

Curriculum Vitae
ORHAN TALU

Professor Emeritus
Department of Chemical Engineering
Cleveland State University
Cleveland, Ohio 44115

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(Update: 8/22/2023)

Home: 450 Audrey Drive
Richmond Hts., Ohio 44143

EDUCATION

Ph.D. - Chemical Engineering, Arizona State University, Tempe, Arizona (1984)

M.S. - Chemical Engineering, Arizona State University, Tempe, Arizona (1980)

B.S. - Chemical Engineering, Middle East Technical University, Ankara, Turkey (1978)

PROFESSIONAL EXPERIENCE

Professor Emeritus: June 2021 - *present*
Department of Chemical Engineering
Cleveland State University, Cleveland, Ohio

Professor: September 1996 – May 2021
Department of Chemical Engineering
Cleveland State University, Cleveland, Ohio

Associate Director: September 2009 – 2016
Fenn Research and Development Institute (FRDI) - Industrial Services &
Contracts (ISC)
Cleveland State University, Cleveland, Ohio

Director: January 2007 – 2013
Doctor of Engineering
Cleveland State University, Cleveland, Ohio

Adjunct Staff: January 1999 - 2010
Biomedical Engineering
Cleveland Clinic Foundation, Cleveland, Ohio

Director: January 1998 – February 2007
Applied Biomedical Engineering
Cleveland State University, Cleveland, Ohio

Chairperson: April 1996 - July 2005
Department of Chemical and Biomedical Engineering
Cleveland State University, Cleveland, Ohio

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GCE Gas Control Equipment Inc. v. VBOX, Inc.
IPR2023-00326

Visiting Scholar: September 1994 - August 1995
Laboratoire d'Informatique pour la Mecanique et Les Sciences de
l'Ingenieur, Centre National de la Recherche Scientifique
CNRS/LIMSI, Orsay, FRANCE

Associate Professor: July 1990 - September 1996
Department of Chemical Engineering
Cleveland State University, Cleveland, Ohio

Assistant Professor: July 1986 - June 1990
Department of Chemical Engineering
Cleveland State University, Cleveland, Ohio

Post-Doctoral Assoc.: May 1984 - June 1986
Department of Chemical Engineering / Department of Economics
Arizona State University, Tempe, Arizona

RESEARCH INTERESTS

Main theme is interfacial phenomena between solids and fluids, from fundamentals including molecular simulations to process development with emphasis on experiments. Topics include:

thermodynamics; phase equilibria, interfacial phenomena, adsorption, molecular simulations, experimental measurements, classical/statistical modeling

kinetics; micropore diffusion, meso/macropore diffusion, membrane permeation and diffusion, measurements, theoretical modeling

processes; gas separations, gas (methane and hydrogen) storage, environmental problems, bioseparations, ion-exchange

material synthesis; silica systems (e.g. zeolites, mesoporous silica) in different forms (e.g. powder, membrane, agglomerate) with/without field enhancement (e.g. high gravity, electrical, magnetic) and characterization of porous materials

SCIENTIFIC AND PROFESSIONAL SOCIETY ACTIVITIES

President:
International Adsorption Society, 2007 - 2010

Vice-President:
International Adsorption Society, 2004 - 2007

Area Chair:
Adsorption and Ion Exchange, AIChE Group 2e, 93/95

Area Vice-Chair:
Adsorption and Ion Exchange, AIChE Group 2e, 91/93

Member:

American Institute of Chemical Engineers (AIChE)
American Chemical Society (ACS)
International Adsorption Society (IAS)
Association of Turkish-American Scientists
Sigma Xi
NIST - IAS joint committee for Adsorbent/Adsorption Standards
American Association for the Advancement of Science

Conference Committees:

12th International Conference of Fundamentals of Adsorption, **Honorary Scientific Committee**, Friedrichshafen, Germany, May 2016

11th International Conference of Fundamentals of Adsorption, **Honorary Scientific Committee**, Baltimore, Maryland, May 2013

10th International Conference on Fundamentals of Adsorption, **Honorary Scientific Committee**, Awaji Hyogo, Japan, May 2010

9th International Conference on Fundamentals of Adsorption, **Honorary Scientific Committee**, Giardini Naxos, Sicily-Italy, May 2007

4th Pacific Basin Conference on Adsorption Science and Technology, **Scientific Board**, Tianjin, China May 2006

8th International Conference on Fundamentals of Adsorption, **Conference Chairman**, Sedona, Arizona, May 2004

3rd Pacific Basin Conference on Adsorption Science and Technology, **Scientific Board**, Kyungju, Korea, May 2003

7th International Conference on Fundamentals of Adsorption, **Scientific Board**, Nagasaki, Japan, May 2001

6th International Conference on Fundamentals of Adsorption, **US vice-chair**, Giens, France, May 1998

5th International Conference on Fundamentals of Adsorption, **Organizing Committee**, Asilomar, CA, May 1995.

Symposium Chairman:

Experimental Methods for Adsorption, AIChE Annual Meeting, San Francisco, California 2016

Fundamentals and Applications of Adsorption and Ion Exchange, AIChE Annual Meeting, Salt Lake City, Utah 2015

Thermodynamics of Adsorption, Fundamentals of Adsorption 10, Baltimore, Maryland, May 2013

Hydrogen Adsorption and Storage, AIChE Annual Meeting, Salt Lake City, Utah, November 2010

Energy Applications of Adsorption , AIChE Annual Meeting, Nashville, Tennessee, November 2009

Experimental Methods in Adsorption, AIChE Annual Meeting, Salt Lake City, Utah, November 2007

Adsorption in Hydrogen Economy, AIChE Annual Meeting, Cincinnati, Ohio, October 2005

Simulated Moving Bed, 8th International Conference on Fundamentals of Adsorption, Sedona, Arizona, May 2004

Mixed Gas Adsorption, AIChE Annual Meeting, San Francisco, California, November 2003

Fundamentals of Adsorption and Ion-Exchange, AIChE Annual Meeting, Indianapolis, Indiana, November 2002

Fundamentals of Adsorption and Ion Exchange I, AIChE Annual Meeting, Reno, Nevada, November 2001

Fundamentals of Adsorption and Ion Exchange II, AIChE Annual Meeting, Reno, Nevada, November 2001

Multicomponent Adsorption, Fundamentals of Adsorption 7, Nagasaki, Japan, May 2001

New Developments in Adsorption and Ion-Exchange Processes, AIChE Annual Meeting, Los Angeles, California, November 2000

Mixed Gas Adsorption, AIChE Annual Meeting, Dallas, Texas, November 1999

Thermodynamics of Condensed Phases-Adsorption, AIChE Annual Meeting, Miami Beach, Florida 1998

Experimental Methods in Adsorption, AIChE Annual Meeting, Los Angeles, November 1997

Fundamentals of Adsorption, AIChE Annual Meeting, Chicago, November 1996

Applications of Ion Exchange for Metal Ion and Molecular Separations from Materials to Processes, AIChE Annual Meeting, Miami Beach, November 1995.

Applications of Adsorption in Energy Storage and Transfer Systems, AIChE Annual Meeting, San Francisco, November 1994.

Liquid Phase Adsorption, AIChE Annual Meeting, St. Louis, November 1993

Gas Phase Applications of Adsorption, AIChE Annual Meeting, Los Angeles, November 1991

Liquid Phase Applications of Adsorption, AIChE Annual Meeting, Los Angeles, November 1991

AWARDS & RECOGNITIONS

Most Outstanding Faculty Member – Chemical and Biomedical Engineering, CSU, 2011, 2013, 2017

Charter Member – National Academy of Inventors, October 2011

Distinguished Faculty Research Award – Cleveland State University, May 2006

Merit Awards – Cleveland State University, 1998, 2001, 2004, 2008, 2012, 2013, 2014, 2015, 2016

EDITORSHIP

Editor-In-Chief:

Adsorption of Gases on Solid Substrates: Adsorption Database in SpringerMaterials, 2012 - present

Regional Editor-America:

Adsorption Journal, Springer, 2010 - 2016

Book Editing:

Orhan Talu and Sasidhar Gumma, Fundamentals of Adsorption, **Adsorption J.**, vol.11, supplement, October 2005

Journal Issue Editing:

Orhan Talu and Shivaji Sircar, Experimental Methods in Adsorption, **Adsorption J.**, vol.5, no. 2, July 1999

Orhan Talu and Francis Meunier, Applications of Adsorption in Energy Storage and Transfer Systems, **Applied Thermal Engineering**, Vol.16, No.5, May 1996

Orhan Talu and Shivaji Sircar, Application of Gas and Liquid Phase Adsorption, **Separation Science and Technology**, Vol. 27, No. 14, November 1992.

PATENTS

1. Steven M. Kuznicki, Wayne Scott Kaboord, Roger James Briggs, Richard Randel Lyman, Jr., Orhan Talu and Edward J. Hummelt, "Fluid Power Accumulator for Vehicle," **US 2,005,275,280-A1; US 7,152,932-B2** (2006)
2. Orhan Talu and Steven M. Kuznicki, "Air separation process - includes using large pore molecular sieve with specified structure as absorbents to improve efficiency of pressure-vacuum swing adsorption processes," **WO 9,615,842-A; WO 9,615,842-A1; AU 9,641,088-A** (1996)

3. Pieter J. von Herrmann and Orhan Talu, "Fuel store for motor vehicle," **US 5,323,752-A** (1994)
4. Orhan Talu, "Gas Storage Process," **US 5,247,971-A** (1993)
5. Orhan Talu, "Sorbable gas sepn. for ammonia removal from waste gas stream," **US 5,160,512-A** (1992)

BOOK CHAPTERS

Orhan Talu, "Ch.4: Physical Chemistry and Engineering for Adsorptive Gas Storage in Nanoporous Solids," *Kaneko (Eds), Nanoporous Materials for Gas Storage (Green Energy and Technology)* " (978-981-13-3504-4), Springer, April 2019

REFEREED PUBLICATIONS

1. Ninad D. Anjekar, Kevin R. Hinkle, Orhan Talu, Qiang Fu, Snakar Nair, Shaowei Yang, "Unexcepected High CO₂ over C₂H₂ Separation Performance by High-Silica CHA Zeolite Membranes," **J. Mem. Sci.**, DOI: 10.1016/j.memsci.2023.121853
2. Darren P. Broom, Orhan Talu and Michael J. Benham, "*Integral Mass Balance (IMB) method for measuring multicomponent gas adsorption equilibria in nanoporous materials*," **Ind. & Eng. Chem.**, 59(46), 20478-20491 (2020)
3. Aaron Moran and Orhan Talu, "Role of Pressure Drop on Rapid Pressure Swing Adsorption," **Ind. & Eng. Chem.**, *errata*, 57(42), 14336 (2018)
4. Aaron Moran and Orhan Talu, "Limitations of Portable Pressure Swing Adsorption Processes for Air Separation," **Ind. & Eng. Chem.**, 57, 11981-11987 (2018)
5. Aaron Moran, Mihir Patel and Orhan Talu, "Axial dispersion effects with small diameter adsorbent particles," **Adsorption**, 24, 333-344 (2018)
6. H. G. T. Nguyen, L. Espinal, R. D. van Zee, M. Thommes, B. Toman, M. S. L. Hudson, E. Mangano, S. Brandani, D. P. Broom, M. J. Benham, K. Cychosz, P. Bertier, F. Yang, B. M. Krooss, R. L. Siegelman, M. Hakuman, K. Nakai, A. D. Ebner, L. Erden, J. A. Ritter, A. Moran, O. Talu, Y. Huang, K. S. Walton, P. Billemon, G. De Weireld, "A reference high-pressure CO₂
7. adsorption isotherm for ammonium ZSM-5 zeolite: results of an interlaboratory study," **Adsorption**, 24, 531-539 (2018)
8. Aaron Moran and Orhan Talu, "Role of Pressure Drop on Rapid Pressure Swing Adsorption," **Ind. & Eng. Chem.**, 56(19), 5715-5723 (2017)
9. Cassandra A. Zentner, Holden W. H. Lai, Joshua T. Greenfield, Ren A. Wiscons, Matthias Zeller, Charles F. Campana, Orhan Talu, Stephen A. FitzGerald, Jesse L. C. Rowsell, "High Surface Area and Z' in a Thermally Stable 8-Fold Polycatenated Hydrogen-Bonded Framework," **Chem. Comm.**, 51(58), 11642-11645 (2015)

10. Orhan Talu, "Net Adsorption of Gas/Vapor Mixtures in Microporous Solids," **J. Phys. Chem. C**, *117*, 13059-13071 (2013)
11. Orhan Talu, "Measurement and Analysis of Mixture Adsorption Equilibrium in Porous Solids," **Chem. Ing. Tech.**, *83*, 67 (2011)
12. Sasidhar Gumma and Orhan Talu, "Net Adsorption: A Thermodynamic Framework for Supercritical Gas Adsorption and Storage in Porous Solids," **Langmuir**, *26*, 17013 (2010)
13. Asli Ertan, Pradeep Kodomuri, Orhan Talu and S.N. Tewari, "Effect of Synthesis Time and Treatment on Porosity of Mesoporous Silica Materials," **Adsorption J.**, *15*, 81 (2009)
14. Asli Ertan, S.N. Tewari and Orhan Talu, "Electrodeposition of Nickel Nanowires and Nanotubes Using Various Templates," **J. Experimental Nanoscience**, *3*, 287 (2008)
15. Junghai Guo, Dhananjai B. Shah and Orhan Talu, "Determination of Effective Diffusivities in Commercial Single Pellets: Effect of Water Loading," **Ind. Eng. Chem. Res.**, *46*, 600 (2007)
16. M. Goktug Ahunbay, I. Richard Elliott and Orhan Talu, "Gas Permeation Through Zeolite Single Crystal Membranes," **Adsorption J.**, *11 (sup.1)*, 313 (2005)
17. I.H. Aljundi, J.M. Belovich and Orhan Talu, "Adsorption of Lactic Acid from Fermentation Broth and Aqueous Solutions on Zeolite Molecular Sieves," **Chem. Eng. Sci.**, *60*, 5004 (2005)
18. M.G. Ahunbay, J.R. Elliott, Jr., and O. Talu, "The Effect of Surface Resistances on the Diffusion of Binary Mixtures in the Silicalite Single Crystal Membrane," **J. Phys. Chem. B**, *109*, 923 (2005).
19. M.G. Ahunbay, J.R. Elliott, Jr., and O. Talu, 'Surface Resistance to Permeation Through the Silicalite Single Crystal Membrane: Variation with Permeant.', **J. Phys. Chem. B**, *108*, 7801 (2004).
20. Sasidhar Gumma and Orhan Talu, "Gibbs Dividing Surface and Helium Adsorption," **Adsorption J.**, *9*, 17 (2003)
21. Sasidhar Gumma and Orhan Talu, "Infinite Dilution Selectivity Measurements by Gas Chromatography," **Adsorption Science and Technology**, p. 131 (Ed: Chang-Ha Lee), World Scientific, Singapore (2003)
22. Flor Siperstein, Alan L. Myers, and Orhan Talu, "Long Range Corrections for Computer Simulations of Adsorption," **Molecular Physics** *100*, 2025-2030 (2002)
23. Orhan Talu and Reiner Staudt, "Mixture Adsorption with Self-Association and Solvation," **Fundamentals of Adsorption** *7*, p.78 (Eds: K.Kaneko, H.Kanoh, Y.Hanzawa), IK International, Chiba-City, Japan (2002)
24. M.G. Ahunbay, J.R. Elliott, Jr., and O. Talu, "The Diffusion Processss of Methane in the Silicalite Single Crystal Membrane,' **J. Phys. Chem. B**, *106*, 5163 (2002).

25. Flor Siperstein, Orhan Talu and Alan L. Myers, "Gas Storage: Absolute Adsorption Versus Excess Adsorption," **Fundamentals of Adsorption 7**, p.311 (Eds: K.Kaneko, H.Kanoh, Y.Hanzawa), IK International, Chiba-City, Japan (2002)
26. D.B. Shah, Orhan Talu, J. Chhedda and H. Zhang, "Binary Diffusion in Silicalite: Theory and Experiment," **Fundamentals of Adsorption 7**, p.740 (Eds: K.Kaneko, H.Kanoh, Y.Hanzawa), IK International, Chiba-City, Japan (2002)
27. Orhan Talu and Alan L. Myers, "Molecular Simulation of Adsorption: Gibbs Dividing Surface and Comparison with Experiment," **AIChE J.**, 47, 1160 (2001)
28. Orhan Talu and Alan L. Myers, "Reference Potentials for Adsorption of Helium, Argon, Methane and Krypton in High-Silica Zeolites," **Colloids and Surfaces A: Physicochem. Eng. Aspects**, 187, 83 (2001)
29. Orhan Talu and Reiner Staudt, "Association Theory for Multicomponent Adsorption," **Proceedings of 2nd Pacific Basin Conference on Adsorption Science and Technology**, Brisbane, Australia, May (2000)
30. Junghai Guo, D.B. Shah and Orhan Talu, "Effect of Water Loading on Effective Diffusivity in Industrial Adsorbents," **Adsorption Science and Technology**, 558 (2000)
31. Matthew S. Sun, D.B. Shah, Heather H. Xu and Orhan Talu, "Adsorption Equilibria of C1 to C4 Alkanes and CO2 and SF6 on Silicalite," **J. Phys. Chem.**, 102, 1466 (1998)
32. Orhan Talu, Matthew S. Sun and D.B. Shah, "Diffusivities of n-Alkanes in Silicalite by Steady State Single Crystal Membrane Technique," **AIChE J.**, 44, 681 (1998)
33. Orhan Talu, "Needs, Status, Techniques and Problems with Binary Gas Adsorption Experiments," **Adv. Colloid and Interface Sci.**, 76-77, 227 (1998)
34. Orhan Talu, D.B. Shah, Matthew S. Sun and Heather H. Xu, "Steady State Measurements of Binary Permeation Through Microporous Membranes," p. 1201, **Fundamentals of Adsorption 6** (Editor: F. Meunier) (1998)
35. Junhai Guo, D.B. Shah and Orhan Talu, "Transport Through a Single Commercial Adsorbent Pellet/Bead by Steady State Wicke-Kallenbach Technique," p. 1195, **Fundamentals of Adsorption 6** (Editor: F. Meunier) (1998)
36. Orhan Talu and Alan L. Myers, "Force Constants for Adsorption of Helium and Argon in High-Silica Zeolites," p. 861, **Fundamentals of Adsorption 6** (Editor: F. Meunier) 1998
37. Heather X. Xu, D.B. Shah and Orhan Talu, "Synthesis of ZSM-5 Films at Elevated Gravity," **Zeolites**, 19, 114 (1997)
38. Matthew S. Sun, Orhan Talu and D.B. Shah, "Diffusion Measurements Through Embedded Zeolite Crystals," **AIChE J.**, 42, 3001 (1996)
39. Matthew S. Sun, Orhan Talu and D.B. Shah, "Adsorption Equilibria of C5-C10 Normal Alkanes in Silicalite Crystals," **J. Phys. Chem.**, 100, 17276 (1996)

40. Orhan Talu and Francis Meunier, "Adsorption of Associating Molecules in Micropores and Application to Water on Activated Carbon", **AIChE J.**, 42, 809 (1996)
41. Paul M. Mathias, Ravi Kumar, J. Douglas Moyer, Jr., Joan M. Schork, Sree R. Srinivisan, Steven R. Auvil and Orhan Talu, "Correlation of Multicomponent Gas Adsorption by the Dual-Site Langmuir Model: Application to Nitrogen/Oxygen Adsorption on 5A-Zeolite," **Ind. Eng. Chem. Res.**, 35, 2477 (1996)
42. Orhan Talu, Jianmin Li, Ravi Kumar, Paul Mathias, J. Douglas Moyer, Jr. and Joan M. Schork "Measurement and Correlation of Oxygen/Nitrogen/5A-Zeolite Adsorption Equilibria for Air Separation, **Gas Sep. Purif.**, 10, 149 (1996)
43. Orhan Talu, D.B. Shah and S. Sun, "Molecular Diffusion in a Single Zeolite Crystal", p. 953, **Fund. of Adsorption** (Editor: M.D. LeVan), Kluwer (1996)
44. Orhan Talu and A.L. Myers, "Prediction of Adsorption of Polar and Non-Polar Gases on Silicalite by Molecular Simulation", p. 945, **Fund. of Adsorption** (Editor: M.D. LeVan), Kluwer (1996)
45. K.J. Chang and Orhan Talu, "Behavior and Performance of Adsorptive Natural Gas Storage Cylinders During Discharge", **Applied Thermal Engineering**, 16, 359 (1996)
46. Orhan Talu, Jianmin Li and Alan L. Myers, "Activity Coefficients of Adsorbed Mixtures", **Adsorption**, 1, 103 (1995)
47. Jianmin Li and Orhan Talu, "Adsorption Equilibrium of Benzene/p- Xylene Vapor Mixture on Silicalite", **Chem. Eng. Science**, 49, 189 (1994)
48. Orhan Talu, Si Yang Zhang and David T. Hayhurst, "Effect of Cations on Methane Adsorption by NaY, MgY, CaY, SrY and BaY Zeolites", **J. Phys. Chem.**, 97, 12894 (1993)
49. Jan Malczyk, Orhan Talu and Robert Megargle, "Development of an Intelligent Motion Controller and Its Application to the Automation of a McBain-Bakr Balance", **J. Autom. Chem.**, 15, 183 (1993)
50. Jianmin Li and Orhan Talu, "Structural Effect on Molecular Simulations of Tight-Pore Systems", **J.Chem. Soc. Faraday Trans.**, 89, 1683 (1993)
51. Orhan Talu, "An Overview of Adsorptive Storage of Natural Gas", p. 655, **Fund. of Adsorption** (Editor: M. Suzuki), Kodansha (1993)
52. Jianmin Li and Orhan Talu, "Effect of Structural Heterogeneity on Multicomponent Adsorption: Benzene and p-xylene Mixture on Silicalite", p. 373, **Fund. of Adsorption** (Editor: M. Suzuki), Kodansha (1993)
53. Orhan Talu, "Behavior of Aromatic Molecules in Silicalite by Direct Integration of Configurational Integral", **Molecular Simulation**, 8, 119 (1991)
54. Orhan Talu, Chang-Jie Guo and David T. Hayhurst, "The Effect of Molecular Structure on Heterogeneity and Surface Phase Transition", p. 859, **Fund. of Adsorption** (Editor: A.G. Mersmann and S.E.Scholl), United Engineering Trustees (1991)

55. Siyang Zhang, Orhan Talu and David T. Hayhurst, "High Pressure Adsorption of Methane on NaX, MgX, CaX, SrX, and BaX", **J. Phys. Chem.**, 95, 1722 (1991)
56. Orhan Talu, Chang-Jie Guo and David. T. Hayhurst, "Heterogeneous Adsorption Equilibria with Comparable Molecule and Pore Sizes," **J. Phys. Chem.**, 93, 7294 (1989)
57. Chang-Jie Guo, Orhan Talu and David T. Hayhurst, "Phase Transition and Structural Heterogeneity; Benzene Adsorption on Silicalite," **AIChE J.**, 35, 573 (1989)
58. Orhan Talu and Alan L. Myers, "Rigorous Thermodynamic Treatment of Gas Adsorption," **AIChE J.**, 34, 1887 (1988)
59. Orhan Talu and Alan L. Myers, "Letters to the Editor," **AIChE J.**, 34, 1931 (1988)
60. Diego P. Valenzuela, Alan L. Myers, Orhan Talu and Imre Zwiebel, "Adsorption of Gas Mixtures: Effect of Energetic Heterogeneity," **AIChE J.**, 34, 397 (1988)
61. Orhan Talu and Imre Zwiebel, "Spreading Pressure Dependent Equation for Adsorbate Phase Activity Coefficients," **Reactive Polymers**, 5, 81 (1987)
62. Orhan Talu and Imre Zwiebel, "Multicomponent Adsorption Equilibria of Nonideal Systems," **Reactive Polymers** 6, 51 (1987)
63. Orhan Talu and Robert L. Kabel, "Isosteric Heat of Adsorption and the Vacancy Solution Model," **AIChE J.**, 33, 510 (1987)
64. Orhan Talu and Imre Zwiebel, "Multicomponent Adsorption Equilibria of Nonideal Mixtures," **AIChE J.**, 32, 1263 (1986)

CONFERENCE PROCEEDINGS

1. Goktug Ahunbay, J. Richard Elliott and Orhan Talu, "Molecular Dynamics of Single Crystal Membrane," **Topical Conf. on Engineering Sciences and Fundamentals**, Los Angeles, California, November 2000
2. Orhan Talu and Reiner Staudt, "Association Theory for Multicomponent Adsorption," **4th Topical Conf. on Separation Science and Technology**, Dallas, Texas, November 1999
3. Mei Zhang, J. Richard Elliott and Orhan Talu, "Escape from an Atomistically Defined Pore," **4th Topical Conf. on Separation Science and Technology**, Dallas, Texas, November 1999
4. D.B. Shah, Orhan Talu and X.Zhang, "Measurement of Binary Diffusivities with Single Crystal Membrane Technique," **4th Topical Conf. On Separation Science and Technology**, Dallas, Texas November 1999
5. Orhan Talu and Alan L.Myers, "Determination of Forcefields from Experimental Data for Simulation of Adsorption in Zeolites," **Applying Molecular Simulation and Computational Chemistry**, Miami Beach, Florida, November 1998

6. J. Guo, D.B. Shah and Orhan Talu, "Adsorption and Diffusion of Hydrocarbons in Industrial Adsorbents by Single-Pellet Wicke Kallenbach Technique," **Topical Conf. on Separation Science and Technology**, Los Angeles, November, 1997
7. Matthew S. Sun, D.B. Shah and Orhan Talu, "Micropore Diffusivity of n-Alkanes by Steady-State Single Crystal Membrane," **Topical Conf. on Separation Science and Technology**, Los Angeles, November, 1997
8. Orhan Talu, "Binary Gas Adsorption Data: Needs, Status, Techniques and Problems," **Topical Conf. on Separation Science and Technology**, Los Angeles, November, 1997
9. Hetaher H. Xu, M.S. Sun, D.B. Shah and Orhan Talu, "Separation of Light Alkanes Through Zeolite (MFI) Membranes," **Topical Conf. on Separation Science and Technology**, Los Angeles, November, 1997
10. Orhan Talu, "Equilibrium Measurement Techniques for Screening New Adsorbent Materials," **Proc. of 5th World Congress of Chemical Engineering**, San Diego, California, July 1996
11. Jianmin Li and Orhan Talu, "Molecular Simulations in Very Tight Pores", **Proc. of Topical Conference on Separations Technologies**, Miami Beach, Florida, November 1992
12. Orhan Talu, "Use of Additives to Increase Adsorptive Storage Capacity", **Proc. of Topical Conference on Separations Technologies**, Miami Beach, Florida, November 1992
13. X.C. Lu, O. Talu, D.B. Shah, and D.T. Hayhurst, "Recovery of Low Concentration Ammonia from Off-Gases", **Proc. of Topical Conference on Separations Technologies**, Miami Beach, Florida, November 1992
14. Orhan Talu, David T. Hayhurst and SiYang Zhang, "High Pressure Adsorption of Methane in Na, Mg, Ca, Sr and Ba X- and Y-type Zeolites", **Proc. of 2nd China-Japan-USA Symposium on Advanced Adsorption Separation Science and Technology**, Hangzhou, China, May 1991
15. Orhan Talu, Chang-Jie Guo and David T. Hayhurst, "A Two-Patch Heterogeneous Model with Surface Phase Transition for Benzene Adsorption on Silicalite," **Adsorption: Science and Technology**, (Editor: A. E. Rodrigues, M.D. LeVan and D. Tondeur), Kluwer, 1989

CONFERENCE PRESENTATIONS

1. D. P. Broom, O. Talu and M. J. Benham, "Measuring binary gas adsorption equilibria using the Integral Mass Balance (IMB) method," 8th Int. Conf. of Fed. Of European Zeolite Associations, Brighton, UK, July (2020 - postponed to 2021 due to COVID pandemic)
2. D. P. Broom, O. Talu, and M. J. Benham, "Measuring binary gas adsorption by nanoporous materials using the Integral Mass Balance (IMB) method," 12th Int. Sym. on Characterization of Porous Solids (COPS-XII), Bath, United Kingdom, June 2020

3. D. P. Broom, O. Talu and M. J. Benham, "Characterizing nanoporous materials for gas separations using the Integral Mass Balance (IMB) method," Gordon Research Conference-Chemical Separations, Galveston, Texas, January 2020
4. Orhan Talu, Darren P. Broom, and Michael J. Benham, "A new technique to measure multicomponent adsorption equilibrium: Integral Mass Balance (IMB)," AIChE Annual Meeting, Orlando, Florida, November 2019
5. D. P. Broom, O. Talu, and M. J. Benham, "Binary gas adsorption by nanoporous materials measured using a new flowing gravimetric technique," 13th Int. Conf. on Fundamentals of Adsorption, Cairns, Australia, May 2019
6. Rushik Bhandodkar, Dustin Bowden, S. Edibullu, Orhan Talu, Sasidhar Gumma, "Chemical Potential Difference between the Large and Small Pore Forms of MIL-53(Al)," AIChE Annual Meeting, Pittsburgh PA, November 2018
7. Aaron Moran and Orhan Talu, "Effect of an Equalization Step on the Minimum Bed Size Factor of a RPSA process," AIChE Annual meeting, Minneapolis, Minnesota, October 2017
8. Aaron Moran, Mihir Patel and Orhan Talu, "Measurement of Mass Transfer Parameters for Rapid Pressure Swing Adsorption," AIChE Annual meeting, Minneapolis, Minnesota, October 2017
9. Sasidhar Gumma, Kara Ufuoma and Orhan Talu, "Binary Adsorption Equilibria on MIL-53(Al)," AIChE Annual meeting, Minneapolis, Minnesota, October 2017
10. Aaron Moran and Orhan Talu, "Limits of RPSA Processes: Does a Minimum Bed Size Factor Exist?" AIChE Annual meeting, Minneapolis, Minnesota, October 2017
11. Aaron Moran and Orhan Talu, "Structure and basic adsorption properties of tpcb, a high porosity hydrogen-bonded organic framework (HOF)," AIChE Annual Meeting, San Francisco, California, November 2016
12. Aaron Moran, Mihir Patel and Orhan Talu, "Evaluation of the Mass Transfer Rate in Columns of Small Diameter Zeolite Particles," AIChE Annual Meeting, San Francisco, California, November 2016
13. Aaron Moran, Muhammet Köksal and Orhan Talu, "Effect of Mass Transfer on Rapid Pressure Swing Adsorption Performance," AIChE Annual Meeting, San Francisco, California, November 2016
14. Aaron Moran, Muhammet Köksal and Orhan Talu, "Cycle Type Comparison Under Rapid Pressure Swing Adsorption Conditions," AIChE Annual Meeting, San Francisco, California, November 2016
15. Aaron Moran and Orhan Talu, "A Rapid Pressure Swing Adsorption Process for Oxygen Generation," AIChE Annual Meeting, Salt Lake City, Utah, November 2015

16. Lea Treick¹, Philipp S. Schandelmaier¹, Aaron Moran and Orhan Talu, "Unusual Nitrogen-Oxygen Adsorption Properties of Large Pore Titanium Silicate (ETS-10)," AIChE Annual Meeting, Salt Lake City, Utah, November 2015
17. Aaron Moran and Orhan Talu, "Evaluation of a Pressure Swing Adsorption Process for Oxygen Generation Utilizing a Rate Enhanced Adsorbent," AIChE Annual Meeting, Salt Lake City, Utah, November 2015
18. Orhan Talu, "Pros and Cons of Absolute, Excess and Net Adsorption Thermodynamics," AIChE Annual Meeting, Atlanta, November 2014
19. Orhan Talu and Ali M. Farran, "Maxwell-Stefan Kinetics Applied to Net Adsorption," AIChE Annual Meeting, Atlanta, November 2014
20. Orhan Talu, Aaron Moran, and Prahar Vaidya, "Pure and Binary Net Adsorption of CH₄, CO₂ and C₂H₄," AIChE Annual Meeting, Atlanta, November 2014
21. Orhan Talu, "Net Adsorption Thermodynamic Framework for Microporous Solids," AIChE Annual Meeting, San Francisco, November 2013
22. Orhan Talu, "Inconsistencies in Thermodynamic Treatment of Adsorption Brought to Light by Net Adsorption Formulations," 11th International Conference on Fundamentals of Adsorption, Baltimore, Maryland, May 2013
23. Orhan Talu and Qianqian Zhou, "Net Adsorption Thermodynamic Framework for Microporous Adsorbents," AIChE Annual Meeting, Pittsburgh, Pennsylvania, October 2012
24. Orhan Talu, "Net Adsorption for Multicomponent Gas Equilibrium," AIChE Annual Meeting, Pittsburgh, Pennsylvania, October 2012
25. Orhan Talu, "Multicomponent Equilibrium Modeling with Net Adsorption," 6th Pacific Basin Conference on Adsorption Science and Technology, Taipei, Taiwan, May 2012
26. Orhan Talu, INVITED LECTURE: "Mixture Adsorption Equilibrium Measurements," 49th Tutzinger Symposium Adsorption, Tutzinger, Lake Starnberg, Germany, June 2010
27. Orhan Talu and Sasidhar Gumma, "A Novel Method for Reporting Adsorption Equilibria: Net Adsorption," 10th International Conference on Fundamentals of Adsorption, Awaji Hyogo, Japan, May 2010
28. Asli Ertan, Ross Puts and Orhan Talu, "Equilibrium and Kinetics of Hydrogen Storage in Nano-Palladium," AIChE Annual Meeting, Nashville, TN, November 2009
29. Sasidhar Gumma and Orhan Talu. "A Novel Method for Reporting Adsorption Equilibria: Net Adsorption," AIChE Annual Meeting, Philadelphia, Pennsylvania, November 2008
30. Asli Ertan and Orhan Talu, "Palladium nanowires for hydrogen storage: Equilibrium and kinetics," Materials Innovations in a Emerging Hydrogen Economy, Cocoa Beach, Florida, February 2008

31. Asli Ertan and Orhan Talu, "Hydrogen Storage Equilibrium and Kinetics of Palladium Nanowires Grown in Anodized Alumina," AIChE Annual Meeting, Salt Lake City, Utah, November 2007
32. Aniket Sonalkar and Orhan Talu, "Permeation in Mesoporous Silica-Anodized Alumina Composite Membranes," AIChE Annual Meeting, Salt Lake City, Utah, November 2007
33. Orhan Talu and Asli Ertan, "Is Differential Volumetric Technique More Accurate," AIChE Annual Meeting, Salt Lake City, Utah, November 2007
34. Orhan Talu, "KEYNOTE LECTURE: Adsorptive Storage," 9th Int. Conf. On Fundamentals of Adsorption, Giardini Naxos, Italy, May 2007
35. Orhan Talu, Sasidhar Gumma, Deepam Panchal, Roger J. Briggs and Edward J. Hummelt, "Adsorptive Storage of Mechanical Energy (Work) for Transportation Applications," AIChE Annual Meeting, San Francisco, California, November 2006
36. Asli Ertan, Surendra N. Tewari and Orhan Talu, "Different Methods fo Mesoporous Silica Synthesis and Their Effects on Surface Properties," AIChE Annual Meeting, Cincinnati, Ohio, October 2005
37. Pradeep Kodumuri, Orhan Talu and Surendra N. Tewari, "In-Situ Growth odlf Zeolites and Mesoporous Silica on Metal Substrates," AIChE Annual Meeting, Cincinnati, Ohio, October 2005
38. Chandrashekhar Pendyala, Surendra N. Tewari and Orhan Talu, "Study of Growth Mechanisms of Metallic Nanowire Arrays in Porous Substrates," AIChE Annual Meeting, Cincinnati, Ohio, October 2005
39. Orhan Talu, "Sub-Nanostructured Non-Transition Metal Complex Grids for Hydrogen Storage," DOE Hydrogen Program Review, Washington, D.C., May 2005
40. Orhan Talu and Sasidhar Gumma, "Problems of volumetric-gravimetric measurements," 8th Int. Conf. On Fundamentals of Adsorption, Sedona, Arizona, May 2004
41. Goktug Ahunbay, Richard Elliott and Orhan Talu, "Gas Permeation through Single Crystal Membranes," 8th Int. Conf. On Fundamentals of Adsorption, Sedona, Arizona, May 2004
42. Sasidhar Gumma and Orhan Talu, "Infinite Dilution GC for Measurement of Binary Adsorption Equilibrium," 8th Int. Conf. On Fundamentals of Adsorption, Sedona, Arizona, May 2004
43. Orhan Talu and Sasidhar Gumma, "Modeling Binary Adsorption Equilibria using Infinite Diluton Gas Chromatographic Measurements," AIChE Annual Meeting, San Francisco, California, November 2003
44. Orhan Talu, Yin Xu, Vichien Tangpanyapinit, Sasidhar Gumma and Steven M. Kuznicki, "A True Molecular Sieve with Continuous Pore Size Control," AIChE Annual Meeting, San Francisco, California, November 2003

45. Goktug Ahunbay J. Richard Elliott and Orhan Talu, "The Role of Zeolite Pore Structures and Surface Resistances on the Performance of Binary Mixture Separation," AIChE Annual Meeting, San Francisco, California, November 2003
46. Sasidhar Gumma and Orhan Talu, "Measurement of Gibbs Dividing Surface with He, Ne, Ar and CH₄," AIChE Annual Meeting, San Francisco, California, November 2003
47. Goktug Ahunbay, J. Richard Elliott and Orhan Talu, "The Effect of Surface Resistances on the Diffusion of Binary Mixtures in the Silicalite Single Crystal Membrane," AIChE Annual Meeting, San Francisco, California, November 2003
48. M.G. Ahunbay, J.R. Elliott, Jr., and Orhan Talu, "The Effect of Surface Resistances on the Diffusion of Binary Mixtures in the Silicalite Single Crystal Membrane," Midwest Thermodynamics Symposium, Columbus 2003
49. Orhan Talu and Alan L. Myers, "Adsorptive Storage of Hydrogen and Methane," AIChE Annual Meeting, Indianapolis, Indiana, November 2002
50. Orhan Talu and Sasidhar Gumma, "On Measurement of True Density of Microporous Solids," AIChE Annual Meeting, Indianapolis, Indiana, November 2002
51. Sasidhar Gumma and Orhan Talu, "Measurement of Infinite Dilution Selectivities in Binary Adsorption Using Gas Chromatography," AIChE Annual Meeting, Indianapolis, Indiana, November 2002
52. Goktug Ahunbay, J. Richard Elliott and Orhan Talu, "Surface Resistance to Permeation Through the Silicalite Single Crystal Membrane: Variation with Permeant," AIChE Annual Meeting, Indianapolis, Indiana, November 2002
53. M.G. Ahunbay, J.R. Elliott, Jr., and Orhan Talu, "The Effect of Surface Resistances on the Diffusion of Binary Mixtures in the Silicalite Single Crystal Membrane," Midwest Thermodynamics Symposium, Pittsburgh 2002
54. S. Gumma, Valerie A. Bell, Richard M. Jacubinas, Orhan Talu and S.M. Kuznicki, "Equilibrium Separation of Nitrogen from Methane by Adsorption," AIChE Annual Meeting, Reno, Nevada, November 2001
55. Orhan Talu, "Surface Excess Versus Absolute Amount Adsorbed," AIChE Annual Meeting, Reno, Nevada, November 2001
56. M. Goktug Ahunbay, J. Richard Elliott, Orhan Talu, "Surface Resistance to Permeation in the Single Crystal Membrane," AIChE Annual Meeting, Reno, Nevada, November 2001
57. Prasanth Manne and Orhan Talu, "Transportability of Effective Potential Parameters Between Different Zeolites for Spherical Molecules like CH₄, Ar, and SF₆," AIChE Annual Meeting, Reno, Nevada, November 2001
58. Orhan Talu, M.G. Ahunbay, and J.R. Elliott, Jr., "The Diffusion Process of Methane Through the Single Crystal Membrane," Midwest Thermodynamics Symposium, East Lansing 2001

59. Orhan Talu and Reiner Staudt, "Mixture Adsorption with Self-Association and Solvation," Fundamentals of Adsorption 7, Nagasaki, Japan, May 2001
60. Flor Siperstein, Orhan Talu and Alan L. Myers, "Gas Storage: Absolute Adsorption Versus Excess Adsorption," Fundamentals of Adsorption 7, Nagasaki, Japan, May 2001
61. D.B. Shah, Orhan Talu, J. Chhedda and H. Zhang, "Binary Diffusion in Silicalite: Theory and Experiment," Fundamentals of Adsorption 7, Nagasaki, Japan, May 2001
62. S. Gumma, D.B. Shah and Orhan Talu, "Binary Adsorption of n-Alkanes on Silicalite," AIChE Annual Meeting, Los Angeles, California, November 2000
63. Juben Chhedda, Huixiong Zhang, D.B. Shah and Orhan Talu, "Theories of Multicomponent Diffusion in Zeolites," AIChE Annual Meeting, Los Angeles, California, November 2000
64. Flor Siperstein, Alan L. Myers and Orhan Talu, "Long-Range Corrections for Energy and Amount Adsorbed in Zeolites," AIChE Annual Meeting, Los Angeles, California, November 2000
65. Orhan Talu, Goktug Ahunbay, and J. Richard Elliott, "Molecular Dynamics of Single Crystal Membrane," AIChE Annual Meeting, Los Angeles, California, November 2000
66. Orhan Talu, "Comparison Between Adsorption Experiments and Simulation," 2nd TRI/Princeton Workshop on Characterization of Porous Materials: From Angstroms to Millimeters, Princeton, New Jersey, June 2000
67. O. Talu, G. Ahunbay, and J.R. Elliott, Jr., "Transition Kinetics During Escape from the Straight Channels of Silicalite," Midwest Thermodynamics Symposium, Minneapolis 2000
68. Orhan Talu and Reiner Staudt, "Association Theory for Multicomponent Adsorption," 2nd
69. Pacific Basin Conference on Adsorption Science & Technology, Brisbane, Australia, May 2000
70. Junghai Guo, D.B. Shah and Orhan Talu, "Effect of Water Loading on Effective Diffusivity in Industrial Adsorbents," Proceedings of 2nd Pacific Basin Conference on Adsorption Science and Technology, Brisbane, Australia 2000
71. Orhan Talu and Reiner Staudt, "Adsorption of Associating Molecules in Multicomponent
72. Systems," Annual meeting DVCV Working-group; Adsorption, Wernigerode, Germany,
73. April 2000
74. Flor R. Siperstein, Alan L. Myers and Orhan Talu, "Binary Mixture Adsorption in Zeolites: A Comparison Between Experiment and Molecular Simulation," NECZA 99, Philadelphia, PA, December 1999
75. Orhan Talu and Reiner Staudt, "Association Theory for Multicomponent Adsorption," 4th Topical Conf. on Separation Science and Technology, Dallas, Texas, November 1999
76. Mei Zhang, J. Richard Elliott and Orhan Talu, "Escape from an Atomistically Defined Pore," 4th Topical Conf. on Separation Science and Technology, Dallas, Texas, November 1999

77. Orhan Talu and Alan L. Myers, "Gibbs Dividing Surface; Molecular Simulation and Experiment," 4th Topical Conf. on Separation Science and Technology, Dallas, Texas, November 1999
78. D.B. Shah, Orhan Talu and X.Zhang, "Measurement of Binary Diffusivities with Single Crystal Membrane Technique," 4th Topical Conf. On Separation Science and Technology, Dallas, Texas November 1999
79. J.H. Guo, D.B. Shah and Orhan Talu, "Transport of Hydrocarbons in Water Loaded Industrial 5A and 13X Pellets," AIChE Annual Meeting, Miami Beach, Florida, November 1998
80. D.B. Shah, Orhan Talu and H. Zhang, "Investigation of Dependence of Corrected Micropore Diffusivity on Loading by Single Crystal Membrane Technique," AIChE Annual Meeting, Miami Beach, Florida, November 1998
81. Orhan Talu and Alan L.Myers, "Determination of Forcefields from Experimental Data for Simulation of Adsorption in Zeolites," Applying Molecular Simulation and Computational Chemistry, Miami Beach, Florida, November 1998
82. Orhan Talu, D.B. Shah, Matthew S. Sun and Heather H. Xu, "Steady State Measurements of Binary Permeation Through Microporous Membranes," Fundamentals of Adsorption 6, Giens, France, May 1998
83. Orhan Talu, "Pure and Binary Gas Adsorption: Theory & Experiment," Applications of Adsorption and Ion Exchange, Izmir, Turkey, May 1998
84. Junhai Guo, D.B. Shah and Orhan Talu, "Transport Through a Single Commercial Adsorbent Pellet/Bead by Steady State Wicke-Kallenbach Technique," Fundamentals of Adsorption 6, Giens, France, May 1998
85. Orhan Talu and Alan L. Myers, "Force Constants for Adsorption of Helium and Argon in High-Silica Zeolites," Fundamentals of Adsorption 6, Giens, France, May 1998
86. Orhan Talu and Steven M. Kuznicki, "Pure Component Adsorption by ETS-10," Fundamentals of Adsorption 6, Giens, France, May 1998
87. J. Guo, D.B. Shah and Orhan Talu, "Adsorption and Diffusion of Hydrocarbons in Industrial Adsorbents by Single-Pellet Wicke Kallenbach Technique," Topical Conf. on Separation Science and Technology, Los Angeles, November, 1997
88. Matthew S. Sun, D.B. Shah and Orhan Talu, "Micropore Diffusivity of n-Alkanes by Steady-State Single Crystal Membrane," Topical Conf. on Separation Science and Technology, Los Angeles, November, 1997
89. Orhan Talu, "Binary Gas Adsorption Data: Needs, Status, Techniques and Problems," Topical Conf. on Separation Science and Technology, Los Angeles, November, 1997
90. Hetaher H. Xu, M.S. Sun, D.B. Shah and Orhan Talu, "Separation of Light Alkanes Through Zeolite (MFI) Membranes," Topical Conf. on Separation Science and Technology, Los Angeles, November, 1997

91. Orhan Talu, "Needs, Status, Techniques and Problems with Binary Gas Adsorption Experiments," TRI/Princeton Workshop on Characterization of Porous Solids, Princeton, June 1997
92. S. Koehl, F. Dreisbach, R. Staudt and Orhan Talu, "Effect of Pressure on Infinite Dilution Activity Coefficients," AIChE Annual Meeting, Chicago, November 1996
93. H. Xu, D.B. Shah and Orhan Talu, "Synthesis of ZSM-5 Membranes at Elevated Gravity," AIChE Annual Meeting, Chicago, November 1996
94. M.Sun, Orhan Talu and D.B. Shah, "Binary Diffusion Measurements Using the Single Crystal Membrane Method," AIChE Annual Meeting, Chicago, November 1996
95. L. Liu and Orhan Talu, "Air Separation by Pressure Swing Adsorption," AIChE Annual Meeting, Chicago, November 1996
96. Orhan Talu, "Equilibrium Measurement Techniques for Screening New Adsorbent Materials," 5th World Congress of Chemical Engineering, San Diego, California, July 1996.
97. Orhan Talu, D.B. Shah, and S. Sun, "Molecular Diffusion in a Single Zeolite Crystal," AIChE Annual Meeting, Miami Beach, Florida, November 1995
98. Orhan Talu and Francis Meunier, "Adsorption of Associating Molecules in Micropores and Application to Water Adsorption on Activated Carbon," AIChE Annual Meeting, Miami Beach, Florida, November 1995
99. D.B. Shah, Orhan Talu, X.I. Lu and Hongbin Xu, "Moderation of Ammonium Concentration Spikes in Industrial Wastewater With Clinoptilolite," AIChE Annual Meeting, Miami Beach, Florida, November 1995
100. Orhan Talu and A.L. Myers, "Prediction of Adsorption of Polar and Non-Polar Gases on Silicalite by Molecular Simulation", 5th. Int. conf. on Fund. of Adsorption, Asilomar, California, May 1995.
101. Orhan Talu, D.B. Shah and S. Sun, "Molecular Diffusion in a Single Zeolite Crystal", 5th Int. Conf. on Fund. of Adsorption, Asilomar, California, May 1995.
102. K.J. Chang and Orhan Talu, "Dynamic Capacity of Adsorptive Natural Gas Storage Systems", AIChE Annual Meeting, San Francisco, November 1994.
103. Orhan Talu, D.B. Shah and S. Sun, "Continuous Heavy Metal Removal from Solutions and Slurries by Films of a New Ion-Exchange Media", AIChE Annual Meeting, San Francisco, November 1994.
104. Orhan Talu, D.B. Shah, S. Sun, K.W. Street, W.H. Warren and W.C. Won, "A New Ion-Exchange Media for Heavy Metal Removal from Solutions and Slurries", AIChE Annual Meeting, San Francisco, November 1994.
105. Orhan Talu, D.B. Shah, X.L. Lu and D.T. Hayhurst, "A New Ion-Exchange Media for Heavy Metal Removal", ACS Meeting, San Diego, CA, March 1994.

106. X.F. Lu and Orhan Talu, "Combined Gravimetric-Volumetric Technique for Binary Adsorption Equilibria Without Composition Measurement", AIChE Annual Meeting, St. Louis, Missouri, November 1993.
107. Jianmin Li and Orhan Talu, "Evaluation of Multicomponent Adsorption Data", AIChE Annual Meeting, St. Louis, Missouri, November 1993.
108. Jianmin Li and Orhan Talu, "Molecular Simulations in Very Tight Pores", Topical Conference on Separations Technologies, Miami Beach, Florida, November 1992.
109. Orhan Talu, "Use of Additives to Increase Adsorptive Storage Capacity", Topical Conference on Separations Technologies, Miami Beach, Florida, November 1992.
110. X.C. Lu, O. Talu, D.B. Shah, and D.T. Hayhurst, "Recovery of Low Concentration Ammonia from Off-Gases", Topical Conference on Separations Technologies, Miami Beach, Florida, November 1992.
111. Jianmin Li and Orhan Talu, "Effect of Structural Heterogeneity on Multicomponent Adsorption: Benzene, Toluene, and p-Xylene Mixtures on Silicalite", IVth International Conference on Fundamentals of Adsorption, Kyoto, Japan, May 1992.
112. Orhan Talu, "An Overview of Adsorptive Storage of Natural Gas," IVth International Conference on Fundamentals of Adsorption, Kyoto, Japan, May 1992.
113. Orhan Talu, "Molecular Motion in Tight-Fit Pores by simple Simulations", International Symposium on Fractal and Physically Adsorbed Molecular States, Chiba, Japan, May 1992.
114. Jianmin Li and Orhan Talu, "Study of Adsorption of Benzene/p-Xylene Binary Mixture on Silicalite", AIChE Annual Meeting, Los Angeles, November 1991.
115. Orhan Talu, David T. Hayhurst and SiYang Zhang, "High Pressure Adsorption of Methane in Na, Mg, Ca, Sr and Ba X- and Y- Type Zeolites", 2nd China-Japan-USA Symposium on Advanced Adsorption Separation Science and Technology, Hangzhou, China, May 1991.
116. Orhan Talu, "Behavior of Aromatic Molecules in Silicalite by Direct Integration of Configurational Integral," AIChE Annual Meeting, Chicago, Illinois, November 1990.
117. David T. Hayhurst and Orhan Talu, " Overview of Adsorbed Natural Gas Storage," Gas Utilization Research Forum, London, England, July 1990.
118. Orhan Talu, "Carbons and Odorants, Storage Enhancement with Additives," Gas Utilization Research Forum, London, England, July 1990.
119. Orhan Talu, C.J. Guo and David T. Hayhurst, "Steric Effects for Aromatic Molecules Adsorbed in MFI-Type Zeolites," Annual Symposium of the Pittsburgh-Cleveland Catalysis Society, Beachwood, Ohio, April 1990.
120. Orhan Talu and David T. Hayhurst, "Isothermic Heat of Adsorption by the Virial Isotherm Equation," AIChE Annual Meeting, San Francisco, California, November 1989.

121. Si-Yang Zhang, David T. Hayhurst and Orhan Talu, "High Pressure Adsorption of Methane in MgX, CaX, SrX and BaX Zeolites," AIChE Annual Meeting, San Francisco, California, November 1989.
122. Chang-Jie Guo, Orhan Talu and David T. Hayhurst, "Adsorption Heterogeneity of Molecular Sieves Silicalite," 8th. International Zeolite Conference, Amsterdam, Netherlands, July 1989.
123. Orhan Talu, Chang-Jie Guo and David T. Hayhurst, "The Effect of Molecular Structure on Heterogeneity and Surface Phase Transition," 3rd. International Conference on Fundamentals of Adsorption, Sonthofen, W.Germany, May 1989.
124. Chang-Jie Guo, Orhan Talu and David T. Hayhurst, "Structural Heterogeneity of Molecular Sieves," 11th. North American Meeting of Catalysis Society, Dearborn, Michigan, May 1989.
125. Orhan Talu, Chang-Jie Guo and David T. Hayhurst, "Phase Transition on a Heterogeneous Surface; Benzene and Toluene on Silicalite," AIChE Annual Meeting, Washington, D.C., November 1988.
126. Orhan Talu, Chang-Jie Guo and David T. Hayhurst, "A Two-Patch Heterogeneous Model with Surface Phase Transition for Benzene Adsorption on Silicalite," Adsorption: Science and Technology, Vimerio, Portugal, July 1988.
127. Orhan Talu and Imre Zwiebel, "Multicomponent Adsorption Equilibria of Nonideal Systems," AIChE Annual Meeting, Chicago, Illinois, November 1985.
128. Orhan Talu and Imre Zwiebel, "Adsorbate Phase Activity Coefficients as a Function of Spreading Pressure and Composition," American Chemical Society Meeting, Chicago, Illinois, September 1985.

FUNDED RESEARCH

1. Next Generation Personal Medical Oxygen Concentrators
 - a. Period: 5/15/2013- 12/15/2018 Orhan Talu (PI) and Sridhar Ungarala
 - b. Invacare Corporation, Elyria, Ohio Amount: \$ 601,883
2. MRI: Acquisition of an integrated atomic force microscope/ Inverted optical microscope for interdisciplinary research at Cleveland State University

Period: 8/13/2013-8/12/2016 C. Kothapalli(PI), O.Talu, A.Resnick,X.L.Sun,N.Holland

 - a. National Science Foundation, Arlington, Virginia Amount: \$ 289,939
3. Characterization and Benchmarking Zeolite Adsorbents for Oxygen Concentrators
 - a. Period: 4/20/2012- 5/15/2013 Orhan Talu (PI) and Sridhar Ungarala
 - b. Invacare Corporation, Elyria, Ohio Amount: \$ 97,601
4. MRI: Acquisition of a field emission scanning electron microscope for multidisciplinary nanotechnology research
 - a. Period: 10/1/2011 – 9/30/2014 Petru S. Fodor (PI), Orhan Talu, John Turner,
 - i. Miron Kaufman
 - b. National Science Foundation, Arlington, Virginia Amount: \$ 472,115

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5. Adsorbent Silicates Grown in Nanopores of Alumina for Membrane Applications
 - a. Period: 7/1/07 – 6/30/08 Orhan Talu
 - b. Faculty Research Development Program, University Research Council,
Cleveland State University Amount: \$ 16,880
6. Sub-Nanostructured Non-Transition Metal Complex Grids For Hydrogen Storage
 - a. Period: 1/1/04 – 6/30/08 Orhan Talu (PI) and Surendra N. Tewari
 - b. Office of Energy Efficiency and Renewable Energy, Department of Energy,
Washington D.C. Amount: \$ 1,378,455
7. Power Partnership for Ohio
 - a. Period: 6/1/04 – 5/31/07 Orhan Talu
 - i. Part of 16 mil\$ collaborative research between North East Ohio
universities and companies, Wright Capital Project Fund, Ohio
Department of Development, State of Ohio Amount: \$ 412,222
8. Performance of Microporous Adsorbents under Cycling at very High Pressures
 - a. Period: 6/1/03 – 10/31/03 Orhan Talu
 - b. Eaton Corp., Milwaukee, WI Amount: \$ 72,366
9. Application of Molecular Gates™ Technology to Oxygen Enrichment of Air Streams and
Simplified Purification of Natural Gas
 - a. Period: 12/1/99 - 11/30/02 Orhan Talu
 - b. part of 4.5 mil\$ NIST/ATP collaborative research agreement between Engelhard
Corp., U. of South Alabama, U. of Massachusetts and Cleveland State
University/Advanced Manufacturing Center Amount: \$ 965,941
10. Multi-component Adsorption Equilibria of a n-C₄H₁₀-CO₂ System
 - a. Period: 6/1/98 - 5/30/99 Orhan Talu
 - b. The BOC Gases, Murray Hill, New Jersey Amount: \$ 40,000
11. Application of Single Crystal Membrane Technique for Investigation of Binary Diffusivities
in Zeolites
 - a. Period: 3/1/98 - 2/28/01 Orhan Talu (PI), D.B. Shah and R.J. Elliott
 - b. National Science Foundation, Arlington, Virginia Amount: \$ 248,604
12. Exploratory Research on Diffusion of Gases through Adsorbents
 - a. Period: 1/1/98 - 12/31/98 Orhan Talu
 - b. Air Products and Chemicals, Inc., Allentown, Penn. Amount: \$ 25,000
13. Evaluation of H₂O Tx Cells
 - a. Period: 6/30/98 - 9/30/98 Orhan Talu (PI) and Jorge E. Gatica
 - b. ARx Technologies, Cleveland, Ohio Amount: \$ 19,090
14. Sixth International Conference on Fundamentals of Adsorption
 - a. Period: 1/15/98 - 12/31/99 Orhan Talu
 - b. National Science Foundation, Arlington, Virginia Amount: \$ 15,000
15. A Novel Fermentation/Separation Process for Lactic Acid Production
 - a. Period: 7/1/96 - 6/30/98 Joanne Belovich (PI) and Orhan Talu
 - b. Cleveland Advanced Manufacturing Program, Cleveland, Ohio

Amount: \$ 45,431

16. Development of Single Crystal Membrane Technique for Direct Measurement of Micropore Diffusivity
 - a. Period: 4/1/94 - 9/30/97 Orhan Talu (PI) and D.B. Shah
 - b. National Science Foundation, Arlington, Virginia Amount: \$ 159,715
17. Collection of Oxygen/Nitrogen Binary Data on X-5297 for PSA Air Separation Process Evaluation;
 - a. Period: 6/15/94 - 9/15/96 Orhan Talu
 - b. Engelhard Corporation, Iselin, New Jersey Amount: \$ 82,098
18. Diffusion of Gases through Adsorbent Particles
 - a. Period: 10/1/95 - 9/30/96 Orhan Talu
 - b. Air Products and Chemicals, Inc., Allentown, PA Amount: \$ 20,000
19. Experimental and Theoretical Investigation of Relationship Between Pore Structure and Effective Diffusivities in Biporous Materials
 - a. Period: 7/1/96 - 6/30/97 D.B. Shah (PI) and Orhan Talu
 - b. EFRD, Cleveland State University, Cleveland, Ohio Amount: \$ 10,940
20. Environmental Experiments in Chemical Engineering Laboratory;
 - a. Period: 6/1/94 - 5/30/95 N.H.Dural (PI) and Orhan Talu
 - b. National Science Foundation, Arlington, Virginia Amount: \$ 20,149
21. In-Plant Testing of Ion-exchange Membranes to treat Electroplating Wastewater,
 - a. Period: 4/1/93 - 4/8/94 D.B.Shah (PI) and Orhan Talu
 - b. NASA/Lewis Research Center, Cleveland, Ohio Amount: \$ 39,693
22. Crystal Transformations Caused by Adsorbed Molecules in Microporous Systems
 - a. Period: 6/15/92 - 6/14/93 Orhan Talu
 - b. Research Challenge, State of Ohio, Materials Initiative Amount: \$ 20,000
23. Optimization of the Adsorption Process for Removal and Recovery of Ammonia from Off-Gases
 - a. Period: 1/91 - 6/91 D.T. Hayhurst (PI), Orhan Talu and D.B. Shah
 - b. GE Lighting, Environmental Division, Euclid, Ohio Amount: \$ 50,383
24. Moderation of Ammonium Concentration in Industrial Waste-Waters by Ion-Exchange
 - a. Period: 1/91 - 6/91 Orhan Talu (PI), D.T. Hayhurst and D.B. Shah
 - b. GE Lighting, Environmental Division, Euclid, Ohio Amount: \$ 89,912
25. High Pressure Binary Adsorption Equilibrium of Oxygen-Nitrogen Mixtures
 - a. Period: 11/90 - 2/91 Orhan Talu
 - b. Air Products and Chemicals, Inc., Allentown, PA Amount: \$ 16,537
26. Removal and Recovery of Ammonia From Off-Gases By Adsorption
 - a. Period: 7/90 - 12/90 D.T. Hayhurst (PI), Orhan Talu and D.B. Shah
 - b. GE Lighting, Environmental Division, Euclid, Ohio Amount: \$ 52,978
27. Adsorptive Methane Storage Capacity of Microporous Carbons
 - a. Period: 1/90 - 12/90 Orhan Talu

- b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 15,002
- 28. Adsorptive Methane Storage Capacity of CaX Zeolites
 - a. Period: 10/89 - 12/89 Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 12,766
- 29. The Evaluation of Adsorption Based Delivery Systems
 - a. Period: 1/89 - 9/89 Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 24,016
- 30. The Dynamic Behavior of Adsorptive Storage Systems for Odorized Methane
 - a. Period: 1/88 - 12/88 Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 90,740
- 31. The Effect of Adsorbent on Odorized Methane Storage
 - a. Period: 10/87 - 12/87 Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 20,175
- 32. The Characterization of Adsorptive Storage Behavior with Odorized Methane
 - a. Period: 4/87 - 9/87 Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 68,508
- 33. Validation of the Spreading Pressure Dependent Model
 - a. Period: 1/87 - 6/87 Orhan Talu
 - b. Research and Creative Activities Grant Program, Ohio Amount: \$ 2,400
- 34. The Evaluation of Methane Adsorption on Molecular Sieve Carbons
 - a. Period: 7/86 - 2/87 D.T. Hayhurst (PI) and Orhan Talu
 - b. Michigan Consolidated Gas Company, Detroit, Michigan Amount: \$ 42,824

CONFERENCES ATTENDED

AIChE Annual Meeting, Pittsburgh PA, November 2018

AIChE Annual Meeting, San Francisco, California, November 2016

AIChE Annual Meeting, Salt Lake City, Utah, November 2015

AIChE Annual Meeting, Atlanta, Georgia, November 2014

AIChE Annual Meeting, San Francisco, California, November 2013

11th International Conference on Fundamentals of Adsorption, Baltimore, Maryland, May 2013

AIChE Annual Meeting, Pittsburgh, Pennsylvania, October 2012

6th Pacific Basin Conference on Adsorption Science and Technology, Taipei, Taiwan, May 2012

49th Tutzinger Symposium Adsorption, Tutzinger, Lake Starnberg, Germany, June 2010

10th International Conference on Fundamentals of Adsorption, Awaji Hyogo, Japan, May 2010

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AICHE Annual Meeting, Philadelphia, Pennsylvania, November 2008

Materials Innovations in a Emerging Hydrogen Economy, Cocoa Beach, Florida, February 2008

AICHE Annual Meeting, Salt Lake City, Utah, November 2007

9th International Conference on Fundamentals of Adsorption, Giardini Naxos, Italy, May 2007

University Clean Energy Alliance of Ohio (UCEAO), Columbus, April 2007

AICHE Annual Meeting, San Francisco, November 2006

AICHE Annual Meeting, Cincinnati, Ohio, October 2005

DOE Hydrogen Program Annual Review, Washington, D.C., May 2005

AICHE Annual Meeting, Austin, Texas, November 2004

8th International Conference on Fundamentals of Adsorption, Sedona, Arizona, May 2004

AICHE Annual Meeting, San Francisco, California, November 2003

AICHE Annual Meeting, Indianapolis, Indiana, November 2002

AICHE Annual Meeting, Reno, Nevada, November 2001

Fundamentals of Adsorption 7, Nagasaki, Japan, May 2001

AICHE Annual Meeting, Los Angeles, California, November 2000

2nd TRI/Princeton Workshop on Characterization of Porous Materials: From Angstroms to Millimeters, Princeton, New Jersey, June 2000

AICHE Annual Meeting, Dallas, Texas, November 1999

AICHE Annual Meeting, Miami Beach, Florida, November 1998

6th International Conference on Fundamentals of Adsorption, Giens, France, May 1998

Applications of Adsorption and Ion Exchange, Izmir, Turkey, May 1998

AICHE Annual Meeting, Los Angeles, November 1997

TRI/Princeton Workshop on Characterization of Porous Solids, Princeton, June 1997

Integrating Engineering and the Biological Sciences: A Revolution in the Making, National Academy of Engineering, Washington D.C., October 1997

AICHE Annual Meeting, Chicago, November 1996

5th World Congress of Chemical Engineering, San Diego, California, July 1996

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2nd Topical Conference on Separations Technology and AIChE Annual Meeting, Miami Beach, Florida, November 1995

5th International Conference on Fundamentals of Adsorption, Asilomar, California, May 1995

AIChE Annual Meeting, San Francisco, California, November 1994

ACS Annual Meeting, San Diego, California, March 1994

AIChE Annual Meeting, St. Louis, November 1993

Topical Conference on Separations Technology and Annual Meeting of American Institute of Chemical Engineers, Miami Beach, November 1992

4th International Conference on Fundamentals of Adsorption, Kyoto, Japan, May 1992

International Symposium on Fractal and Physically Adsorbed Species, Chiba, Japan, May 1992

AIChE Annual Meeting, Los Angeles, November 1991

Second China-Japan-USA Symposium on Advanced Adsorption Separation Science and Technology, Hangzhou, China, May 1991

AIChE Annual Meeting, Chicago, Illinois, November 1990

Gas Utilization Research Forum, London, England, July 1990

Annual Symposium of the Pittsburgh-Cleveland Catalysis Society, Beachwood, Ohio, April 1990

AIChE Annual Meeting, San Francisco, California, November 1989

3rd. International Conf. on Fundamentals of Adsorption, Sonthofen, W.Germany, May 1989

AIChE Annual Meeting, Washington, D.C., November 1988

Adsorption Science and Technology, Vimeiro, Portugal, July 1988

AIChE Annual Meeting, New York, N.Y., November 1987

Chemical Engineering Faculty Summer School, American Society for Engineering Education, North Dartmouth, Mass., August 1987

AIChE Annual Meeting, Miami, Florida, November 1986

AIChE Annual Meeting, Chicago, Illinois, November 1985

American Chemical Society Meeting, Chicago, Illinois, September 1985

AIChE Annual Meeting, San Francisco, California, November 1984

AIChE Spring Meeting, Anaheim, California, May 1984

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AIChE Spring Meeting, Houston, Texas, May 1983

GRADUATE STUDENT ADVISING

Completed

1. Adsorption Properties of MIL-53(Al), *Rushik Bandodkar*, **MS**, July 2019
2. Pressure Swing Adsorption, *Aaron Moran*, **DRE**, May 2018
3. Pure and Binary Adsorption Equilibria of oxygen and nitrogen in LiLSX Zeolite, *Hima Bindu Gandra*, **M.S.**, May 2017
4. Effect of Axial Dispersion on Mass Transfer Rate with Small Zeolite Particles, *Mihirkumar Sanatbhai Patel*, **M.S.**, August 2017
5. Pure and Binary Adsorption of Methane and Nitrogen in Silicalite, *Prahar S. Vaidya*, **M.S.**, May 2016
6. A PSA Process for an Oxygen Concentrator, *Aaron Moran*, **M.S.**, May 2014
7. Mathematical Modeling of PSA, *Kevin D. Brininger*, **M.S.** (co-advising w/Dr. S. Ungarala), August 2014
8. Multicomponent Equilibrium with Net Adsorption Thermodynamic Framework, *Qianqian Zhou*, **M.S.**, May 2013
9. Hydrogen Storage Phase Properties of Palladium Nanowires, *Ross Puts*, **M.S.**, August 2009
10. Templates for Electrochemical Growth of Nanostructured Metal Hydride Materials for Hydrogen Storage, co-advisor with Dr. S.N. Tewari, *Pradeep Kodumuri*, **DRE**, May 2009
11. Synthesis and Characterization of Mesoporous Silica Materials as Templates for Nanowires, *Asli Ertan*, **DRE**, December 2008
12. Single Cell Solid Oxide Fuel Cell Test System, *Megnath Grade*, **M.S.**, May 2008
13. Hot Vibration Testing of Solid Oxide Fuel Cells, *Jason Bretmersky*, **M.S.**, May 2007
14. Electrochemical Nanowire Growth in Track Etched Polycarbonate Films, *Chandrashekhhar Pendyala*, **M.S.**, May 2006
15. Composite Fuel Cell PEM Membranes for High Temperature Applications, *Kanti Penmetsa*, **M.S.**, August 2006
16. Adsorption Equilibrium Database Development, *Suthir Bethanabotlu*, **M.S.**, December 2005
17. PEM Fuel Cell Test Apparatus, *Joseph Steirer*, **M.S.**, August 2004

18. An Automated Magnetically Coupled Microbalance System for High Pressure, High Temperature, Adsorption/Absorption Measurements of Corrosive Gases, *Aadesh R. Harale*, **M.S.**, August 2004
19. Single Component Adsorption Characteristics of ETS-4 Materials, *Yin Xu*, **M.S.**, December 2003
20. Multicomponent Adsorption of n-Alkanes on Silicalite, *Sasidhar Gumma*, **D.Eng.**, August 2003
21. Binary Diffusion in Micropores by Single Crystal Membrane (SCM) Technique, *Huixiong Zhang*, **D.Eng.**, August 2003
22. Molecular Simulation of Adsorption in Titanium Silicate Zeolites, *Prashant Manne*, **M.S.**, December 2002
23. Novel Fermentation and Adsorption for Production of Lactic Acid, co-advising with Dr. J. Belovich, *Isam Hasan Aljundi*, **D.Eng.**, May 2001
24. An Automated System for the Measurement of Binary Adsorption Equilibria, *Sasidhar Gumma*, **M.S.**, June 1999
25. Synthesis of Zeolite Membranes, co-advising with Dr. D.B. Shah, *Hongbin Xu*, **D.Eng.**, June 1998
26. Diffusion in Adsorbent Pellets, *Junghai Guo*, co-advising with Dr. D.B. Shah, **D.Eng.**, March 1998
27. Diffusivities of Gas Molecules in Microporous Substances, *Matthew S. Sun*, **D.Eng.**, September 1997
28. Adsorption of Methane, Ethane, and Butane on Silicalite, *Mayank Jain*, **M.S.**, September 1997
29. Automated Experimental System for the Measurement of Multicomponent Adsorption Equilibrium and Dynamics, *Mark Mittelstaedt*, **M.S.**, July 1994
30. Adsorption Equilibria of Oxygen, Nitrogen and Binary Mixtures on Titanium Silicalites, *Ling Liu*, **M.S.**, August 1994
31. Temperature Transient Profiles During Discharge from Adsorbed Natural Gas Storage Systems, *K.J. Chang*, **M.S.**, August 1994
32. Gravimetric Measurement of Binary Adsorption Equilibria, *Xin-Fang Lu*, **M.S.**, September 1993
33. Investigation of Lateral and Vertical Interaction Energies by Molecular Simulations in Silicalite-Aromatic system, *Cheryl Minichiello*, **M.S.**, June 1993
34. Application of the SPD Model to Multicomponent Gas Adsorption, *Bill Henry*, **M.S.**, June 1993

35. Concentration Transients of Fixed-Bed Adsorbers During Depressurization, *Vidya Karnam*, **M.S.**, June, 1993
36. Theoretical Studies on Multicomponent Gas Adsorption, *Jianmin Li*, **D.Eng.**, August, 1993
37. Fixation of Hazardous Metals in Ceramics, *Mike Pophal*, **M.S.**, August 1993
38. High Pressure Adsorption of Methane in X-Type Zeolites, *Si-Yang Zhang*, co-advising with Dr. David T. Hayhurst, **D.Eng.**, May 1991
39. Computer Simulation of Temperature/Pressure Transients in Fixed-Bed Adsorbers, *Nailesh Sangani*, **M.S.**, January 1991
40. Simulation of Dynamic Methane Storage Capacity of Microporous Carbons, *Bruce Kendall*, **M.S.**, June 1990
41. Adsorption Equilibria of Highly Selective Systems, *Sastry Taruvai*, **M.S.**, December 1989
42. Adsorption Equilibria and Kinetics of Aromatics in Silicalite, *Chang-Jie Guo*, co-advising with Dr. David T. Hayhurst, **D.Eng.**, August 1989
43. Experimental Design and Analysis of Flow Rate Performance of Eternal Feeding Pump, *Mark R. Honard*, **M.S.**, December 1986

Other Mentees/Visitors

1. Effect of Bed Length to Diameter Ratio for Air Separation in VPSA, *Muhammet Koksai*, (visiting from U. of Duisburgh-Essen, Duisburgh, Germany), completed July 2016
2. N₂/O₂ adsorption isotherm in LiX zeolites, *Lea Teick* (visiting from Hochschule Offenburg, U. of App. Sciences, Offenburg, Germany), completed August 2015
3. PSA air separation using a process development experimental system, *Philipp Sebastian Schandelmaier* (visiting from Hochschule Offenburg, U. of App. Sciences, Offenburg, Germany), completed August 2015
4. Diffusion Through Nanoporous Titanium Silicate Membranes, *Yelda Akdeniz*, (**visiting** from Izmir Technological Institute, Turkey) completed July 2000
5. Adsorption Isotherms and Behavior of Association Theory, *Dr. Reiner Staudt* (visiting from Univ. of Siegen, Siegen, Germany), completed 1999
6. Pure Component and Binary Adsorption Equilibrium of Nitrogen and Methane on Norit-R1 Activated Carbon, *Stefan Dohrmann* (**visiting** from University of Siegen, Germany), completed May 1997
7. Measurement of Infinite Dilution Adsorbed Phase Activity Coefficients by Gas Chromatographic Techniques, *Susanne Koehl* (**visiting** from University of Siegen, Germany), completed May 1996

COURSES/EXPERIMENTS DEVELOPED

CHE 494/594 – Fuel Cells

CHE 695/795 - Surface Phase Equilibria

CHE 412 - Fixed-Bed adsorption experiment for Chemical Engineering Laboratory II

COURSES TAUGHT

Cleveland State University

CHE 302 – Chemical Engineering Thermodynamics

CHE 323 - Chemical Engineering Thermodynamics

CHE 411 - Chemical Engineering Laboratory I

CHE 412 - Chemical Engineering Laboratory II

CHE 420 – Chemical Engineering Laboratory

CHE 432 - Chemical Engineering Methods I

CHE 440 - Process Design I

CHE 441 - Process Design II

CHE 502 - Advanced Thermodynamics

CHE 508 – Advanced Separation Processes

CHE 695/795 - Surface Phase Equilibria

CHE 494/594 – Fuel Cells

CHE 410 - Chemical Engineering Special Projects;

- 1) Adsorption and Desorption of Methane in Carbon packed cylinders
- 2) Computer Analysis of Adsorption Dynamics
- 3) Simulation of Dynamic Methane Storage Capacity

CHE 695 - Selected Topics;

- 1) Thermodynamics of Adsorption
- 2) High Pressure Adsorption
- 3) Data Acquisition and Control of Laboratory Apparatus

ESC 150 – FORTRAN

ESC 151 – ANSI C

ESC 301 – Fluid Dynamics

ESC 321 - Engineering Thermodynamics

ESC 350 - Numerical Methods

Arizona State University

CHE 451 - Chemical Engineering Laboratory

CHE 332 - Heat Transfer

CHE 352 - Transport Phenomena Laboratory

CHE 333 - Mass Transfer

ECE 106 - Computer Aided Engineering

UNIVERSITY SERVICE

1. *Member:* Faculty Affairs Committee, Washkewicz College of Engineering, Spring 2020
2. *Member:* CBE Faculty search committee (2 positions, 120 applicants), 2019 – 2020
3. *Member:* Peer Review Committee, Fenn College of Engineering, 2018 – present
4. *Associate Director:* Fenn Research and Development Institute (FRDI) - Industrial Services & Contracts (ISC), Cleveland State University, 2009 - 2016
5. *Member:* Peer Review Committee, Fenn College of Engineering, 2012 – 2016
6. *Member:* Provost's ad-hoc selection committee for endowed Chairs, Cleveland State University 2015
7. *Member:* Chemical & Biomedical Eng. Faculty Search Committee, 2014-2015
8. *Senator:* Faculty Senate, Cleveland State University, 2011 - 2015
9. *Member:* Chemical & Biomedical Eng. Faculty Search Committee, 2013 - 2014
10. *Member:* Graduate Council, Cleveland State University, 2011 – 2013
11. *Director:* Doctor of Engineering, Fenn College of Engineering, 2007-2013
12. *Member:* Chemical & Biomedical Eng. Visiting Lecturer Search Committee, summer 2013
13. *Member:* Chemical & Biomedical Eng. Faculty Search Committee, 2012 - 2013
14. *Member:* University Distinguished Faculty Selection Committee, 2012

15. *Member:* University Strategic Planning Committee, Cleveland State University, 2008 - 2011
16. *Member:* Chemical & Biomedical Eng. Faculty Search Committee, 2010 - 2011
17. *Convener:* Industrial Relations Affinity Group, Fenn College of Engineering, 2008-2009
18. *Chairman:* Steering Committee, Applied Biomedical Engineering, Fenn College of Engineering/Cleveland Clinic Foundation Lerner Research Institute, 1997 - 2007
19. *Member:* Graduate Council, Cleveland State University, 2003 – 2005
20. *Member:* Graduate Dean Search Committee, Cleveland State University, 2000
21. *Member:* Graduate Council, Cleveland State University, 1993 - 2002
22. *Member:* Steering Committee, Molecular Medicine Program Development, 1999
23. *Member:* Strategic Planning Steering Committee, Fenn College of Engineering, 1997
24. *Member:* Strategic Planning Committee, Fenn College of Engineering, 1997
25. *Chairman:* Search Committee for Associate Dean of Operations, Assistant Dean for Academic Affairs and Assistant Dean of Graduate Studies and Research, Fenn College of Engineering, 1997
26. *Member:* Advisory Committee for the Center for International Studies and Programs, Cleveland State University, 1996 - 1998
27. *Chairman:* Fenn College of Engineering Dean Search Advisory Committee, 1995 - 1996
28. *Member:* Faculty Affairs Committee, Fenn College of Engineering, 1993 - 1994
29. *Coordinator:* Chemical Engineering Graduate Program, 1992 - 1994
30. *Member:* Graduate Affairs Committee, Fenn College of Engineering, 1992 - 1994
31. *Chairman:* Chemical Engineering Chairperson Search Committee, 1991 - 1992
32. *Member:* University Research Council, Cleveland State University, 1989 - 1992
33. *Member:* Lab. Sci. Faculty Development Committee, Cleveland State University, 1989 - 1992
34. *Member:* Faculty Affairs Committee, Fenn College of Engineering, 1987 - 1991
35. *Chairman:* Faculty Affairs Committee, Fenn College of Engineering, 1989 - 1991
36. *Member:* Computer Committee, Fenn College of Engineering, 1988 - 1993
37. *Member:* Academic Computing Advisory Committee, Cleveland State University, 1989 - 1993

38. *Faculty Advisor:* AIChE Student Chapter, Cleveland State University, 1986 - 1993

39. *Coordinator:* Chemical Engineering Department Seminar Series, 1987 - 1989

40. Screenshot for Orhan Talu from Web-of-Science (as of 8/22/2023)

