feed. *Applied Energy*, 104 (2013) 408-417. http://dx.doi.org/10.1016/j.apenergy.2012.11.028

169. Lee, W.Y., Hanna, J. and Ghoniem, A.F., On the predictions of carbon deposition on the nickel

anode of an SOFC and its impact on open–circuit conditions, *J. Electrochemical Soc.*, 2013, 160(2): F94-F105. http://dx.doi.org/10.1149/2.051302jes

170. Zhao, Z.L., Chen, T.J., and Ghoniem, A.F., Rotary-bed reactor for chemical looping combustion with carbon capture; Part 1: reactor design and model development, *Energy & Fuels*, 2013, 27(1) pp. 327-343, http://dx.doi.org/10.1021/ef3014103

171. Zhao, Z.L., Chen, T.J., and Ghoniem, A.F., Rotary-bed reactor for chemical looping combustion with carbon capture; Part 1I: base case and sensitivity analysis, *Energy & Fuels,* 2013, 27(1), pp. 344-359, http://dx.doi.org/10.1021/ef301411g

172. Hong, J.S., Kirchen, P. and Ghoniem, A.F., Laminar oxy-fuel diffusion flame supported by an oxygen permeable ion transport membrane. *Combust. Flame*, 160, 3, 2013, pp. 704-717. http://dx.doi.org/10.1016/j.combustionflame.2012.11.014

173. Hong, S.H., Speth, R., Shanbhogue, S., and Ghoniem, A.F., Examining flow-flame interactions and the characteristic stretch rate in vortex-driven combustion dynamics using PIV and numerical simulations, *Combustion and Flame*, 160 (2013) pp. 1381-1397. http://dx.doi.org/10.1016/j.combustflame.2013.02.016

174. Bates, Richard and Ghoniem, A.F., Biomass torrefaction: modeling of Reaction thermochemistry, *Bioresource Technology*, 134 (2013) 331-340, http://dx.doi.org/10.1016/j.biortech.2013.01.158

175. Kumar, Mayank and Ghoniem, Ahmed F., Application of a validated CFD gasification model to determine the impact of coal particle size on carbon conversion, *Fuel*, 108, 2013, 565-577. http://dx.doi.org/10.1016/j.fuel.2013.02.009

176. Hanna, J., Lee, W.Y., and Ghoniem, A.F., Electrochemical kinetics models for CO oxidation in Ni-YZS anodes, *J. Electrochemical. Soc.*, 160(6) F698-F708 (2013). http://dx.doi.org/10.1149/2.136606jes

177. Chen, L., Yong, S.Z. and Ghoniem, A.F., Modeling the slag behavior in 3D CFD simulations of slagging coal oxy-combustion. *Fuel Processing Tech*, 112, 2013, 106-117. http://dx.doi.org/10.1016/j.fuproc.2013.02.010

178. Hong, JS, Kirchen, P. and Ghoniem, A.F., Analysis of heterogeneous oxygen exchange and fuel oxidation on the catalytic surface of pervoskite membranes*, J. Membrane Sci*., 445, 96-106, 2013. http://dx.doi.org/10.1016/j.memsci.2013.05.055

179. Yu, X., Shi, Y., Wang, H., Cai, N., Li, C., Hanna, J., Tomov, R.I., Glowacki, B.A. and Ghoniem, A.F., Experimental characterization and elementary reaction modeling of solid oxide electrolyte direct carbon fuel cell, *J. Power Sources*, 243 (2013) 159-171. http://dx.doi.org/10.1016/j.jpowsour.2013.05.149

180. Habib, M.A., Ahmed, P., Ben-Mansour, R., Badr, H.M., Kirchen, P., and Ghoniem, A.F., Modeling of a combined ion transport and porous membrane reactor for oxy-combustion, *J. Membrane Sci*., 446 (2013) 230-243. http://dx.doi.org/10.1016/j.memsci.2013.06.035

181. Chen, Lei, and Ghoniem, A.F., Development of a 3D computational slag flow model for coal combustion and gasification, *Fuel*, 113 (2013) 357-366, 2013. http://dx.doi.org/10.1016/j.fuel.2013.05.103

182. Botero, C., Field, R., Herzog, H. and Ghoniem, A.F., The Phase Inversion based coal-CO_2 slurry (PHICCOS) feeding system: techno-economic assessment using coupled multiscale analysis method, *International Journal for Greenhouse Gas Control*, 18, 150-164, 2013. http://dx.doi.org/10.1016/j.ijggc.2013.07.001

183. Hong, S.H., Shanbhogue, S., Kedia, K. and Ghoniem, A.F., Impact of the flame-holder heat transfer characteristics on the onset of combustion instability, *Combust. Sci. Tech*., 185 (2013) 1541-1567. http://dx.doi.org/10.1080/00102202.2013.816575

184. Hong, S.H., Speth, R., Shanbhogue, S., and Ghoniem, A.F., On the phase between pressure and heat release fluctuations in C_3H_8/H_2 flames in a backward-facing step combustor and its role in dynamic mode transition, *Combustion and Flame,* 160 (2013) 2827-2742. http://dx.doi.org/10.1016/j.combustflame.2013.07.001

185. Hanna, J., Shi, Y., Lee, W.Y., and Ghoniem, A.F., Fundamentals of electro and thermochemistry in the anode of solid-oxide fuel cells with hydrocarbon and syngas fuels, *Progress Energy Combust. Sci*., 2014, 40(1), pp. 74-111. http://dx.doi.org/10.1016/j.pecs

186. Schlegel, F. and Ghoniem, A.F., Simulation of high Reynolds number reactive transverse jet and the formation of a triple flame, *Combustion and Flame*, 161 (2014) 971-986. http://dx.doi.org/10.1016/j.combustflame.2013.10.006

187. Nemitallah, M.A., Habib, M.A., Ben-Mansour, R., and Ghoniem, A.F., Design of an ion-transport 2014, 60. reactor for gas turbine combustion applications, *J. Membrane Sci.*, 450, pp. 60-71, 2014. http://dx.doi.org/10.1016/j.memsci.2013.08.040

188. Zhao, Z.L., Chen, T., Iloeje, C., and Ghoniem, A.F., Impact of oxygen carrier on the performance of a rotary bed reactor, Part 1: material properties and catalytic activity, *Fuel*, 121 (2014) 327-343. http://dx.doi.org/10.1016/j.fuel.2013.11.056

189. Zhao, Z.L., Chen, T., Iloeje, C., and Ghoniem, A.F., Impact of oxygen carrier on the performance of a rotary bed reactor, Part 1I: fuel conversion and reactor design, *Fuel*, 121 (2014) 344-360. http://dx.doi.org/10.1016/j.fuel.2013.11.055

190. Yu, X., Shi, Y., Wang, H., Cai, N., Li, C., and Ghoniem, A.F., Using potassium catalytic gasification to improve the performance of solid oxide direct carbon fuel cells; experimental characterization and elementary reaction modeling, *J. Power Sources*, Vol. 252, 2014, 139-137. http://dx.doi.org/10.1016/j.jpowsour.2013.12.021

191. Kedia, K.S., Safta, C., Ray, J., Najm, H.N. and Ghoniem, A.F., A second-order immersed boundary-SAMR construction for chemically reacting flow over heat-conducting Cartesian grid-conforming solid, *Journal of Computational Physics,* 272, 408-428, 2014. http://dx.doi.org/10.1016/j.jcp.2014.04.019

192. Kedia, K.S. and Ghoniem, A.F., The stabilization mechanism of a laminar premixed flame on a bluff body*, Combustion and Flame*, 161 (2014) 327-339. http://dx.doi.org/10.1016/j.combustflame.2014.02.005

193. Chen, L., and Ghoniem, A.F., Modeling CO_2 chemical effects on CO formation in oxy-fuel diffusion flames using detailed, quasi-global and global reaction mechanisms, *Combust, Sci. Tech*, 186:7 2014, 829-848. http://dx.doi.org/10.1080/00102202.2014.883384

194. Gazzani, M., Turi, D.M., Ghoniem, A.F., Macchi, E., and Manzolini, G., Techno-economic assessment of two novel feeding systems for a dry feed gasifier in an IGCC plant with Pd-membranes for CO_2, *Int. J. Greenhouse Gas Control*, 25 (2014) 62-78. http://dx.doi.org/10.1016/j.ijggc.2014.03.011

195. Bakshi, A., Altantzis, C. and Ghoniem, A.F., Towards Accurate multidimensional simulations of dense multiphase flows using cylindrical coordinates, *Powder Technology*, 264 (2014) 242-255. http://dx.doi.org/10.1016/j.powtec.2014.04.052.

196. Ragavan, A, and Ghoniem, A.F., Direct Simulation of supercritical water-hydrocarbon mixing in a cylindrical Tee junction at intermediate Reynolds number: Formulation, numerical methods and laminar mixing*, J. Supercritical Fluids*, 2014, 92 (2014) pp. 31-46. http://dx.doi.org/10.1016/j.supflu.2014.04.015

197. Bates, R. and Ghoniem, A.F., Modeling reaction-transport interactions during biomass torrefaction, *Fuel*, 137 (2014) 216-229. http://dx.doi.org/10.1016/j.fuel.2014.07.047

198. Hunt, A., Dimitrakopoulos, G., Kirchen, P., and Ghoniem, A.F., Measuring the oxygen profile and permeation flux across an ion transport (LCF) membrane and the development and validation of multistep surface exchange model, *J Membrane Sci.*, 468 (2014) pp. 62-72. http://dx.doi.org/10.1016/j.memsci.2014.05.043

199. Sheu, E.J. and Ghoniem, A.F., Redox-reforming based integrated solar natural gas plants: reforming and thermodynamic cycle efficiency, *Int. J Hydrogen Energy*, 39 (2014) 14817-14833. http://dx.doi.org/10.1016/j.ijhydene.2014.07.086

200. Ragavan, A, and Ghoniem, A.F., Simulation of supercritical water-hydrocarbon mixing in a cylindrical Tee junction at intermediate Reynolds number: Impact of temperature difference

between streams, *J. Supercritical Fluids*, 95 (2014) pp. 325-338. http://dx.doi.org/10.1016/j.supflu.2014.09.030 .

201. Ahmed, P., Habib, M.A., Ben-Mansour, R., Kirchen, P. and Ghoniem, A.F., CFD analysis of a novel reactor design using ion transport membranes for oxy-fuel combustion, *Energy*, 77 (2014) pp. 932-944. http://dx.doi.org/10.1016/j.energy.2014.10.003

202. Beretta, G.P., Iora, P., and Ghoniem, A.F., Allocating resources and products in multi-hybrid multi-cogeneration: what fractions of heat and power are renewable in hybrid fossil-solar CHP, *Energy*, 78, 2014, 587-603. http://dx.doi.org/10.1016/j.energy.2014.10.046

203. Bongartz, D., and Ghoniem, A.F., Chemical kinetics modeling of oxy-fuel flames of mixtures of hydrogen sulfide and methane, *Combustion and Flame*, 162 (2015) 544-553. http://dx.doi.org/10.1016/j.combustflame.2014.08.019

204. Hong, S.H., Shanbhogue, S., and Ghoniem, A.F., Impact of fuel composition on the recirculation zone structure and its role in lean premixed flame anchoring, *Proceedings of the Combustion Institute*, Vol. 35, issue 2, 2015, 1493-1500. http://dx.doi.org/10.1016/j.proci.2014.05.150

205. Kedia, K.S., and Ghoniem, A.F., The response of a harmonically excited premixed flame stabilized on a heat-conducting bluffbody. *Proceedings of the Combustion Institute*, Vol. 35, issue 1, 2015, 1065-1072. http://dx.doi.org/10.1016/j.proci.2014.06.007

206. Taamallah, S., LaBry, Z., Shanbhogue, S., and Ghoniem, A.F., Thermoacoustic instabilities in lean premixed combustion and their link to the flame macrostructure under acoustically uncoupled and coupled conditions. *Proceedings of the Combustion Institute*, Vol. 35, issue 3, 2015, 3273-3282. http://dx.doi.org/10.1016/j.proci.2014.07.002

207. Altantzis, C., Bates, R.B. and Ghoniem, A.F. Estimating the specularity coefficient and its effect on bubble dynamics and circulation time in a thin rectangular fluidized bed, *Powder Technology,* 270 (2015) 256-270. http://dx.doi.org/10.1016/j.powtec.2014.10.029

208. Taamallah, S., LaBry, Z., Shanbhogue, S., and Ghoniem, A.F., Correspondence between the uncoupled flame configuration and thermoacoustic instability in lean premixed swirl stabilized combustor. *J Eng. Gas Turbine Power* 137(7), 071505 (2015) (12 pages). http://dx.doi.org/10.1115/1.4029173

209. Timko, M.T., Ghoniem, A.F. and Green, W.H., Upgrading and desulfurization of heavy oils by supercritical water, *Journal of Supercritical Fluids*, Vol. 96 (2015), pp. 114-123. http://dx.doi.org/10.1016/j.supflu.2014.09.015

210. Sheu, E.J., Mokheimer, E. and Ghoniem, A.F., Dry redox reforming hybrid power cycle: performance analysis ad comparison to steam redox reforming, *Int. J Hydrogen Energy*, 40 (2015) 2939-2949. http://dx.doi.org/10.1016/j.ijhydene.2015.01.018

211. Habib, M.A., Ahmed, P., Ben-Mansour, R., Mezghani, K., Alam, Z., Shao-Horn, Y. and Ghoniem, A.F., Experimental and numerical investigation of La_2NiO_4 membranes for oxygen separation: geometry optimization and model validation, *J. Energy Resources Technology*, 2015; 137(3): 031102-031102-12. http://dx.doi.org/10.1115/1.4029670

212. Iloeje, C., Zhao, Z.L., and Ghoniem, A.F., Analysis of isothermal redox chemical looping combustion-based power plants with carbon capture, *Int. J of Greenhouse Control Technology*, 35 (2015) 56-70. http://dx.doi.org/10.1016/j.ijggc.2015.01.013

213. Chakroun, N.W. and Ghoniem, A.F., Techno-economic analysis of sour gas oxy-fuel combustion cycles with CCS; Water Cycles, *Int. J. Greenhouse Control*, 36 (2015) 1-12. http://dx.doi.org/10.1016/j.ijggc.2015.02.004

214. Kedia, K.S. and Ghoniem, A.F., The blow-off mechanism of a bluffbody stabilized laminar-premixed flame, *Combustion and Flame*, 162 (2015) 1304-1315. http://dx.doi.org/10.1016/j.combustflame.2014.10.017

215. Bakshi, A., Altantzis, C., Bates, R.B. and Ghoniem, A.F., Eulerian-Eulerian simulation of dense solid-gas cylindrical fluidized beds; wall boundary condition and its impact on fluidization. *Powder Tech.,* 277 (2015) 47-62. http://dx.doi.org/10.1016/j.powtec.2015.02.056

216. Alzahrani, F.M., Sanusi, Y.S., Vogiatzaki, K., Ghoniem, A.F., Habib, M.A., and Mokheimer,

E.M.A., Evaluation of the accuracy of selected syngas chemical mechanisms, ASME *J. Energy Resources Technology*, 2015; 137(4): 042201-042201-13. http://dx.doi.org/10.1115/1.4029860.

217.   Stark, A.K., Bates, R.B., Zhao, Z., and Ghoniem, A.F., Prediction and validation of syngas and tar species from a reactor network model of fluidized bed biomass gasification, *Energy and Fuels*, 2015, 29, 2437-2452 . http://dx.doi.org/10.1021/ef5027955

218.   Wu, X.Y., Cheng, L., Uddi, M., Kirchen, P. and Ghoniem, A.F., Towards enhanced hydrogen production from water using oxygen permeating LCF membranes, *Phys. Chem. Chem. Phys.,* 2015, 17, 10093-10107. http://dx.doi.org/10.1039/C5CP00584A

219.   He, P., Ragavan, A. and Ghoniem, A.F., Impact of non-ideality on mixing of hydrocarbons and water at supercritical and near critical conditions, *J. of Supercritical Fluids*, 102 (2015) 50-65. http://dx.doi.org/10.1016/j.supflu.2015.03.017

220.   Hong, J.S., Kirchen, P. and Ghoniem, A.F., The coupling effect of gas phase chemistry and surface reactions on oxygen permeation and fuel conversion in ITM reactors, *J. Membrane Science,* 488 (2015) 1-12. http://dx.doi.org/10.1016/j.memsci.2015.04.006

221.   Lee, WY, Ong, K. and Ghoniem, A.F., Modeling the impact of CO electrochemistry on the performance of an SOFC running on syngas, *ECS Transactions* 68(1), 2015, 3059-3074. http://dx.doi.org/10.1149/06801.3059ecst

222.   Hunt, A., Dimitrakopoulos, G., and Ghoniem, A.F., Surface vacancy and permeation flux limits of perovskite membranes, *Journal of Membrane Science*, 489 (2015) 248-257. http://dx.doi.org/10.1016/j.memsci.2015.03.095

223.   Taamallah, S., Vogiatzaki, K., Alzahrani, F.M., Mokheimer, E., Habib, M.A. and Ghoniem, A.F., Fuel flexibility, stability and emissions of premixed hydrogen-enriched combustion: technology, fundamentals and numerical simulations, *Applied Energy*, 154, 2015, 1020-1047. http://dx.doi.org/10.1016/j.apenergy.2015.04.044

224.   Bongartz, D. and Ghoniem, A.F., Impact of sour gas composition on ignition delay, burning velocity and premixed flame structure in air and oxy-fuel combustion, *Combustion and Flame*, 162 (2015), pp. 2749-2757. http://dx.doi.org/10.1016/j.combustflame.2015.04.014

225.   Chakroun, N. and Ghoniem, A.F., High efficiency and low LCOE Combined cycles for sour gas oxy-combustion with CO_2 capture, *Int. J. Greenhouse Control*, 41 (2015) 163-173. http://dx.doi.org/10.1016/j.ijggc.2015.02.004

226.   Iloeje, C., Zhao, ZL, and Ghoniem, A.F., Efficient cycles for carbon capture enabled CLC power plants based on thermally balanced Redox reactors. *Int. J. Greenhouse Control Technology*, 41 (2015) 302-315.   http://dx.doi.org/10.1016/j.ijggc.2015.07.023

227.   Iloeje, C., Field, R. and Ghoniem, A.F., Nitrogen oxide and sulfur oxide removal from coal oxy-combustion using pressurized column adsorber. *Fuel*, 160 (2015) 178-188. http://dx.doi.org/10.1016/j.fuel.2015.07.057

228.   Sheu, E.J., Mokheimer, E.M., and Ghoniem, A.F., A Review of Solar Reforming Systems, *J. of Hydrogen Energy*, 40 (2015) pp. 12929-12955. http://dx.doi.org/10.1016/j.ijhydene.2015.08.005

229.   He, Ping, and Ghoniem, A.F., A group contribution pseudo-component method for phase equilibrium modeling of mixtures of petroleum fluids and a solvent, *Industrial. & Eng. Chemistry Research*, 2015, 54, 8809-8820. http://dx.doi.org/10.1021/asc.jecr.5b02516

230.   Bongartz, D., Shanbhogue, S. and Ghoniem, A.F., Reactor network modeling to predict sulfur oxides formation in sour gas oxy-combustion, *Energy & Fuels*, 2015, 29, 7670-7680. http://pubs.acs.org/doi/abs/10.1021/acs.energyfuels.5b01709

231.   Shanbhogue, S., Taamallah, S., Sanusi, Y., Mokheimer, E., Habib, M. and Ghoniem, A.F., Flame structure, combustion instability and extinction strain scaling in swirl stabilized premixed CH_4-H_2 combustion, *Combustion and Flame*, 163, 2016, 494-507. http://dx.doi.org/10.1016/j.combustflame.2015.10.026

232.   Nemitallah, M. Habib, M., Mokheimer, E. and Ghoniem, A.F., Investigation of a turbulent premixed flame in a backward facing combustion, effect of equivalence ration, *Energy,* 95, 2016, 211-222.   http://dx.doi.org/10.1016/j.energy.2015.12.010.

233. Choi, B.C., Park, J.S., and Ghoniem, A.F., Characteristics of outwardly propagating spherical flames of R134a ($C_2H_2F_4$)/CH_4/O_2/N_2 mixtures in a constant volume combustion chamber, *Energy*, 95 (2016) 517-527. http://dx.doi.org/10.1016/j.energy.2015.11.043

234. Turi, D., Chiesa, P., Macchi, E. and Ghoniem, A.F., High fidelity model of oxygen ion transport membrane; mechanism characterization and experimental validation, *Energy*, 96 (2016) 127-141. http://dxx.doi.org/10.1016/j.energy.2015.12.055

235. Sierra-Pallares, J., Ragavan, A., and Ghoniem, A.F., Computational study of organic solvent-CO_2 mixing in convective supercritical environment under laminar conditions; impact of enthalpy of mixing, *J. Supercritical Fluids*, 109, 2016, 109-123. http://dx.doi.org/10.1016/j.supfl.2015.11.007

236. Taamallah, S., Shanbhogue, S. and Ghoniem, A.F., Turbulent flame stabilization modes in premixed swirl combustion; mechanisms and Karlovitz number based predictive criteria, *Combustion and Flame*, 166 (2016) 19-33. http://dx.doi.org/10.1016/j.combustflame.2015.12.007

237. Bates, R.B., Altantzis, C. and Ghoniem, A.F., Modeling biomass char gasification, combustion and attrition kinetics in fluidized beds, *Energy & Fuels*, 30(1), 2016. 360-376. http://dx.doi.org/10.1021/acs.energyfuels.5b02120.

238. Sheu, E., and Ghoniem, A.F., Receiver reactor concept and model development for a solar steam redox reformer", *Solar Energy,* 125 (2016) 339-359. http://dx.doi.org/10.1016/j.solarenr.2015.12.024

239. Ahmed, P., Habib, M.A., Ben-Mansour, R., and Ghoniem, A.F., CFD investigation of the oxy-combustion characteristics of diesel oil, kerosene and heavy oil liquid fuels in a model furnace, *Energy and Fuels*, 2016, 30(3) pp. 2458-2473. http://dx.doi.org/10.1021/acs.energyfuels.5b02794

240. Bakshi, A., Altantzis, C. and Ghoniem, A.F., Multiphase flow Statistics 3D detection and tracking algorithm: Methodology and application to large-scale fluidization, *Chemical Engineering J.*, 293 (2016) 355-364. http://dx.doi.org/j.cej.2016.02.058

241. Ong, K., and Ghoniem, A.F., The impact of steam gasification and thermal coupling in indirect carbon fuel cell system performance, *J. Power Source*, 2016, 333 (2016) 51-64. http://dx.doi.org/10.1016/j.jpowsour.2016.02.050

242. Dimitrakopoulos, G., Hunt, A and Ghoniem, A.F., A multistep surface exchange mechanism and detailed defect transport to model oxygen permeation in $La_{1-x}Ca_xFeO_{3-d}$. *J. Membrane Sci.,* 510 (2016) 209-219. http://dx.doi.org/10.1016/j.memsci.2016.03.004

243. Ong, K., Lee, W.Y., Hanna, J. and Ghoniem, A.F., isolating the impact of CO concentration in syngas mixtures on SOFC performance via internal reforming and direct oxidation, *Int. J. Hydrogen Energy*, 41 (2016) 9035-9047. http://dx.doi.org/10.1016/j.hydene.2016.03.107

244. Kewlani, G., Shanbhogue, S. and Ghoniem, A.F., Investigation into the impact of the equivalence ratio on turbulent premixed combustion using PIV and LES techniques; "V" and "M" flame configurations in a swirl combustor, *Energy and Fuels*, 2016, 30, 3451-3462. http://dx.doi.org/10.1021/acs.energyfuels.5b02921

245. Sheu, E.J., and Ghoniem, A.F., Sensitivity analysis for a solar steam redox reforming receiver-reactor, *Solar Energy* 134 (2016), pp. 23-31. http://dx.doi.org/10.1016/j.solener.2016.04.038

246. Bakshi, A., Altantzis, C. and Ghoniem, A.F., Study on the effect of reactor scale on fluidization hydrodynamics using a high resolution, two-fluid simulation; *Powder Tech.,* 299 (2016) 185-198. http://dx.doi.org/10.1016/j.powtec.2016.05.029

247. Zhao, ZL, Uddi, M., Tsvetkov, N., Yildiz, B. and Ghoniem, A.F., Redox kinetics study of fuel reduced ceria for chemical looping water splitting. *J. Physical Chemistry C*, 2016, 120, 16271-16289. http://dx.doi.org/acs.jpcc.6b01847

248. Michaels, D., and Ghoniem, A.F., Impact of the flameholder material on the flame leading edge structure and flame-flow interactions of lean premixed flames stabilized on a bluffbody. *Combustion and Flame*, 172 (2016) 62-78. http://dx.doi.org/10.1016/j.combustflame.2016.07.007

249. Stark, A.K., Altantzis, C., Bates, R.R., and Ghoniem, A.F., Towards an advanced reactor network modeling framework for fluidized bed biomass gasification incorporating information from detailed CFD simulations, *Chemical Engineering Journal,* 303 (2016) 409-424.

http://dx.doi.org/10.106/j.cej.2016.06.026

250. Woo, M., Choi, B.C., and Ghoniem, A.F., Experimental and numerical studies on NOx emission characteristics in laminar non-premixed jet flames of ammonia-containing methane fuel with oxygen/nitrogen oxidizer. *Energy*, 114, 2016. http://dx.doi.org/10.1016/j.energy.2016.07.150.

251. Wu, X., Uddi, M. and Ghoniem, A.F., Enhancing co-production of H_2 and syngas via water splitting and POM on surface modified oxygen permeable membranes, *AICHE J.*, Dec. 2016, 62 (12) pp. 4427-4435. http://dx.doi.org/10.1002/aic.15518

252. Watanabe, H., Shanbhogue, S.J., Taamallah, S., Chakroun, N.W. and Ghoniem, A.F., The structure of swirl stabilized turbulent premixed CH_4/air and $CH_4/O_2/CO_2$ flames and why oxy-flames seen to burn more intensely, *Combustion and Flame,* 174, 2016, pp. 111-119. http://dx.doi.org/10.1016/j.combustflame.2016.09.015

253. Dimitrakopoulos, G. and Ghoniem, A.F., Role of gas phase and surface chemistry in methane reforming using ion transport membranes. *Proceedings of the Combustion Institute*, Vol. 36, 2017, pp. 4347-4354. http://dx.doi.org/10.1016/j.proci.2016.06.177

254. Taamallah, S., Shanbhogue, S.J., Chakroun, N., Watanabe, H., and Ghoniem, A.F., On the characteristic flow and flame times for scaling oxy and air flame stabilization modes in swirl combustion. *Proceedings of the Combustion Institute*, Vol. 36, 2017, pp. 3799-3807. http://dx.doi.org/10.1016/j.proci.2016.07.022

255. Michaels, D., Shanbhogue, S., and Ghoniem, A.F., The role of chemistry in defining the flow structure in a wake stabilized laminar lean premixed CH_4/H_2/Air flames, *Combustion and Flames*, 176 (2017) 151-161. http://do.doi.org/10.1016/j.combustflame.2016.10.007

256. Ong, Katherine, Hanna, J. and Ghoniem, A.F., Investigation of a combined hydrogen and oxygen spillover mechanism for syngas electro-oxidation on Ni/YSZ, *J. Electrochemical Soc.*, 164(2) 2017, 151-161. http://dx.doi.org/10.1149/2.0161702jes

257. He, P. and Ghoniem, A.F., A sharp interface method for coupling multiphase flow, heat transfer and multicomponent mass transfer with interface diffusion. *J. Computational Physics*, 332 (2017), 316-332. http://dx.doi.org/10.1016/j.jcp.2016.12.002

258. Mansouri, N. and Ghoniem, A.F., Does Nuclear desalination make sense in Saudi Arabia. Desalination, 406 (2017) 37-43. http://dx.doi.org/10.1016/j.desal.2016.07.009

259. Iloeje, C., Zhao, Z.L., and Ghoniem, A.F., A reduced fidelity model for the rotary chemical looping combustion reactor, *Applied Energy*, 190 (2017) 7125-739. http://dx.doi.org/10.1016/j.apenergy.2016.12.072

260. Dimitrakopoulos, G., and Ghoniem, A.F., A multistep mechanism to model H_2 and CO surface reactions and defect chemistry on LCF mixed conductors, *J. Membrane Sci.,* 529 (2017) 114-132. http://dx.doi.org/10.1016/j.memsc.2017.01.052

261. Bates, R.B., Jablonski, W.S., Carpenter, D.L., Altantzis, C., Garg, A., Barton, J.L., Chen, R., Field, R.P. and Ghoniem, A.F., Steam-air blown bubbling fluidized bed biomass gasification (BFBBG): Experiments ad validation of multi-scale models. *AICHE J.*, 2017, Vol 63, No. 5, pp. 1543-1565. http://dx.doi.org/10.1002/aic.15666

262. Bakshi, A., Altantzis, C., Glicksman, L.R. and Ghoniem, A.F., Gas-flow distribution in bubbling fluidized beds: CFD based analysis and impact of operating conditions and reactor scale. *Powder Technology*, 316 (2017), 500-511. http://dx.doi.org/10.1016/j.powtec.2017.01.005.

263. Zhao, Z.L., Uddi, M., Tzvetkov, N., Yildiz, B. and Ghoniem, A.F., Redox kinetics study and non-stoichiometric characterization of $Ce_{0.5}Zr_{0.5}O_2$ for water splitting and hydrogen production. *J. Physical Chemistry C*, 2017, 121, 11055-11068. http://dx.doi.org/10.1021/acs.jpcc.7b00644

264. Dimitrakopoulos, G., Schucker, R.C., Johnson, J.R., Kopec., K.K., Alahmadi, F., Derrickson, K., and Ghoniem, A.F., Hydrogen and ethylene production through water splitting and ethane dehydrogenation using $BaFe_{0.9}Zr_{0.1}O_{3-\delta}$ mixed conductors, *ECS Transactions*, 80 (9), 2017, 181-190.

265. Labban, O., Chen, T., Ghoniem, A.F., Lienhard, J.H. and Norford, L.K., Next-generation HVAC: Prospects for and limitations of desiccant and membrane-based cooling and dehumidification,

Applied Energy, 200 (2017) 330-346. http://dx.doi.org/10.1016/j.apenergy.2017.05.051

266. Bakshi, A., Altantzis, C. and Ghoniem, A.F., Mixing dynamics in bubbling fluidized beds, *AICHE J.*, 63(10) (2017), 4316-4328. http://dx.doi.org/10.1002/aic.15801

267. Stark, A.K., and Ghoniem, A.F., Quantification of the influence of particle diameter on polycyclic aromatic hydrocarbon (PAH) formation in fluidized bed biomass pyrolysis, *Fuel*, 2017, 206, 276-288. http://dx.doi.org/10.1016/j.fuel.2017.06.020

268. Zhao, ZL, Uddi, M., Tsvetkov, N., Yildiz, B and Ghoniem, A.F., Enhanced intermediate temperature CO_2 splitting with non-stoichiometric ceria and ceria-zirconia. *Phys. Chem. Chem. Phys*. 2017, 19. 25774-25785. http://dx.doi.org/10.1039/c7cp04789d

269. Roy, J., Ghoniem, A.F., Panora, R., Gehret, J., Falls, B., Wallace, D., and Daniel, O., Development and testing of the Ultera® dual stage catalyst system on gasoline fueled light duty vehicle (LDV's), *SAE International J. of Passenger Cars – Mechanical Systems*, 10(1), 2017, pp. 157-168. http://dx.doi.org/10.4271/2017-01-0920

270. Chakroun, N., Michaels, D., Shanbhogue, S. and Ghoniem, A.F., Response of stoichiometric oxy-combustion to strain; role of chemistry and transport, *J. Propulsion Power*, 34(4) 2018, 825-835. http://dx.doi.org/10.2514/1.B36665.

271. Wu, XY and Ghoniem, A.F., H_2 assisted CO_2 thermochemical reduction on LCF membranes: a kinetics study. *ChemSusChem*, 11(2) 2018, pp. 483-493. http://dx.doi.org/10.1002/cssc.201701372

272. Michaels, D. and Ghoniem, A.F., Leading edge dynamics of lean premixed flames stabilized on a bluff body, *Combustion and Flames*, Volume 191, 2018, Pages 39-52. http://dx.doi.org/10.1016/j.combustflame.2017.12.0210

273. Jimenez, C., Michaels, D., and Ghoniem, A.F., Stabilization of ultra-lean hydrogen-enriched inverted flames behind a heat conducting bluffbody and the phenomenon of anomalous blowoff, *Combustion and Flame*, 191, 2018, 86-98. http://dx.doi.org/10.1016/j.combustflame.2017.12.032

274. He, P. and Ghoniem, A.F., Phase separation during mixing of partially miscible fluids under near-critical and supercritical conditions and the phenomenon of "uphill diffusion". *J. Supercritical Fluids*. 135 (2018) pp. 108-119. https://dx.doi.org/10.1016/j.supflu.2017.12.040

275. Luo, Y., Wu, X.Y., Shi, Y., Ghoniem, A.F., and Cai, N. Exergy analysis of an integrated solid oxide electrolysis cell – mathanation reactor for renewable energy storage. *Applied Energy*, 215, 1, 2018, pp. 371-383. https://dx.doi.org/10.1016/j.apenergy.2018.02.022

276. Choi, B.C. and Ghoniem, A.F., Stabilization and blowout characteristics of lean premixed turbulent flames behind a backward-facing step in a rectangular combustor with heated propane-air mixtures. Fuel, 222 (2018) 627-637. http://dx,doi.org/10.1016/j.fuel.2108.02.160

277. Bakshi, A., Altantzis, C., Bershanska, A., Stark, A., and Ghoniem, A.F., On the limitations of 2D CFD for thin rectangular fluidized bed simulations, *Powder Tech*. 332 (2018) pp. 727-637. http://dx.doi.org/10.106/j.powtec.2018.03.048

278. Hemchandra, S., Shanbhogue, S., Hong, J. and Ghoniem, A.F. Role of shear layer stability in driving combustion instability in a premixed propane-air backward facing step combustor. *Physical Review Fluids*. 3, 063201 (2018). http://dx.doi.org/10.1103/PhysRevFluids.3.063201

279. Bakshi, A., Li, T., Altantzis, C., Rogers, W., Shahnam, M, and Ghoniem, A.F., Comprehensive multivariate sensitivity analysis of CFD-DEM simulations: critical model parameters and their impact of fluidization hydrodynamics, *Power Technology*, 338 (2018) 519-537. http://dx.doi.org/10.1016/j.potec.2018.06.049

280. Roy, J., Ghoniem, A.F., Panora, R. and Gahredt, J., NOx reduction using a dual-stage catalyst system with intercooling in vehicle gasoline engines under real driving conditions. *SAE Int. J. of Engines*, 11(6):893-901, 2018. http://dx.doi.org/10.4271/2018.01.0335

281. Iloeje, C., Zhao, Z., and Ghoniem, A.F., Design and techno-economic optimization of a rotary chemical looping combustion power plant with CO_2 capture, *Applied Energy*, 231 (2018) 1179-1190, 2018. http://dx.doi.org/10.1016/j.apenergy.2018.09.058

282. Ghoniem, A.F., Zhao, Z.L. and Dimitrakopoulos, G., Gas Oxy-Combustion and Conversion Technologies for low Carbon energy: Fundamentals, Modeling and Reactors. Invited Plenary

Lecture, the 37th Symposium on Combustion. *Proceeding of the Combustion Institute*. 37 (2019) 33-56. http://dx.doi.org/10.1016/j.proci.2018.06.002

283. Cao, T., Song, P., Shi, Y., Ghoniem, A.F. and Cai, N., Oxy-combustion of coal in liquid antimony anode solid oxide fuel cell system. *Proceeding of the Combustion Institute*. 37 (2019) 2841-2848. http://dx.doi.org/10.1016/j.proci.2018.08.056

284. Jimenez, C., Michaels, D., and Ghoniem, A.F., Ultra lean hydrogen enriched oscillating flames behind a heat conducting bluff-body; anomalous and normal blow-off. *Proceeding of the Combustion Institute*. 37 (2019) 1843-1950. http://dx.doi.org/10.1016/j.proci.2018.06.117

285. Wu, Y., and Ghoniem, CO_2-to-fuel and methane partial oxidation: process intensification on surface catalyzed LCF oxygen ion transport membranes. *Proceeding of the Combustion Institute*. 37 (2019) 5517-5524. http://dx.doi.org/10.1016/j.proci.2018.05.164

286. Chakroun, N., Shanbhogue, S., Dagan, Y. and Ghoniem, A.F., Flamelet structure in turbulent premixed swirling oxy-combustion of methane. *Proceeding of the Combustion Institute*. 37 (2019) 4578-4586. http://dx.doi.org/10.1016/j.proci.2018.06.181

287. Kung, K.S., Shanbhogue, S., Slocum, A.H. and Ghoniem, A.F., A decentralized biomass torrefaction reactor concept. Part I: Mathematical model and scaling laws. *Biomass and Bioenergy* 125 (2019) 196-203. http://dx.doi.org/10.1016/j.biombioe/2018.12.001

288. Kung, K.S., and Ghoniem, A.F., A decentralized biomass torrefaction reactor concept. Part II: multi-scale analysis and initial experimental evaluation. *Biomass and Bioenergy* 125 (2019) 204-211. http://dx.doi.org/10.1016/j.biombioe/2018.11.004

289. Sanchez, F.A., He, P., Ghoniem, A.F., Pereda, S., Modeling hydrocarbon droplet dissolution in near-critical or supercritical water using GCA-EOS and non-ideal diffusional driving force in binary mixtures. *Journal of Supercritical Fluids*, 146 (2019) 1-14. http://dx.doi.org/10.1016/j.sulflu.2018.12.017

290. Taamallah, S., Chakroun, N., Shanbhogue, S.J., Kewlani, G., Vogiatzki, K. and Ghoniem, A.F., Helical vortex core dynamics and flame interactions in turbulent premixed swirl combustion; a combined experimental and LES investigation, 2019. *Physics of Fluids*. 31 (2019), 025108. http://dx.doi.org/10.1063/1.5065508

291. Iora, P., Beretta, J.P. and Ghoniem, A.F., Exergy loss-based allocation method for hybrid renewable fossil power plants applied to an integrated solar combined cycle. *Energy*, 173 (2019) 893-901. http://dx.doi.org/10.1016/j.energy.2019.02.095

292. Tajik, A.B., Shamim, T., Ghoniem, A.F., and Abu Al-Rab, R., Multi-objective optimization of aluminum anode baking process employing a response surface, *Energy Procedia,* 2019. 5541-5550. http://dx.doi.org/10/1016/j.egypro.2019.01.589

293. Schucker, R., Dimitrakopoulos, G., Derrickson, K., Kopec, K., Al-Ahmadi, F., Johnson, J.R., Shao, L., and Ghoniem, A.F. Oxidative dehydrogenation of ethane to ethylene in an oxygen ion transport membrane reactor - a model for process intensification. *Industrial & Eng. Chemistry Research*. 58(19), 2019, 7989-7997.

294. Wu, XY and Ghoniem, AF, Mixed ionic electronic conducting membranes for thermochemical reduction of CO_2: a review. *Prog. Energy Combust Sci*, 74 (2019) 1-30. http://dx.doi.org/10.1016/j.pecs.2019.04.003

295. Zhao, Z.L., Uddi, M., and Ghoniem, A.F., Redox kinetics of Nickel/nickel oxide foils: Structural evolution and rate-limiting steps. *Combustion and Flame*, 207 (2019) 71-88. http://dx.doi.org/10.1016/j.combustflame.2019.05.012

296. Kung, K, Thengane, S., Shanbhogue, S., Mahajani, S., and Ghoniem A.F., Parametric analysis of a torrefaction reactor operating under oxygen lean conditions, *Energy*, 181 (2019) 603-614. http://dx.doi.org/10.106/j.energy.05.195

297. Dagan, Y, Chakroun, N., Shanbhogue, S. and Ghoniem, A.F., Role of intermediate temperature kinetics and radical transport in LES and the prediction of leading-edge structure of turbulent premixed flames. *Combustion and Flame*, 207, 2019, pp. 368-378. http://dx.doi.org/10.1016/jcombustfla,e.2019.06.004

298. Dimitrakouplos, G., Ghoniem, A.F., and Yildiz, B. In situ catalyst exsolution on perovskite oxides for the production of CO and syngas in ceramic membrane reactors, *Sustainable Energy & Fuels*, 2019, 3, 2347-2355. http://do.doi.org/10.1039/c9se00249a

299. Kung, KS and Ghoniem, AF, Multiscale analysis of drying thermally thick biomass for bioenergy applications, *Energy*, 187 (2019) 115989. http://dx.doi.org/10.1016/j.energy.2019.115989

300. Chakroun, N.M., Shanbhogue, S., Taamallah, S., Michaels, D., Kewlani, G. and Ghoniem, A.F., Investigation of reduced kinetics mechanisms for accurate LES of premixed swirling oxy-fuel combustion, *Combust Sci Tech*, 2019, 1-21. https://dx.doi.org/10.1080/00102202.2019.1684907

301. Suarez-Almeida, M., Gomez-Barea, A., Ghoniem, A.F., Nilsson, S. and Leckner, B., Modeling the transient response of a fluidized bed biomass gasifier, *Fuel*, 274 (2020) 117226. https://doi.org/10.1016/j.fuel.2020.117226.

302. Barr, M., Kung, K., Thengane, S., Sweeney, D. and Ghoniem, A.F. (2019). Characterization of Aggregate Behaviors of Torrefied Biomass as a Function of Reaction Severity. *Fuel*. 266 (2020) 115989. https://doi.org/10.106/j.fuel.117152

303. Cai, L., Wu, X.Y., Zhu, X., Ghoniem, A.F. and Yang, W. Robust membrane reactor for pre-combustion CO_2 capture with near zero energy consumption. 2019, *AICHE Journal*, 2020. http://dx.doi.org/10.1002/aic.17247

304. Kung, K.S., Thengane, S.T., and Ghoniem, A.F., Functional mapping of torrefied products characteristics with index of torrefaction, *Fuel Processing Tech*., 202 (2020) 106362. https://doi.org/10.1016/j.fuproc.2020.106362

305. Kung, K., Thengane, S, Jim Lim, Sokhansanj, S., and Ghoniem, A.F., Thermal loss analysis and improvements for biomass conversion reactor, *Energy Conversion and Management*, 218 (2020) 112924. http://doi.org/10.1016/j.enconman.2020.112924

306. Thengane, S., Burek, J., Kung, K., Ghoniem, A.F and Sanchez, D.L. Life cycle assessment of rice husk torrefaction and prospects for decentralized facilities at rice mills. *Journal of Cleaner Production*, 275 (2020) 123177. http://doi.org/10.1016/j.jclepro.2020.123177

307. Suarez Almeida, M., Gomez Barea, A., Ghoniem, A.F. and Pfeifer, C., Solar gasification in a dual fluidized bed., *Chemical Eng. J.* 2020, 126665.

308. Gomez-Barea, A., Suarez-Almeida, M. and Ghoniem, A.F., Analysis of fluidized bed gasification of biomass assisted by solar-heated particles, *J. Biomass Conversion and Biorefineries*, 2020, 1-16, http://doi.org/10.1007/s13399-020-00865-0

309. Wu, XY, Cai, I., Zhu, X., Ghoniem, AF, and Yang, W, A high efficiency novel IGCC-OTM carbon capture power plant design, *J Advanced Manuf. Processing*, 2, 10059, 2020.

310. Tajik, AR, Shamim, T, Ghoniem, AF and Abu Al-Rub, R, The impact of critical operational parameters on the performance of the aluminum anode baking furnaces, *J. Energy Resources Tech*, 143, 2020, 1-16.

311. Dimitrakopoulos, G., Koo, B., Yildiz, B. and Ghoniem, A.F., Highly durable C2 hydrocarbon production via oxidative coupling of methane using a BaFe0.9Zr0.1O3-d MIEC membrane and La2O3 catalyst., *ACS Catalysis*, 11, 3638-3661, 2021. https://dx.doi.org/10.1021/acscatal.0c04888

312. Kung, K., Thengane, SK, Sokhansanj, S., Lim, J and Ghoniem, AF, Bulk permeability characteristics in a biomass moving bed and their effect on scaling, *Chem Eng. J.,* 2021, 420, 129979. https://doi.org/10.1016/j.cej.2021.129979

313. Chen, L., Shanbhogue, S., Pannala, S., Shtern, V., Ghoniem, A.F. and West, D., A nonpremixed annular jet vortex chamber reactor for methane pyrolysis under oxygen enriched conditions, *Indust. Eng. Chem. Research,* 2021, 60(19) 7443-7453. https://doi.org/10.1021/acs.iecr.1c00131

314. Gupta, S., Hemchandra, S., Shiumra, M, Shanbhogue, S., and Ghoniem, AF, Impact of a centerbody on the unsteady flow dynamics of a swirl nozzle: intermittency of PVC oscillations, *ASME J. of Eng. Gas Turbine and Power*, 144(2) 2022.

315. Ngamsidhiphongsa, N., Ghoniem, AF and Arpornwichanop, A., Detailed kinetic mechanism of devolatilization stage and CFD modeling of downdraft gasifiers using pelletized palm oil empty fruit bunches, *Renewable Energy*, 179 (2021) 2267-2276.

https://doi.org/10.1016/j.renene.2021.08.010

316. Guoxing Chen, Armin Feldhoff, Anke Weidenkaff, Claudia Li, Shaomin Liu, Xuefeng Zhu, Jaka Sunarso, Kevin Huang, Xiao-Yu Wu, Ahmed F. Ghoniem, Weishen Yang, Jian Xue, Haihui Wang, Zongping Shao, Jack H. Duffy, Kyle S. Brinkman, Xiaoyao Tan, Yan Zhang, Heqing Jiang, Rémi Costa, Kaspar Andreas Friedrich, and Ralf Kriegel, Roadmap for sustainable mixed inonic electronic conducting membranes, a Review, *Advanced Functional Materials*, 2021, 2105702. http://doi.org/10.1002/adfm.202105702

317. Kung, KS, Thengane, SK, Ghoniem, AF, Lim, CJ, Cao, Y and Sokhansanj, Startup, shutdown and transition timescale analysis in biomass reactor operation, Energy, 123448 (2022)

318. Thengane, S. Kung, K., Gomez-Barea, and Ghoniem, Advances in biomass torrefaction: process parameters, kinetics. reactor design, applications and market prospects.

CONFERENCE PUBLICATIONS (With Refereed Archival Manuscripts)

1. Ghoniem, A. F. and Oppenheim, A. K., Random element method for numerical modeling of diffusional processes, *Proc. 8th Int. Conf. Num. Meth. Fluid Dynamics,* ed. by E. Krause, Springer-Verlag, New York, pp. 224-232, 1982.

2. Ghoniem, A. F. and Sethian, J. A., Dynamics of recirculation in a turbulent flow; A computational investigation, *The AIAA 23rd Aerospace Sciences Meeting*, Reno, Nevada, AIAA-85-0146, 1985.

3. Ghoniem, A. F., Analysis of flame deformation in a turbulent field; effect of Reynolds number on the burning rate. *The AIAA 23rd Aerospace Sciences Meeting,* Reno, Nevada, 1985, AIAA-85-0140.

4. Ghoniem, A. F., Dynamics of flame propagation in a turbulent field. Invited lecture at the AMS-SIAM Summer Seminar on Large-Scale Computations in Fluid Mechanics, La Jolla, July 1983. *Lectures in Applied Mathematics*, 22, pp. 161-175, 1985.

5. Ghoniem, A. F., Computational methods in turbulent reacting flows. Invited three lecture series at the Seventeenth AMS-SIAM Summer Seminar in Applied Mathematics on Combustion and Chemical Reactors, Cornell University, July 1985. *Lectures in Applied Mathematics*, 24, pp. 199-265, 1986.

6. Ng, K. K., and Ghoniem, A. F., Numerical simulation of a confined shear layer. The 10th International Colloquium on the Dynamics of Explosions and Reactive Systems, August 4-9, 1985, Berkeley, CA. *Dynamics of Reactive Systems,* Part II, ed. Bowen, Meyer, and Soloukhin, *Prog. Astro. Aero*, 105, 1986, pp. 18-49.

7. Ghoniem, A. F. and Gagnon, Y., Numerical investigation of recirculating flow at moderate Reynolds numbers. *The AIAA 24th Aerospace Sciences Meeting*, Reno, Nevada, January 1986, AIAA-86-0370.

8. Ghoniem, A. F. and Ng, K. K., Effect of harmonic modulation on rates of entrainment in a confined shear layer. *The AIAA 24th Aerospace Sciences Meeting*, Reno, Nevada, January 1986, AIAA-86-0056.

9. Ghoniem, A. F., and Givi, P., Vortex-scalar element calculations of diffusion flame stabilized on a plane mixing layer. *25th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 1987, AIAA-87-0225.

10. Ghoniem, A. F., Knio, O. M., and Aly, H. F., Three-dimensional vortex simulation with application to an axisymmetric shear layer. *25th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 1987, AIAA-87-0379.

11. Ghoniem, A. F., and Givi, P., Vortex-scalar element calculations of diffusion flame stabilized on a plane mixing layer. *25th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 1987, AIAA-87-0225.

12. Ghoniem, A. F., Knio, O. M., and Aly, H. F., Three-dimensional vortex simulation with application to an axisymmetric shear layer. *25th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 1987, AIAA-87-0379.

13. Najm, H. and Ghoniem, A.F., Vortex simulation of the convective instability in a dump. *23rd AIAA/SAE/ASME/ASEE Joint Propulsion Meeting*, La Jolla, California, June 29-July 1, 1987, AIAA-87-1874.

14. Knio, O.M. and Ghoniem, A.F., On the formation of streamwise vorticity in turbulent shear flows. *AIAA 26th Aerospace Sciences Meeting*, Reno, NV, January 11-15, 1988, AIAA-88-0728.

15. Ghoniem, A.F., Heidarinejad, G., and Krishnan, A., On mixing, baroclinicity and the effect of strain in a chemically reacting shear layer. *AIAA 26th Aerospace Science Meeting*, Reno, NV, January 11-15, 1988, AIAA-88-0729.

16. Ghoniem, A.F., Vortex methods in two and three dimensions with application to turbulent shear flows. Invited paper, *Proceedings of the AIAA/ASME/SIAM/APS 1st National Fluid Dynamics Congress,* Cincinnati, OH, July 24-28, 1988, p. 658.

17. Heidarinejad, G. and Ghoniem, A.F., Vortex simulation of the reacting shear layer; Effects of the Reynolds and Damkohler numbers. *27th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 9-12, 1989, AIAA-89-0573**.**

18. Krishnan, A. and Ghoniem, A.F., Numerical simulation of the structure of a heated jet in cold Atmosphere. *27th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 9-12, 1989, AIAA-89-0485.

19. Knio, O.M. and Ghoniem, A.F., Three-dimensional vortex simulation of the entrainment augmentation due to streamwise vortex structures. *27th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 9-12, 1989, AIAA-89-0574.

20. Najm, H. and Ghoniem, A.F., Flame-Vorticity-Acoustic Interactions Leading to Combustor Instability. *AIAA/SAE/ASME/ASEE 25th Joint Propulsion Meeting*, Monterey, CA, July 10-12, 1989, AIAA-89-2665.

21. Ghoniem, A.F., Knio, O.M., and Heidarinejad, G., The structure of the reaction zone in a reacting shear layer. *Dynamics of Deflagration and Reactive Systems: Flames*, Progress in Astronautics and Aeronautics, 131, ed. by Kuhl, Leyer, Borisov and Sirignano, 1991, pp. 220-236.

22. Ghoniem, A.F. and Krishnan, A. Vorticity-combustion interactions in a turbulent reacting jet. *Dynamics of Deflagration and Reactive Systems: Flames*. Published in Progress in Astronautics and Aeronautics, 131, ed. by Kuhl, Leyer, Borisov and Sirignano, 1991, pp. 237-256.

23. Ghoniem, A.F., Knio, O.M. and Soteriou, M., Manipulation of the growth rate of a variable-density, spatially developing mixing layer via external modulation. *29th AIAA Aerospace Sciences Meeting*, Reno, NV, January 1991. AIAA-91-0081.

24. Ghoniem, A.F., Martins, L.-F., Rotman, D.A. and Kelly, J., The dispersion of the jet fluid due to the large-scale motion in bluffbody flows. AIAA/SAE/ASME 27th Joint Propulsion Conference, June 24-26, 1991/Sacramento, CA, AIAA-91-1861.

25. Ghoniem, A.F. and Knio, O.M., The Development and Application of the Transport Element Method to 3D Reacting Shear Layers. Vortex Dynamics and Vortex Methods, ed. by C.R. Anderson and C. Greengard. *Lectures in Applied Mathematics*, Vol. 28, pp. 165-218, 1991.

26. Knio, O.M. and Ghoniem, A.F., Stability of a differentially heated asymmetric vorticity layer. NATO Advanced Research Workshop on Vortex Flows and Related Numerical Methods, June 15-19, 1992, Grenoble, France, by J.T. Beale et al., Kluwer Academic Publishers, 1993, pp. 341-372.

27. Soteriou, M.C. and Ghoniem, A.F., Dynamics of reacting shear flows, effects of exothermicity and forcing. *32nd Aerospace Sciences Meeting*, Reno, NV, January 1994. AIAA-94-0777.

28. Petrov, C.A. and Ghoniem, A.F., An Unsteady Strained Flame Model for Turbulent Combustion Simulation. *32nd Aerospace Sciences Meeting*, January 1994, Reno, NV. AIAA-94-0776.

29. Luu, V.C. and Ghoniem, A.F., Simulation of the reacting field in an axisymmetric bluff-body combustor using the vortex-scalar element method—an isothermal fast-chemistry model. *33rd Aerospace Sciences Meeting*, Reno, NV, 1995, AIAA 95-0808.

30. Soteriou, M.C. and Ghoniem, A.F., Wake effects on an exothermic spatially developing shear layer. *33rd Aerospace Sciences Meeting*, Reno, NV, 1995, AIAA-95-0807.
31. Petrov, C. and Ghoniem, A.F., An Unsteady strained flame model with reduced reaction mechanism for turbulent combustion simulation. *33rd Aerospace Sciences Meeting*, Reno, NV 1995, AIAA-95-0380.
32. Annaswamy, A., Fleifil, M., Ghoniem, Z. and Ghoniem, A.F., Dynamic instability in combustion processes—a feedback model and active control. *Proceedings of the 4th IEEE Conf. on Control Applications.*, Albany, NY, Sept. 28-29, 1995.
33. Gharakhani, A. and Ghoniem, A.F., A Random-vortex-boundary-element method for the simulation of time dependent incompressible viscous flows in three dimensional geometries. *Proceedings of the 2nd Int. Workshop on Vortex Flows and Related Numerical Methods,* Montreal, Canada, August 1995, ESAIM: Proceedings, Vol. 1, 1996, pp. 33-47, http://www.emath.fr/proc/vol1/
34. Gharakhani, A. and Ghoniem, A.F., A Massively parallel implementation of a three-dimensional random-vortex-boundary-element method. *Proceedings of the 2nd Int. Workshop on Vortex Flows and Related Numerical Methods*, Montreal, Canada, August 1995, ESAIM: Proceedings, Vol. 1, 1996, pp. 213-223, http://www.emath.fr/proc/vol1/
35. Soteriou, M.C. and Ghoniem, A.F., Numerical simulation of exothermic spatially developing shear flows. *Proceedings of the 2nd Int. Workshop on Vortex Flows and Related Numerical Methods,* Montreal, Canada, August 1995, ESAIM: Proceedings, Vol. 1, 1996, pp. 429-446, http://www.emath.fr/proc/vol1/
36. Zhang, Z. and Ghoniem, A.F., Transport element method for axisymmetric variable-density flow and its application to the spread and dispersion of a dense cloud. *Proceedings of the 2nd Int. Workshop on Vortex Flows and Related Numerical Methods*, Montreal, Canada, August 1995, ESAIM: Proceedings, Vol. 1, 1996, pp. 77-94, http://www.emath.fr/proc/vol1/.
37. Gharakhani, A. and Ghoniem, A.F., Vortex simulation of the three-dimensional wake behind a cube. *34th Aerospace Sciences Meeting*, Reno, Nevada, January 1996, AIAA 96-0170.
38. Gharakhani, A. and Ghoniem, A.F., 3D Vortex simulation of intake flow in a port-cylinder with a valve seat and a moving piston. *International Spring Fuels & Lubricants Meeting*, Dearborn, Michigan, May, 1996, SAE 961195.
39. Soteriou, M.C., Knio, O.M., and Ghoniem, A.F., Simulation of flow-combustion interactions in a spatially developing mixing layer. (preliminary paper presented at the *30th Aerospace Sciences Meeting and Exhibit*, January, 1996, Reno, Nevada. AIAA-96-0081). Dynamics of Exothermicity, Vol. 2, pp. 97-116, Gordon and Breach Publishers, 1996.
40. Gharakhani, A. and Ghoniem, A.F., Toward a grid-free simulation of flow in engines, Proceedings of the 1997 ASME Fluids Engineering Annual Summer Meeting, Vancouver, Canada, 1997, FEDSM97-3025, pp. 1-11.
41. Ghoniem, A.F. and Petrov, C., Numerical simulation of reacting flows with multi-step kinetics. *35th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January, 1997, AIAA-97-0291.
42. Ghoniem, A.F. and J. Saghbini, Numerical simulation of the dynamics and mixing in a swirling flow. *35th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January, 1997, AIAA-97-0507.
43. Hathout, J.P., Fleifil, M., Annaswamy, A.M. and Ghoniem, A.F., Why do second peaks appear in experimental active controllers of thermo-acoustic instability. 33rd. AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Seattle, WA, July 6-7, 1997, AIAA-97-2834.
44. Lakkis, I and Ghoniem, A.F., Lagrangian simulation of fire plumes," the 7th AIAA/ASME Joint Thermophysics and Heat Transfer Conf., Albuquerque, NM, June 15-18, 1998.
45. Gharakhani, A. and Ghoniem, A.F., 3D Vortex simulation of flow in engines during compression. Proceedings of the 1998 ASME Fluids Engineering Annual Summer Meeting, Washington, D.C., FEDSM98-5001, June 21-25, 1998.

46. Gharakhani, A. and Ghoniem, A.F., Grid-free simulation of flow in opposed piston engines. 3rd Int. Workshop on Vortex Flows and related Numerical Methods, Toulouse, France, Aug 24-27, 1998, http://www.emath.fr/Maths/Proc/Vol.7.

47. Shankar, S. and Ghoniem, A.F., Vortex method for axisymmetric reacting flows, a new redistribution algorithm for diffusion. 3rd Int. Workshop on Vortex Flows and related Numerical Methods, Toulouse, France, Aug 24-27, 1998, http://www.emath.fr/Maths/Proc/Vol.7.

48. Lakkis, I. and Ghoniem, A.F., Grid free simulation of radiative transport in participating medium. 3rd Int. Workshop on Vortex Flows and related Numerical Methods, Toulouse, France, Aug 24-27, 1998, http://www.emath.fr/Maths/Proc/Vol.7

49. Fleifil, M., Annaswamy, A.M., Hathaout, J.P., and Ghoniem, A.F., Reduced order modeling of heat release dynamics and active control of time-delay instability. *38th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January 2000, AIAA-2000-0708.

50. Marzouk, Y.M., Najm, H.N., and Ghoniem, A.F., Flame embedding techniques for turbulent combustion simulations at high Damkohler conditions. *38th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January, 2000, AIAA-2000-0866.

51. Lakkis, I, and Ghoniem, A.F., Grid-free simulation of a reacting fuel ring. *the 38th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January 2000, AIAA-2000-0861.

52. Ghoniem, A.F., and Lakkis, I. Towards Lagrangian, Grid-free Simulation of Combustion. Keynote address, Proceedings of the First MIT Conference on Computational Fluid and Solid Mechanics, June 12-15, 2001, MIT, Cambridge, MA, pp. 1188-1191.

53. Marzouk, Y.M., and Ghoniem, A.F., Computational Modeling and Control of Mixing in a Transverse Jet. Presented at the First MIT Conference on Computational Fluid and Solid Mechanics, June 12-15, 2001, MIT, Cambridge.

54. Prasanth, R., Annaswamy, A., Hathout, JP, and Ghoniem, A.F., When do open loop strategies for combustion control work. 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conf., July 2000, Huntsville, AL, AIAA-2000-3350.

55. Wee, D. Park, S., Yi, T., Annaswamy, A., and Ghoniem, A. F., Reduced order modeling of reacting shear flow. *40th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January 2002, AIAA-2002.

56. Marzouk, Y., and Ghoniem, A.F., Mechanism of formation of streamwise vorticity in a transverse jet. *40th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January 2002, AIAA-2002.

57. Yi, T., Wee, D, Annaswamy, A.M. and Ghoniem, A.F., Self-sustained oscillations in separating flows; simulation and stability analysis. 2nd MIT Conference in Fluid and Solid Mechanisms, June 17-20, 2003, Cambridge, MA.

58. Murugappan, S., Park, S., Annaswamy, A., Ghoniem, A.F., Acharya, S.A., and Allgood, D.C., Optimal control of a swirl stabilized spray combustor using system identification approach. *39th Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, January 2001, AIAA-2001-0779, *Combust. Sci Tech*, 175, 55-81, 2003

59. Marzouk, Y.M., and Ghoniem, A.F., Vorticity generation mechanisms and correct boundary conditions for transverse jet simulations. 2nd MIT Conference in Fluid and Solid Mechanisms, June 17-20, 2003, Cambridge, MA.

60. Albukreck, C.M., Batishcheva, A., and Ghoniem, A.F., Parallel vortex simulations of high Reynolds number flows. 2nd MIT Conference in Fluid and Solid Mechanisms, June 17-20, 2003, Cambridge, MA.

61. Ghoniem, A.F., Combustion Dynamics, Mechanisms, Modeling and Control, Invited Keynote address, presented at the 19th ICDERS, Hakone, Japan, July 28-August 1, 2003.

62. Park, S.B., Wachsman, A., Annaswamy, A.M., Ghoniem, A.F., Pang, B., Yu, K., Experimental study of POD based control for combustion instability using linear photodiode array, the 42nd AIAA Aerospace Science Meeting, Reno NV, January 2004.

63. Wachsman, A., Park, S.B., Annaswamy, A.M., Ghoniem, A.F., Simultaneous combustion instability and emissions control using air and fuel modulation, the 42nd AIAA Aerospace Science Meeting, Reno NV, January 2004.
64. Marzouk, Y.M., and Ghoniem, A.F., Vorticity formulation for an actuated jet in cross flow, the 42nd AIAA Aerospace Science Meeting, Reno NV, January 2004.
65. Pang, B, Yu, K., Park, S., Wachsman, A., Annaswamy, A., and Ghoniem, A.F., Characterization and control of vortex dynamics in an unstable dump combustor, the 42nd AIAA Aerospace Science Meeting, Reno NV, January 2004.
66. Yi, Y., Wee, D., Annaswamy, A.M., and Ghoniem, A.F., Self-sustained oscillations in separating flow: 1. Simulations, stability analysis and reduced order modeling. *Advanced in Combustion and Noise Control*, Chapter 27, pp. 423-434. Ed. by G.D. Roy K.H. Yu, J.H. Whitelaw and J.J. Witton, Cranfield University Press, 2005.
67. Yi, Y., Wee, D., Annaswamy, A.M., and Ghoniem, A.F., Self-sustained oscillations in separating flow: 2. Reduced order modeling and control," *Advanced in Combustion and Noise Control*, Chapter 28, pp. 437-449. Ed. by G.D. Roy K.H. Yu, J.H. Whitelaw and J.J. Witton, Cranfield University Press, 2005.
68. Park, S.B., Pang, B., Wachsman, A., Yu, K., Annaswamy, A.M., and Ghoniem, A.F., Performance of an adaptive Posicast controller in a liquid fueled dump combustor, *Advanced in Combustion and Noise Control*, Chapter 231, pp. 479-487. Ed. by G.D. Roy K.H. Yu, J.H. Whitelaw and J.J. Witton, Cranfield University Press, 2005.
69. Wachsman, A., Park, S.B., Annaswamy, A.M., and Ghoniem, A.F., POD based control strategies using air forcing in a backward facing step combustor, *Advances in Combustion and Noise Control*, Chapter 5, pp. 65-78. Ed. by G.D. Roy K.H. Yu, J.H. Whitelaw and J.J. Witton, Cranfield University Press, 2005.
70. Wee, D.H., Marzouk, Y.M., and Ghoniem, Lagrangian simulation of a jet in crossflow at a finite Reynolds number, the 43rd AIAA Aerospace Science Meeting, Reno NV, January 2005.
71. Ghoniem, A.F. and Marzouk, Y.M., Simulations of high Reynolds number transverse jets and analysis of the underlying vortical structure, the 43rd AIAA Aerospace Science Meeting, Reno NV, January 2005, AIAA-2005-0308.
72. Speth, R., Marzouk, Y.M., and Ghoniem, A.F., Impact of hydrogen addition on flame response to stretch and curvature, the 43rd AIAA Aerospace Science Meeting, Reno NV, January 2005, AIAA-2005-0143.
73. Wee, D., Park, S., Yi, T., Annaswamy, A. and Ghoniem, A.F., Model based optimal active control of liquid fueled combustion systems, in *Combustion Processes in Propulsion; Control, Noise and pulsed Detonation*, Chapter 19, pp. 201-209, Academic Press 2006.
74. Marzouk, Y.M. and Ghoniem, A.F., "Actuating transverse jets via nozzle edge vortical perturbations" the 44th AIAA Aerospace Sciences Meeting, Reno, NV, January 2006.
75. Speth, R.L., Altay, H.M. and Ghoniem, A.F., Dynamics and stability limits of syngas combustion in a backward facing step combustor, the ASME Turbo Expo 2007, May 14-17, 2007, Montreal, Canada.
76. Altay, H.M., Speth, R.L., Snarheim, D. and Ghoniem, A.F., Impact of microjet actuation on stability of backward facing combustor, the 45th AIAA Aerospace Sciences Meeting, Reno, NV, January 2007, AIAA-2007-563.
77. Alexander, B.R., and Ghoniem, A.F., Analysis and optimization of the coupled parameters of the Graz cycle, the Proceedings of GT2008, ASME Turbo Expo 2008: Power for Land, Sea and Air, June 2008, Berlin, Germany.
78. Speth, R.L., Altay, H.M., Hudgins, D.E. and Ghoniem, A.F., Dynamics and Stability limits of syngas combustion in a swirl stabilized combustor, the Proceedings of GT2008, ASME Turbo Expo 2008: Power for Land, Sea and Air, June 2008, Berlin, Germany, GT2008-51023.

79. Speth, R.L., Altay, H.M., Hudgins, D.E., Annaswamy, A. and Ghoniem, A.F., Vortex-driven combustion instabilities in step and swirl stabilized combustors, the 46th AIAA Aerospace Sciences Meeting, Reno, NV, January 2008.

80. Monaghan, R., Singer, S., Zheng, C., Kumar, M., and Ghoniem, A.F., Reduced order modeling of entrained flow solid fuel gasification, presented at the ASME Congress, Orlando, FL, November 2009.

81. Kumar, M., Singer, S., Zheng, C., Monaghan, R. and Ghoniem, A.F., CFD simulations of entrained flow gasifiers with improved devolatilization and char consumption submodels, IMECE, 3, 383-395, 2010.

82. LaBry, Z.A., Shanbogue, S.J., Speth, R.L., and Ghoniem, A.F., Instability suppression in a swirl stabilized Combustor using microjet air injection, presented at the AIAA 48th Aerospace Sciences Meeting, Orlando, FL, Jan 2010.

83. El-Asrag, H., and Ghoniem, A.F., Unsteady Flame Embedding (UFE) subgrid models for turbulent premixed combustion simulations, presented at the AIAA 48th Aerospace Sciences Meeting, Orlando, FL, Jan. 2010.

84. Sisco, J.C., Shanbhogue, S., El-Asrag, H. and Ghoniem, A.F., Development of a combustion stability analysis tools incorporating detailed flame-vortex dynamics, 46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, July 2010. Nashville TN.

85. Hong, J.S., Field, R., Gazzino, M. and Ghoniem, A.F., Techno-economic evaluation of the pressurized oxy-fuel combustion systems, Proceedings of the ASME 2010 Int. Mechanical Eng. Congress and Exposition, Nov 12-18, 2010, Vancouver, BC, CA, IMECE21010-38002.

86. LaBry, Z.A., Shanbhogue, S.J. and Ghoniem, A.F., "Microjet injection for suppressing instability in a premixed swirl stabilized combustor," Presented at the 49th AIAA Aerospace Sciences Meeting January, Orlando, FL 2011.

87. Speth, R.I., Shanbhogue, S.J., Hong, S.H., and Ghoniem, A.F., "Mode selection in flame-vortex driven combustion instability", Presented at the 49th AIAA Aerospace Sciences Meeting January, Orlando, FL 2011.

88. Rutberg, M.J., Delgado, A., Herzog, H. and Ghoniem, A.F., A system-level generic model of water use at power plants and its application to regional water use estimation and technology evaluation, IMECE2011-63786, ASME 2011 IMECE, Nov 11-17, 2011, Denver, CO. Summary appeared as Chapter 3.2 in "Thermal Power Plant Cooling: Context and Engineering", Ed by Carey King, ASME, 2013, ISBN: 9780791860250.

89. Kewlani, G., Abani, N., Shanbhogue, S. and Ghoniem, A.F., Large-eddy simulation of a swirl stabilized combustor, presented at the AIAA 50th Aerospace Science Meeting, Jan 2012, Nashville, TN.

90. Hassan, B., Shamim, T. and Ghoniem, A.F., "A parametric study of multi-stage chemical looping combustion for CO2 capture power plants, Proceedings of the ASME Summer Heat Transfer Conference, July 8-12, 2012, Puerto Rico, ASME2012-58579.

91. Hong, S.H., Shanbhogue, S.J., and Ghoniem, A.F., Impact of heat transfer at the flame-holder on combustion instability characteristics, ASME Turbo Expo 2012, GT2012-70057, June 11-15, Copenhagen DN.

92. Kewlani, G., Vogiatzaki, K., Shanbhogue, S., and Ghoniem, A.F., LES of wake stabilized reacting flows: a validation study, presented at the 51st AIAA Aerospace Sciences Meeting, Jan 2013. http://dx.doi.org/10.2514/6.2013-169

93. Iora, P., Ghoniem, A.F. and Beretta, G.P., What fraction of the electrical energy produced in a hybrid solar-fossil power plant should qualify as "renewable energy," Presented at the IMECE, San Diego, Nov 2013.

94. Beretta, G.P., Iora, P. and Ghoniem, A.F., what fraction of the fuel consumed by a heat-and-power cogeneration facility should be allocated to the heat produced, Presented at the IMECE, San Diego, Nov 2013.

95. LaBry, Z., Taamallah, Z., Kewlani, G., Shanbhogue, S. and Ghoniem, A.F., Intermittency and

mode transition in an acoustically uncoupled lean premixed swirl stabilized combustor, the ASME Turbo Expo 2014, Dusseldorf, Germany, June 2014. GT2014-27316.

96. Taamallah, S., LaBry, Z., Shanbhogue, S., and Ghoniem, A.F., Correspondence between the uncoupled flame configuration and thermoacoustic instability in lean premixed swirl stabilized combustor. ASME Turbo Expo, Dusseldorf, Germany, June 2014, GTP-14-1558.

97. Watanabe, H., Shanbhogue, S., and Ghoniem, A.F., The structure of swirl-stabilized premixed CH_4/air and CH_4/O_2/CO_2 flames; Impact of the equivalence ratio, Proceedings of the ASME TurboExpo, June 2015, Montreal, CA, GT2015-43224.

98. Taamallah, S., Shanbhogue, S.J., Sanusi, Y., Mokhiemer, E., and Ghoniem, A.F., Transition from a single to a double flame configuration in swirling reacting flows; mechanism, dynamics and effect of the thermal boundary condition, Proceedings of the ASME TurboExpo, June 2015, Montreal, CA, GT2015-43998.

99. Hong, S., Shanbhogue, S.J., and Ghoniem, A.F., Investigation on the correspondence between turbulent premixed flames and flow fields in a backward facing step combustor using OH-PLIF and PIV measurements, 9th US National Combustion Meeting, May 17-20, 2015, Cincinnati, OH.

100. Bates, R.B., Altantzis, C. and Ghoniem, A.F., Bubbling fluidized bed biomass gasification: modeling of char gasification and attrition kinetics, 9th US National Combustion Meeting, May 17-20, 2015, Cincinnati, OH.

101. Shanbhogue, S.J., Taamallah, S., Hong, S., Watanabe, H., LaBry, Z.A., Speth, R., and Ghoniem, A.F., Is scaling of premixed turbulent combustion dynamics using strained flame models possible, 9th US National Combustion Meeting, May 17-20, 2015, Cincinnati, OH.

102. Zhao, Z., Uddi, M., Chen, T., and Ghoniem, A.F., Oxidation studied for chemical looping combustion using thin nickel foils, 9th US National Combustion Meeting, May 17-20, 2015, Cincinnati, OH.

103. Shanbhogue, S.J., Sanusi, Y.S., Taamallah, S., Habib, M.A., Mokheimer, E.M., and Ghoniem, A.F., Scaling of combustion instability mode transition associated with the appearance of the outer recirculation zone flame in swirling CH_4/H_2 mixture, 9th US National Combustion Meeting, May 17-20, 2015, Cincinnati, OH.

104. Weiner, A. M., Blum, D., Lienhard, J., and Ghoniem, A.F., Design of a hybrid RO-MED solar desalination system for treating agricultural drainage water in California, for presentation at the Int. Desalination Association World Congress 15, Aug 30-Sep 4, 2015 San Diego, CA

105. Michaels, D., Kedia, K.S. and Ghoniem, A.F., The effect of stretch and heat loss on the anchoring of a bluffbody stabilized lean premixed flame during acoustic forcing, AIAA SciTech conference, Jan 2016, San Diego, CA.

106. Kirthy, S.K., Hong, S.H., Shanbhogue, S.J., Ghoniem, A.F., and Hemchandra, S., Role of unstable shear layer oscillations in driving combustion instability in a backward facing step combustor. Proceedings of the ASME Turbo Expo 2016, June 16-20, 2016, Seoul Korea, GT2016-57322.

107. Chakroun, N., Michaels, D., Shanbhogue, S. and Ghoniem, A.F., Response of premixed stoichiometric CH_4/O_2/CO_2 flames to strains; the role of chemistry and transport, AIAA SciTech Forum, 9-13 Jan 2017, Grapevine, TX. AIAA-2017-1800

108. Dana, A.G., Gudiyella, S., Green, W.H., Shanbhogue, S.J., Michaels, D., Chakroun, N.W. and Ghoniem, A.F., Automated generation of chemical mechanisms for predicting extinction strain rates with application in flame stabilization and combustion instability, AIAA SciTech Forum, 9-13 Jan 2017, Grapevine, TX 2017. AIAA-2017-0835.

109. Chakroun, N., Kewlani, G., Taamallah, S., Michaels, D., Shanbhogue, S. and Ghoniem, A.F., On the role of chemical kinetics modeling in the LES of premixed bluff body combustor, AIAA SciTech Forum, 9-13 Jan 2017, Grapevine, TX 2017. AIAA-2017-1572

110. Rambo, K.A., Warsinger, D.M., Shanbhogue, S., Lienhard, J.H., and Ghoniem, A.F., Water-energy nexus in Saudi Arabia, *Energy Procedia*, 105, 2017, 330-346. http://dx.doi.org/10.1016/j.egypro.2017.03.782

111. Roy, J., Ghoniem, A.F., Panora, R., et al., Development and testing of the Ultera® dual stage

catalyst system on gasoline fueled light duty vehicle (LDV's), WCX-17 SAE World Congress Experience, April4-6, 2017. http://dx.doi.org/10.4271/2017-01-0902

112.   Luo, Y., Wu, XY, Shi, Y., Ghoniem, A.F., and Cai, N., Exergy efficiency analysis of a power-to-methane system coupling water electrolysis and hydrogen production, *ECS Transactions* 78(1) 2965-2973.

113.   Dimitrakopoulos, G., Schucker, R.C., Johnson, J.R., Kopec., K.K., Alahmadi, F., Derrickson, K., and Ghoniem, A.F., Hydrogen and ethylene production through water splitting and ethane dehydrogenation using BaFe0.9Zr0.1O3-d mixed conductors, 232nd ECS Meeting, Oct 1-5, 2017, National Harbor, MD.

114.   Suarez-Almeida, M., Salinero, J., Ghoniem, A.F., Leckner, B. and Gomez-Barea, A., Simulation of the transient response of a fluidized bed gasifier for hybridized concentrated solar thermal power plant, 23rd Int. Conf. on Fluidized Bed Conversion, May 13-17, 2018, Seoul Korea,

115.   Roy, J., Ghoniem, A.F., Panora, R. and Gahredt, J., NOx reduction using a dual-stage catalyst system with intercooling in vehicle gasoline engines under real driving conditions. WCX-18 SAE World Congress Experience, 2018.

116.   Tajik, A.B., Shamim, T., Ghoniem, A.F., and Abu Al-Rab, R., CFD simulations of NOx and soot formation in aluminum anode baking furnace, for presentation at the ASME Int. Mech Eng. Congress and Exposition, Nov 2018, Pittsburg, PA.

117.   Tajik, A.B., Shamim, T., Ghoniem, A.F., and Abu Al-Rab, R., Multi-objective optimization of aluminum anode baking process employing a response surface, 10th International Conference on Applied Energy, Hong Kong, Aug 22-28, 2018

118.   Gupta, S., Hemchandra, S., Shiumra, M, Shanbhogue, S., and Ghoniem, AF, Impact of a centerbody on the unsteady flow dynamics of.a swirl nozzle: intermittency of PVC oscillations, ASME Turbo Expo, June 7-11, 2021, GT2021-58358.

119.   Patankar, A., Wu, X.Y., Choi, W.J., Tuller, H., and Ghoniem, A.F., Reactor Train System for efficient solar thermochemical fuel production, Proceedings of the ASME 2021 Inter. Mech. Eng. Congress and Exhibition. IMECE 2021, Nov 1-5, 2021. https://doi.org/10.1115/IMECE2021-69716

120.   Shanbhogue, S, Weibel, D., Gomez del campo, F., Cuerra-Garcia, C and Ghoniem, AF, plasmasActive control of large amplitude combustion oscillation using nanosecond repetitively pulsed discharge plasmas, AIAA SciTech 2022 Forum, 1450.

BOOKS

1.   "Meeting the Entropy Challenge, An International Thermodynamics Symposium in Honor and Memory of Joseph H. Keenan", Ed. By G.P. Beretta, A.F. Ghoniem and G. N. Hatsopoulos, AIP Press, NY, 2008.

2.   "Energy Conversion Engineering, Towards Low CO_2 Powers and Fuels," Ahmed F. Ghoniem, 2022, Cambridge University Press, xxiv+816 p. DOI: 10.1017/9781108777551.

SOME BOOK CHAPTERS

1.   Ghoniem, A.F., Heidarinejad, G. and Krishnan, A. "Turbulence-Combustion interactions in a reacting shear layer," *Turbulent Reactive Flows*, ed. by Borghi and Murthy, *Lecture Notes in Engineering*, 40, New York, 1989, pp. 631-677.

2.   Ghoniem, A.F., "Vortex Simulation of Reacting Shear Flow," Chapter 10 in *Numerical Approaches to Combustion Modeling*, ed by E. Oran and J. Boris, Progress in Aeronautics and Astronautics, Vol. 135, 1991, pp. 305-348.

3. Ghoniem, A.F., "Numerical simulation of turbulent combustion using vortex methods," *Fluid Mechanical Aspects of Combustion*, ed. by M. Onofre and A. Resei, Pitman, 1991, pp. 305-326.
4. Ghoniem, A.F., "Energy and Climate Change; and How to Avoid a Man-Made Disaster," appeared in "Large-Scale Disasters: Prediction, Control and Mitigation," Ed. By M. Gad-el-Hak, Cambridge University Press, 2008, pp. 177-217.
5. El-Asrag, H.A. and Ghoniem, A.F., Unsteady Flame Embedding, Chapter 12 in "Turbulent Combustion Modeling, Advances, new Trends and Perspectives," Ed. by E. Mastorakos and T. Echekki, Cambridge, 2010, pp. 259-282.

SOME CONFERENCE PUBLICATIONS (With Refereed Abstract)

1. Sethian, J.A., Sulem, J.B., and Ghoniem, A.F., Interactive scientific visualization and parallel display techniques. *Proceedings of the Supercomputing Conference*, Orlando, FL, Nov. 14-18, 1988.
2. Najm, H., and Ghoniem, A.F., Modeling pulsating combustion due to the flow-flame interactions in vortex stabilized pre-mixed flames. The International Symposium on Pulsating Combustion, August 5-8, 1991, Monterey, CA.
3. Annaswamy, A., Fleifil, M., Ghoniem, Z. and Ghoniem, A.F., Dynamic instability in combustion processes—a feedback model and active control. *Proceedings of the 4th IEEE Conf. on Control Applications*., Albany, NY, Sept. 28-29, 1995.
4. Annaswamy, A.M., Fleifil, M., Ghoniem, Z. and Ghoniem, A.F., A Dynamic model of resonant interactions in combustion processes.' *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*), San Francisco, CA, November 1995.
5. Ghoniem, A.F., Hathout, J.P., Fleifel, M. and Annaswamy, A.M., Analysis and design of active control of thermo-acoustic instability using a model based approach. the IEEE Conference on Control Applications, East Hartford, CT, Sept. 1997.
6. Rumsey, J.W., Fleifel, M., Annaswamy, A.M., Hathout, J.P., and Ghoniem, A.F., The Role of active control in suppressing thermo-acoustic instability: theory to practice. The IEEE Conf. on Control Application, East Hartford, CT, Sept. 1997.
7. Hathout, J.P., Fleifil, M. Annaswamy, A.M. and Ghoniem, A.F, Modeling and control of combustion instability using fuel injection. Tthe AVT NATO Symposium, Braunschwig, Germany, May 8-12 2000.
8. Marzouk, Y.M., and Ghoniem, A.F., Three-Dimensional Vortex Filament Simulation of a Transverse Jet. The American Physical Society, Division of Fluid Dynamics Meeting, November 2001, APS Bulletin, p. 199.
9. Ghoniem, A.F., Active Control of Mixing and Combustion, from Mechanism to Implementation. invited paper presented at the American Physical Society, Division of Fluid Dynamics Meeting, November 2001, APS Bulletin, p. 24.
10. Ghoniem, A.F., Marzouk, Y.M., and Najm, H.N., Can a one-dimensional strained flame model combustion in flame-vortex interactions, Proceeding of the Second Mediterranean Combustion Symposium, Egypt, January 2002, pp. 372-383.
11. Marzouk, Y.M., and Ghoniem, A.F., Vortex simulation of transverse jets. 4th International Workshop on Vortex Flows and Related Numerical Methods, Santa Barbara, March 2002.
12. Park, S.B., Annaswamy, A.M., and Ghoniem, A.F., A model based self-tuning controller for kinetically controlled combustion instability. American Control Conference, May 8-10, 2002, Anchorage, AL.

13. Park, S.B., Wee, D., Annaswamy, A.M., and Ghoniem, A.F., Adaptive low order posicast control of a combustion testing rig model. Conference on Decision and Control, Dec. 2002, Las Vegas, NV.

14. Ghoniem, A.F. and Annaswamy, A.M., Model based control of combustion dynamics. Invited Plenary lecture, Proceedings of the 4th Symposium on Smart Control of Turbulence, Tokyo, Japan, March 2003.

15. Ghoniem, A.F., Yi, T., Wee, D. and Annaswamy, A.M., Nonlinear control of self-sustained oscillations in separating flows. 3rd Mediterranean Combustion Symposium, Morocco, June 2003.

16. Ghoniem, A.F., Modeling and control of combustion dynamics. Invited paper, Int. Symposium on Combustion and Atmospheric Pollution, St. Petersburg, Russia, July 8-11, 2003.

17. Ghoniem, A.F., Lean Premixed Combustion. Invited Plenary Lecture at IFRF/JFRF, Maui, Hawaii, 2004.

18. Wee, D.H., Marzouk, Y.M. and Ghoniem, A.F., K-means clustering and diffusive interpolation for high-resolution. American Physical Society's Fluid Dynamics Meeting, Seattle, WA, Nov 2005.

19. Marzouk, Y.M., and Ghoniem, A.F., Vorticity structures and mechanisms in a transverse jet. American Physical Society's Fluid Dynamics Meeting, Seattle, WA, Nov 2005.

20. Ghoniem, A.F., Lagrangian Methods in Fluids and Combustion. Invited Plenary Lecture, MIT Conference on Fluid and Solid Mechanics, 2005.

21. Altay, H.M., Kedia, J. S., Speth, R.L., and Ghoniem, A.F, Simulations of laminar perforated plat stabilized flame dynamics. The US National Combustion Conference, May 2009, Ann Arbor Michigan.

22. Hong, J., Field, R., Gazzino, M., and Ghoniem, A.F., Performance of the pressurized oxy-fuel combustion power cycle, impact of combustor pressure.The Clearwater Coal Conference, May 31-June 4, Clearwater, FL, 2009.

23. El-Asrag, H., Nave, J.C., and Ghoniem, A.F., An algorithm for accurate prediction of turbulent burning velocity for under resolved premixed flames. Fall Technical Meeting, Eastern States Section of the Combustion Institutes, U. of Maryland, Oct 18-21 2009.

24. Monaghan, R.F.D. and Ghoniem, A.F., Dynamic Reduced order modeling of entrained flow gasifiers, Part I: model description and validation. Proceedings of the 35th International Technical Conference on Clean Coal & Fuel Systems, June 6-10, 2010, Clearwater, FL.

25. Monaghan, R.F.D. and Ghoniem, A.F., Dynamic Reduced order modeling of entrained flow gasifiers, Part II: steady-state predictions and sensitivity analysis. Proceedings of the 35th Inter. Technical Conference on Clean Coal & Fuel Systems, June 6-10, 2010, Clearwater, FL.

26. Yong, S.Z., Gazzino, M. and Ghoniem, A.F., Multiphase models of slag layer built-up in solid fuel gasification and combustion. Proceedings of the 35th International Technical Conference on Clean Coal & Fuel Systems, June 6-10, 2010, Clearwater, FL.

27. Iloeje, C., Field, R. Gazzino, M. and Ghoniem, A.F., Process modeling and analysis of CO_2 purification for pressurized oxy-coal combustion. Proceedings of the 35th International Technical Conference on Clean Coal & Fuel Systems, June 6-10, 2010, Clearwater, FL.

28. Chen, L., Gazzino, M. and Ghoniem, A.F., Characteristics of pressurized oxy-coal combustion under increasing swirl number, Proceedings of the 35th International Technical Conference on Clean Coal & Fuel Systems, June 6-10, 2010, Clearwater, FL.

29. Wu, G., Timko, M. and Ghoniem, A.F., Mixing of multicomponent hydrocarbon droplet in supercritical water, presented at the Int. Symposium on Supercritical Fluids, May 13-16, 2012, San Francisco CA.

30. Ghoniem, A.F., Oxy-coal Combustion for carbon Capture, invited presentation in the Oxy-fuel Combustion Technology Panel, the 37th International Technical Conference on Clean Coal & Fuel Systems, June 4-7, 2012, Clearwater, FL.

31. Botero, C., Herzog, H. and Ghoniem, A.F., Coal-CO_2 slurry feed for pressurized gasifiers, slurry preparation system characterization and economics, the 11th Green-House Gas Technology Conference, Nov 18-22, 2012, Kyoto, Japan.

32. Botero, C., Field, R.P., Herzog, H.J. and Ghoniem, A.F., Impact of finite-rate kinetics on carbon conversion in a high-pressure single-stage entrained flow gasifier with coal-CO_2 slurry feed. (Best Paper Award, 37th Int. Tech. Conf. on Clean Coal & Fuel Systems, June 2012.

33. Altantzis, C., Bates, R.B., and Ghoniem, A.F., Comparison of simplified 1D models with 2D and 3D CFD simulations of a laboratory-scale bubbling fluidized bed hydrodynamics, presented at the Int. Conf. Multiphase Flow 2013, Jujo, South Korea, May 26-31, 2013.

34. Altantzis, C., and Ghoniem, A.F., Numerical simulation of mixing of a binary mixture consisting of spherical wooden particles and sand in a bubbling fluidized bed, presented at the Int. Conf. Multiphase Flow 2013, Jujo, South Korea, May 26-31, 2013.

35. Hunt, A., Dimitrakopoulos, G., Kirchen, P., and Ghoniem, A.F. *Experimental surface characterization of oxygen ion transport membranes for flux model development under oxy-fuel combustion conditions*. Conference of Inorganic Membranes, Valencia, September 2013.

36. Bates R. B. Addison S.K. Zhao Z., Ghoniem A.F., Comparison of reduced kinetic mechanisms for gas phase reactions in fluidized bed biomass gasification. *Presented* at the 2013 American Institute of Chemical Engineers (AIChE) Annual Meeting, 2013.

37. Bates R. B. Altantzis C., Ghoniem A.F., Eulerian simulations of the bubbling dynamics of binary mixtures in pseudo-2D and 3D gas-solid fluidized beds. *Presented* at the 2013 American Institute of Chemical Engineers (AIChE) Annual Meeting, 2013.

38. Taamallah, S., Vogiatzaki, K., Kewlani, G., Shanbhogue, S., and Ghoniem, A.F., "Influence of Boundary Layer Trip on Non–Swirling and Swirling Reacting Jets Using Large Eddy Simulation" Numerical Combustion Conference, San Antonio Texas, USA, April 8-10th, 2013.

39. Stark, A.K., Altantzis, C., and Ghoniem, A.F., CFD modeling of wood sawdust gasification in a laboratory-scale fluidized bed gasifier, presented at the SIAM Numerical Combustion Conference, San Antonio, TX, April 2013.

40. Botero, C., Field, R.P., Herzog, H.J. and Ghoniem, A.F., On the role of thermodynamics and kinetics in a coal-CO_2 slurry-fed gasifier: optimization of CO_2:H_2O ratio though CO_2 skimming and steam injection. The 38th Int. Tech. Conf. on Clean Coal & Fuel Systems, June 2013, Best Paper Award.

41. Bates R. B. Altantzis C., Ghoniem A.F., Assessment of discrete bubble models using two-fluid simulations of thin rectangular fluidized beds. *Presented at the 2014* National Energy Technology Laboratory (NETL) Multiphase Flow Science Workshop, Morgantown, PA, 2014.

42. Bates R. B. Ghoniem A.F., 2014 Time scale and modeling sensitivity analysis of carbon conversion kinetics in fluidized bed gasifier. *Presented* at the 2014 Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products (TCS), 2014.

43. Bates R.B., Altantzis C., Ghoniem A.F., 2014. Multifluid Eulerian modeling and theoretical analysis of solids mixing in thin rectangular and cylindrical gas solid fluidized beds. *Presented* at the 2014 American Institute of Chemical Engineers (AIChE) Annual Meeting, 2014.

44. Lee, WY, Ong, K. and Ghoniem, A.F., Modeling the impact of CO electrochemistry on the performance of an SOFC running on syngas, the ECS Conference on Electrochemical Energy Conversion & Storage with SOFC-XIV, July 26-31, 2015, Glasgow, Scotland.

45. He, P., Raghavan, A. and Ghoniem, A.F., Mixing of crude oil and near-critical or supercritical water using crude pseudocomponents, presented at the AICHE 2015 Annual Meeting, Salt Lake City, UT, Nov 2015.

46. Wu, X.Y., Uddi, M. and Ghoniem, A.F., Hydrogen production using MIEC membranes for water thermolysis with partial oxidation of methane, presented at the AICHE 2015 Annual Meeting, Salt Lake City, UT, Nov 2015.

47. He, P., Raghavan, A. and Ghoniem, A.F., Uphill diffusion and phase separation in partially miscible multicomponent mixtures, presented at the APS Division of Fluid Dynamics Meeting, Boston MA, Nov 2015.

48. Michaels, D., Shanbhogue, S. and Ghoniem, A.F., The flame anchoring mechanism and associated flow structure in bluff-body stabilized lean premixed flames, presented at the APS Division of

Fluid Dynamics Meeting, Boston MA, Nov 2015.

49. Bakshi, A., Khanna, S., Venuturumili, R., Altantzis, C., and Ghoniem, A.F., Effect of particle size distribution on the hydrodynamics of dense CFB risers, presented at the APS Division of Fluid Dynamics Meeting, Boston MA, Nov 2015.

50. Taamallah, S., Chakroun, N., Shanbhogue, S., Kewlani, G. and Ghoniem, A.F., Experimental and numerical investigation of vortical structures in lean premixed swirl-stabilized combustion, presented at the APS Division of Fluid Dynamics Meeting, Boston MA, Nov 2015.

51. Dimitrakopoulos, G., Hunt, A., and Ghoniem, A.F. A Multistep, Thermodynamically Consistent and Constraint by Material Properties Reaction Mechanism for the $La0.9Ca0.1FeO3-\delta$ Hydrogen Oxidation. Materials Research Society Conference, Boston, December 2015.

52. Bakshi, A., Altantsiz, C. and Ghoniem, A.F., Solids mixing in bubbling fluidized beds, CFD based analysis, *Presented at the 2016* National Energy Technology Laboratory (NETL) Multiphase Flow Science Workshop, Morgantown, PA, 2016.

53. Wu, X.Y. and Ghoniem, A.F. "Perovskite as Oxygen Permeable Membrane and Catalyst for Fuel Production from H2O/CO2 Thermolysis", *2016 MRS Fall Meeting & Exhibit,* Boston, MA, 2016.

54. Wu, X.Y. and Ghoniem, A.F. "Thermodynamic Analysis of Oxygen Permeable Membrane Reactor for Hydrogen Production from Water", *2016 MRS Fall Meeting & Exhibit,* Boston, MA, 2016.

55. Dimitrakopoulos, G., and Ghoniem, A.F. Detailed surface kinetics and charged species diffusion to model the impact of $H2$ and CO oxidation on oxygen permeation through $La0.9Ca0.1FeO3-\delta$ mixed-conductors. International Conference on Inorganic Membranes, Atlanta, July 2016.

56. Dimitrakopoulos, G., Wu, X.Y., and Ghoniem, A.F., "Enhancing syngas production during methane reforming using a La0.9Ca0.1FeO3-δ ion transport membrane"*, 2016 MRS Fall Meeting & Exhibit,* Boston, MA 2016.

57. Wu, X.Y. and Ghoniem, A.F., "Semi-Permeable Membrane Reactor for Catalysis, Hydrocarbon Processing and CO2 Reuse", *2016 AIChE Annual Meeting*, San Francisco, CA, 2016.

58. Bakshi, A., Altantzis, C., Stark, A.K., Bates, R. and Ghoniem, A.F., Steam-blown biomass gasification using fluidized beds: gas-flow distribution for advanced reactor network modeling, *2016 AIChE Annual Meeting*, San Francisco, CA, 2016.

59. Wu, X.Y., and Ghoniem, A.F. "Water Splitting and Partial Oxidation of Methane Using an Oxygen Permeable Membrane with Ni Catalyst", *2016 AIChE Annual Meeting*, San Francisco, CA, 2016.

60. He, P., Sanchez, A., Pereda, S., and Ghoniem, A.F., Impact of non-ideality revealed in numerical simulations of mixing on hydrocarbons and supercritical water, *2016 AIChE Annual Meeting*, San Francisco, CA, 2016.

61. He, P., Raghavan, A., Green, W. and Ghoniem, A.F., Numerical study of heavy crude oil pyrolysis in supercritical water, *2016 AIChE Annual Meeting*, San Francisco, CA, 2016.

62. Wu, X.Y., and Ghoniem, A.F. "Enhanced hydrogen production from water thermolysis on an oxygen permeable membrane: The role of sweep surface reactions", *the 14th International Conference on Inorganic Membranes*, Atlanta, GA, 2016.

63. Ghoniem, A.F., Panora, R.A., Gehret, J.B., Roy, J.P. and Falls, B., Application of the ULTERA dual stage system to gasoline-fueled passenger vehicles, SAE Emissions Control Symposium, Jan 2017, Washington D.C.

64. Wu, X.Y. and Ghoniem, Enhanced CO2 dissociation on surface catalyzed oxygen permeable membrane, Int. Conf. Catalysis on Membrane Reactors, Houston, TX, June 10-13, 2017

65. Wu, X.Y. and Ghoniem, Thermodynamic analysis of oxygen permeable membrane reactor for hydrogen production form water, Int. Conf. Catalysis on Membrane Reactors, Houston, TX, June 10-13, 2017

66. Dimitrakopoulos, G and Ghoniem ICCME, Int. Conf. Catalysis on Membrane Reactors, Houston, TX, June 10-13, 2017

67. Wu, X.Y., and Ghoniem, A.F., CO2 splitting using MIEC membranes, 2017 AICHE Annual

Meeting, Oct 29-Nov 3, 2017, Minneapolis MN.

68. Gentile, GC, Bakshi, A., Stark, A.K., Altantzis, C, Faravelli, T., and Ghoniem, Reduced-order particle scale model for pyrolysis and gasification in fluidized bed reactors, AICHE Annual Meeting, Oct 29-Nov 3, 2017, Minneapolis MN.

69. Bakshi, A., Shahnam, M., Li, T., Altantzis, C., Gel, A., Rogers, W. A., and Ghoniem, A.F., CFD-DEM simulations of bubbling fluidization: global sensitivity analysis for the identification and validation of critical model parameters, AICHE Annual Meeting, Oct 29-Nov 3, 2017, Minneapolis MN.

70. Dimirtakopoulos, G. and Ghoniem, A.F., Methane partial oxidation and reforming to syngas using LCF mixed conductor, 2017 AICHE Annual Meeting, Oct 29-Nov 3, 2017, Minneapolis MN.

71. Ragavan, A. and Ghoniem, A.F., 2017 AICHE Annual Meeting, Oct 29-Nov 3, 2017, Minneapolis MN.

72. X.Y. Wu and A.F. Ghoniem, "Kinetics and Material Stabilities for Membrane-Supported H_2O/CO_2 Splitting", *2017 MRS Fall Meeting & Exhibit,* Boston, 2017

73. Zhao, ZL, Uddi, M, Tsvetkov, N, Yildiz, B. and Ghoniem, A.F., Enhanced intermediate temperature CO2 splitting using non-stoichiometric ceria and ceria zirconia, 232nd ECS Meeting, Oct 1-5, 2017, National Harbor, MD.

74. Dagan, Y. and Ghoniem, A.F Impact of finite rate chemistry on hydrodynamic instability of shear flows in turbulent lean premixed combustion, for presentation at the APS-DFD, Denver, CO, Nov 2017.

75. Long, A., Speth, R, Ghoniem, A.F. and Green, W., Ember: an open source transient reacting flow solver with applications in turbulent flames and strained extinction, 2018 AICHE Annual Meeting.

76. Wu, X.Y. and Ghoniem, A.F., 2018 AICHE Annual Meeting.

77. Ghoniem, A.F., ASME Congress and Exhibition, Invited Plenary Lecture, 2018.

78. Wu, X.Y. and Ghoniem, A.F., 2019, ICCMR14, Eindhoven, the Netherland, July 8-11, 2019.

79. Patankar, A., Wu, XY, Choi, WJ, Tuller, H. and Ghoniem, AF, Thermal Modeling of the Reactor Train System for Efficient Solar Thermochemical Fuel Production with Solid Heat Recovery, AIChE Solar Energy Systems Conference, AUG 4-6, 2021.

80. Patankar, A., Wu, XY, Choi, WJ, Tuller, H. and Ghoniem, AF, Nickel Ferrite - Ceria Composites for Solar Thermochemical Fuel Production – Efficiency Analysis and Design Goals. AIChE Annual meeting, Nov 7-11, 2021.

INVITED LECTURES

Hundreds of invited talks on the fundamentals of energy, computational fluid dynamics, turbulent reacting flows, flow and combustion control, fuel cells, carbon capture technologies including gasification and oxy-combustion, oxygen separation using membranes and thermochemical looping, solar energy and hybridization, reforming and syngas productions. Talks were presented at universities, industrial and government laboratories, specialists' meetings and panels in the United States, France, Canada, Italy, the Soviet Union, Spain, Portugal, Germany, United Kingdom, Japan, Norway, Lebanon, Australia, Russia, India, Malaysia, Saudi Arabia, Turkey, Abu Dhabi, Egypt, South Korea, China, Austria, Morocco, Brazil, Kuwait, Poland, Ireland, Switzerland, etc.

THESES AND INDIVIDUALS SUPERVISED

M.Sc.
1. **Omar Knio**, Professor, Duke University and KAUST
   Low-Mach Number Modeling of Flame Propagation in a confined Volume.

2. **Yves Gagnon**, Professor, University of Moncton, Canada
    Numerical Investigation of Recirculating Flow at Low and Moderate Reynolds Numbers.
3. **K.K. Ng**
    Vortex Simulation of a Confined, Perturbed Mixing Layer.
4. **A. Dickinson**
    Computation of the Forces and Far-Field Sound Radiation from an Unsteady Two-Dimensional Airfoil Using the Vortex Method.
5. **Thomas Bress**
    Effect of Squish and Swirl on Turbulent Flame Propagation.
6. **Antony Loprinzo**
    Numerical Simulation of Turbulent Jet Diffusion Flames
7. **V. Venkatesh**
    Thermal Design and Analysis of A Recuperative Combustor for Gas-Turbine Combustion
8. **Constantine Petrov**, Fidelity Investment
    Numerical Model of Unsteady Strained Flame
9. **J.C. Saghbini**, Cardinal Health (WaveMark)
    Simulation of Vorticity Dynamics in Swirling Flows, Mixing & Vortex Breakdown
10. **Aaron Golub**, Associate Professor, Arizona State University
    Predicting NO and CO Emissions in Lean Natural Gas Spark Ignition Engines.
11. **Youssef Marzouk**, associate professor, MIT
    The Effect of Flow and Mixture in Homogeneity on the Dynamics of Strained Flames
12. **Sungbae Park**, VP for Engineering, Bosch
    Modeling of Combustion Instability at Different Damkohler Conditions
13. **Daehyun Wee**, Ewaha Woman's University
    Stability Analysis and Reduced Order Modeling of a Separating Shear Flow
14. **Adam Wachsman**, BEA Systems
    Experimental Verification of Model-Based Control Strategies Using a Backward-Facing Step Combustor.
15. **Murat Altay**, Bosch
    Vortex Driven Flame Dynamics and Combustion Instability
16. **Raymond Speth**, research scientist, MIT
    Effects of Curvature and Strain on a Lean Premixed Methane-Hydrogen-Air Flame.
17. **Won Yong Lee**, Samsung Corporate Research Labs
    Modeling of Solid Oxide-Fuel Cells.
18. **Fabrice Shlegel**, COMSOL
    A Fast 3-D Particle Method for Simulations of Buoyant and Reacting Flows.
19. **Duane Hudgins**, graduate student at ETH.
    Suppression of Premixed Combustion Dynamics Utilizing Microjet Air Injection
20. **Jongsup Hong**, Korea Institute of Science and Technology
    Techno-Economic Analysis of Pressurized Oxy-Fuel Combustion Power Cycle for CO_2 Capture.
21. **Addison Stark**, ARPA-E
    Multi-Criteria Lifecycle Evaluation of Transportation Fuels Derived from Biomass Gasification
22. **Kushal Sharad Kedia**, ExxonMobile
    Numerical Simulations of Perforated Plate Stabilized Premixed Flames with Detailed Chemistry
23. **Sze Zheng Yong**, junior faculty, Arizona State University
    Multiphase Models of Slag Layer Built-up in Solid Fuel Gasification and Combustion
24. **Zach LaBry**, Escape Dynamics
    Suppression of Thermoacoustic Instabilities in a Swirl Combustor through Microjet Air Injection.
25. **Anna Vasilyeva**
    A Mesh-Free Method for the Poisson Equation for 3D Wall-Bounded Flow Applications
26. **Chuckwunwike Ogbonnia Iloeje**, Argonne National lab

Process Modeling and Analysis of CO_2 Purification for Oxy-Coal Combustion

27. **Alex J Chapman,** Ampaire, LA
    Biomass Characterization and Reduced Order Modeling of Mixed-Feedstock Gasification
28. **Andrew P Shroll**, Caterpillar
    Dynamic Stability, Blow-off, And Flame Characteristics of Oxy-Fuel Combustion
29. **Daniel Apo**, Founder, ESiMi
    Experimental Characterization of an Ion-Transport Membrane (ITM) Reactor For Methane Oxy-Fuel Combustion
30. **Richard Bates**, McKinsey
    Modeling the Coupled Effects of Heat Transfer, Thermochemistry and Kinetics During Biomass Torrefaction
31. **Zhenlong Zhao**, ExxonMobile
    Rotary-Bed Reactor for Chemical-Looping Combustion with Carbon Capture
32. **Michael Rutberg**, senior technologist at TIAX
    Modeling Water Use at Thermoelectric Power Plants
33. **Ashwin Raghavan**, Ph.D. student at MIT
    Simulations of Supercritical Water-Hydrocarbon Mixing at intermediate Reynolds Number: Impact Thermodynamic and Transport Property Variations
34. **Tianjiao Chen,** ATA Engineering, CT
    Experimental Characterization and Chemical Kinetics Study of Chemical Looping Combustion
35. **Le Chang**, Microsoft
    High Temperature Ceramic Membrane for CO_2 Reuse and Syngas Production
36. **Nadim Chakroun**, Ph.D. Student at MIT
    Sour Gas Oxy-combustion Power Cycles for Carbon capture and Sequestration
37. **Dominik Bongartz**, Aachen
    Chemical Kinetics Modeling of Oxy-fuel Combustion of Sour Gas for Enhanced Oil Recovery
38. **Rajesh Sridhar**, Impact Analytics
    Chemistry models for predicting major gas species and tar formation in fluidized bed biomass reactors.
39. **Yan Yan**
    The design of bioenergy potential map and a GIS-enabled optimization model for biofuel production in India.
40. **Yudong Chen**
    Water splitting for hydrogen and syngas coproduction over novel bi-layer perovskie-type membrane
41. **Aniket Patankar**
    Numerical simulation of heavy oil droplet mixing in supercritical water at conditions relevant to supercritical water heavy oil upgrading.
42. **Mahmoud Ramadan**
    Battery safety

Ph.D.
1. **Y.W. Dai**, professor, China (co-advisor, Ph.D. granted at UCB)
   Numerical Modeling of Turbulent Flow in a Channel
2. **C.C. Haiso**, SRI (co-advisor, Ph.D. granted at UCB)
   Combustion Jet Ignition
3. **Habib Najm**, Sandia National Laboratories.
   Numerical Study of the Convective Instability of Turbulent Flames in a Dump Combustor
4. **Ghassem Hiedarinejad** (June1989), professor in Iran
   Numerical Simulation of a Reacting Shear Layer Using the Transport Element Method
5. **Anantha Krishnan**, Lawrence Livermore National Labs
   Turbulence-Combustion Interactions in a Premixed Flame

6. **Luis F. Martins**, Fidelity Investment
   A Hybrid Finite Element-Vortex Simulation for Flow in an Internal Combustion Engine
7. **Omar Knio**, professor at KAUST
   Streamwise and Spanwise Structures in a Turbulent Mixing Layer
8. **Gerard Payen**, Renault (granted at U. of Rouen)
   Development of a 2-d Computational Tool based on a Hybrid Random Vortex Method for the Time-Resolved Analysis of Viscous Bounded Incompressible Flows
9. **Marios Soteriou**, Fellow at United Technology Research Center.
   Numerical Study of Turbulent Combustion in A Shear Layer
10. **Xiaoming Zhang**, Systems Analysis, Waltham.
    A Computational Analysis for the Rise, Dispersion and Deposition of Buoyant Plume
11. **Adrin Gharakhani**, Professor, Claremont Graduate University, CA.
    A 3-D Vortex Boundary Element Method for the Simulation of Unsteady, High Reynolds Number Flows
12. **Van Luu**, McDonnell Douglas.
    Numerical Study of the Reactive Flow in a Two Stream, Coaxial-Jet, Axisymmetric Bluff-Body Combustor
13. **Constantine Petrov**, Fidelity Investment.
    Numerical Simulation of Reacting Flows with Complex Chemistry Using Flame Embedding
14. **Mahmoud Fleifil**, GE Aircraft Engines (Ph.D. granted by Ain Shames U.)
    Numerical Study of the Reactive Flow in a Two Stream, Coaxial-Jet, Axisymmetric Bluff-Body Combustor
15. **Mostafa Abdel Kkalek Mostafa**, Assistant Prof, (Ph.D. granted at Ain Shames U.)
    Numerical Simulation of Acoustic Effect on the Stability of a Lean Premixed Combustor
16. **Issam Lakkis**, professor, American University of Beirut
    Lagrangian Computations of Radiating Fire Plumes
17. **Jean-Pierre Hathout,** President at SiT Control USA, Charlotte NC.
    Modeling and Control of Combustion Instability
18. **Youssef Marzouk**, professor at MIT Aero Astro.
    Vorticity Dynamics and Control of Mixing in a Transverse Jet
19. **Sungbae Park**, Apple.
    Active Combustion Control, Modeling, Design and implementation
20. **Daehuyn Wee**, assistant professor, Ewha Woman's University, South Korea.
    Lagrangian Simulation of Transverse Jets with a Distribution-Based Diffusion Scheme
21. **H. Murat Altay**, Bosch, Izmir, Turkey.
    Physics-Based Flame Dynamics Modeling and Thermo-acoustic Instability Mitigation
22. **Rory Monaghan**, lecturer, National University of Ireland, Galway.
    Dynamic Reduced Order Modeling of Entrained Flow Gasifiers
23. **Raymond Speth**, principal research scientist at MIT
    Fundamental Studies in Hydrogen-Rich Combustion: Instability Mechanisms and Dynamic Mode Selection
24. **Mayank Kumar**, assistant professor, IIT Delhi
    Multiscale CFD Simulations of Entrained Flow Gasification
25. **Fabrice Schlegel**, AMGEN, Boston USA.
    Hybrid Eulerian/Lagrangian 3D methods for high Reynolds number reactive flows
26. **Simcha Singer**, assistant professor at Marquette University
    Gasification and Combustion Modeling for Porous Char Particles
27. **Won Yong Lee**, Samsung Advanced Institute of Technology, South Korea.
    Mathematical Modeling of Solid Oxide Fuel Cells using Hydrocarbon Fuels
28. **Lei Chen**, SABIC, Houston USA.

CFD Simulations of Oxy-Coal Combustion for Carbon Capture at Atmospheric and Elevated Pressures

29. **Jongsup Hong**, assistant professor, Yonsie University, South Korea.
Numerical Simulation of Ion Transport Membrane Oxy-Fuel Reactors for CO_2 Capture Applications.

30. **Cristina Botero**, ComEd, Chicago.
The Phase Inversion-based Coal-CO_2 Slurry (PHICCOS) Feeding System: Design, Coupled Multiscale Analysis and Techno-Economic Assessment

31. **Kushal Sharad Kedia**, ExxonMobil, Houston USA
Development of a Multiscale Projection Method with Immersed Boundaries for Chemically Reactive Flows and its Application to Examine Flame Stabilization and Blow-off Mechanisms

32. **Seunghyuck Hong**, GE Global Research
Towards Predicting Dynamics in Turbulent Premixed Combustion Using PIV-PLIF Measurements of Flow-Flame Microstructures

33. **Gaurav Kewlani**.
Large-Eddy Simulation of Premixed Turbulent Flame Dynamics: Combustion Modeling, Validation and Analysis

34. **Zachery LaBry,** ATA Engineering
Turbulent Flame Microstructure, Dynamics and Thermo-acoustic Instability in Swirl-Stabilized Premixed Combustion; Measurements, Statistics and Analysis

35. **Addison Stark**, Bipartisan Policy Center, D.C.
Multi-scale Chemistry Modeling of Biomass Gasification in a Fluidized Bed Reactor

36. **Anton Hunt**, Redwood Materials, Reno NV
 Experimental investigation of oxygen-separating ion transport membranes for clean fuel synthesis.

37. **Elysia Sheu**, Shell, Houston
A Solar Reforming System for Use in Hybrid Solar-Fossil Fuel Power Generation.

38. **Sofien Taamallah**, IHS
Impact of Fuel and Oxidizer Composition on Premixed Flame Stabilization in Turbulent Swirling Flow: Dynamics and Scaling

39. **Kathrine (Ong) Hornbostel**, assistant professor, University of Pittsburgh
Modeling of Solid Oxide Fuel Cell Performance with Coal Gasification

40. **Chuckwunwike O. Iloeje,** Argonne National Labs
Rotary (redox) Reactor Based Power Cycles for Oxy-combustion with Carbon Capture; Design, Analysis and Optimization

41. **Zhenlong Zhao,** ExxonMobile, Houston
Redox Kinetics Study for Chemical-looping Combustion, Water and CO_2 Splitting using Nickel and Cerium-based Oxygen Carrier

42. **Richard Bates,** McKinsey Consulting, Waltham
Multiscale simulation of methane assisted fluidized bed gasification of biomass

43. **Georgios Dimitrakopoulos,** post-doctoral associate at MIT
Experimental Study and Modeling Analysis of Ion-Transport Membranes for Methane Partial Oxidation and Oxy-fuel Combustion

44. **Akhilesh Bakshi,** ENEL X, Seattle
Multiscale Continuum Simulations of Fluidization: Bubbles, Mixing Dynamics and Reactor Scaling

45. **Xiaoyu Wu**, Assistant Professor, U of Waterloo.
Membrane Supported Hydrogen/Sygas Production Using Reactive H_2O/CO_2 Splitting for Energy Storage

46. **Kevin Kung,** CTO, Takachar.
Design and validation of a decentralized biomass torrefaction system

47. **Nadim Chakroun,** McKinsey Consulting
Dynamics, Stability and Scaling of Turbulent Methane Oxy-Combustion

48. **Ashwin Raghavan**, ExxonMobile, Houston

Multiscale modeling tools for coupled reaction, phase equilibrium and two-phase mixing phenomena with application to supercritical heavy oil upgrading process

49. **Aniket Patankar**
Novel reactor train system for solar thermochemical hydrogen production, started 2020.

Post-doctoral Associates

1. **Omar Knio**, professor, KAUST
2. **Marios Soteriou**, fellow, UTRC
3. **Adrin Gharakhani**. Professor, Claremont Graduate University
4. **Mahmoud Fleifil**, GE Aircraft Engines
5. **S. Shankar**, Quantum
6. **Jean Christophe Nave**, Professor, McGill University
7. **Issam Lakkis**, professor, American University of Beirut
8. **Isam Janajreh**, associate professor, Masdar Institute
9. **Cheng Zhang**, associate professor, University of West Florida
10. **Santosh Shanbhogue**, research scientist at MIT
11. **Anup Shirgaonkar**, data Scientist at Amazon
12. **Seyed-Abdolreza Seyed-Reihani**, (formed his own company)
13. **Yixiang Shi**, Associate Professor at Tsinghua University
14. **Patrick Kirchen**, Associate professor at UBC
15. **Hossam El-Asrag**, ISSI-Air Force Research Lab
16. **Sadegh Dabiri**, Assistant Professor at Purdue University
17. **Neerav Abani**, John Deere
18. **Guang Wu**, Lead Engineer, GE Global Research
19. **Konstantina Vogiatzaki**, senior lecturer, University of Brighton
20. **Mruthunjaya Uddi**, assistant professor, University of Alabama
21. **Yousef Haseli**, assistant professor, Western New England University
22. **Jeffrey Hanna,** York School, Monterey, CA
23. **Seunghyuck Hong,** GE Global Research
24. **Ping He**, Assistant professor, Lamar University
25. **Noura Mansouri**, KAPSARC, KSA
26. **Christos Altantzis**, Swiss Re
27. **Khulood Rambo**, Professor, King Abdel Aziz University
28. **Dan Micheals**, junior faculty, Technion.
29. **Kevin Kung,** post-doctoral fellow, LBNL
30. **Akhilesh Bakshi,** ENEL X
31. **Yuval Dagan**, junior faculty, Technion.
32. **Georgios Dimitrakopoulos**, research scientist at MIT
33. **Xiaoyu Wu,** assistant professor, University of Waterloo, CA.
34. **Sonal Thengane** Assistant professor, IIT
35. **Bonjae Koo,** assistant professor, Sungshin Women's University, South Korea.
36. **WonJae Choi**, assistant professor, Ewha Woman's University, South Korea.
37. **Aidin Panahi**

Research Scientists

1. **Anuradha Annaswamy**, senior research scientist at MIT
2. **Patrick Kirchen**, associate professor at University of British Colombia
3. **Mruthunjaya Uddi**, assistant professor, University of Alabama
4. **Ping He,** assistant professor, Lamar University
5. **Santosh Shanbhogue** at MIT
6. **Georgios Dimitrakopoulos** at MIT

Recent Visiting Scholars/Students
1. **Gian Paolo Beretta,** professor, University of Brescia
2. **Matteo Gazzani,** Ph.D. student, Politecnico de Milano
3. **Tariq Shamim,** professor, Michigan State and MASDAR Institute
4. **Paolo Iora**, assistant professor, University of Brescia and Polytechnic Institute of Milano
5. **Fahad Alzahrani**, M.Sc. student at KFUPM, Saudi Arabia
6. **Marco Astolfi**, Ph.D. student, Polytecnico de Milano
7. **Bing Liu**, Ph.D. student, Tsinghua University, China
8. **Jose Sierra Pallares**, assistant professor, University of Valladolid, Spain
9. **Medhat Nemitallah**, post doctor at KFUPM, Saudi Arabia
10. **Kaylan Annamalai**, professor, Texas A&M.
11. **Davide Turi**, Ph.D. student, Politecnico de Milano
12. **Shahd Labib**, undergraduate at AUC, Egypt
13. **Hirotatsu Watanabe**, associate professor, Tokyo Institute of Technology
14. **Yinka Sanusi**, Ph.D., student, KFUPM
15. **Mohammad Khan**, Ph.D. student, Masdar Institute
16. **Marc Vetter**, M.Sc. student at ETH
17. **Rishav Choudhary,** undergraduate student at IIT Kanpour
18. **Masayasu Shimura**, associate professor, Tokyo Institute of Technology
19. **Byung-Chul Choi**, Korean Board of Shipping
20. **Noura Mansouri**, KAPSARC
21. **Maria Carmen Jimenez Sanchez,** Madrid
22. **Giancarlo Gentile**, Politecnico de Milano
23. **Yu Luo,** Fuzhou University
24. **Daehyun Wee**, Lecturer, Ewha University
25. **Abdul Raouf Tajik**, Ph.D. student, Masdar Institute
26. **Jose Rodrigues,** Ph.D. student, Instituto Superior Tecnico, Portugal
27. **Joao Pirez,** Ph.D. student, Instituto Superior Tecnico, Portugal
28. **Chenshu Hu,** Ph.D. student, Zhejiang University
29. **Alberto Gomez-Barea,** Professor of Chemical Engineering, U of Seville
30. **Masayasu Shimura**, associate professor, Tokyo Institute of Technology (Sept 2019)
31. **Montserrat Suarez**, Ph.D. student at U Seville (Sept 2019)
32. **Nathada Ngamsidhiphongsa,** Chulalonghorn U. Thailand (Jan 2020)
33. **Hao Wang,** PH.D. student at Xi'an Jaiotong University (Jan 2020)
34. **Felipe Gomez del Campo.** FGC Plasma
35. **Drew Wiebel,** FGC Plasma
36. **Antonio Soria Verdugo,** associate professor at Carlos III, Madrid, Spain (Feb 2021)