Curriculum Vitae

RAKESH AGRAWAL

Work Address: Davidson School of Chemical Engineering
Purdue University
480 Stadium Mall Drive
West Lafayette, IN 47907-2100
Telephone (765) 494-2257; Fax: (765)-494-0805
Email agrawalr@purdue.edu
Group Website: http://agrawalrakesh.org

Education:

Sc.D. Massachusetts Institute of Technology, 1980 (Ch.E.)
M.Ch.E. University of Delaware, 1977
B. Tech. Indian Institute of Technology, Kanpur, India, 1975

Professional Experience:

Winthrop E. Stone Distinguished Professor, School of Chemical Engineering, Purdue University. (2004 - Present)
Faculty Affiliate, Division of Environmental and Ecological Engineering, Purdue University (2011 - Present)
Director, Solar Economy Integrative Graduate Education and Research Traineeship (IGERT) Center. (2009-2016)
Director, Sustainable Food, Energy and Water Systems Center, an NSF NRT Center (2017- Present)
Visiting Professor, Ecole Polytechnique Federale de Lausanne, Switzerland, (Sept 2010, May – June 2018).
Visiting Scientist, Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Germany (Oct 2010-Feb. 2011).
ExxonMobil Visiting Chair Professor, Department of Chemical and Biomolecular Engineering, National University of Singapore, (2011-2014).
Fellow of the Hagler Institute for Advanced Study at Texas A&M University (2014-2015).
Visiting Professor, University of Melbourne, Melbourne, Australia, (January- February 2018)
Visiting Scientist, National Renewable Energy Laboratory (NREL), Golden, CO (March – April 2018).
Guest Professor, Tianjin University, Tianjin, China (2018-2020)
Distinguished Adjunct professor, Institute of Chemical Technology, Mumbai, India (2019-2021)

Past: Air Products and Chemicals, Inc., Allentown, USA. (1980-2004)

.

2003-2004 *Air Products Fellow (The highest technical position at Air Products)*
Chair, Air Products' Technology Board
Participating Member, Air Products' Technology Executive Team.

1980-2003 *Process Engineer, Principal Research Engineer, Senior Principal Research Engineer, Lead Research Engineer, Process Manager, Senior Engineering Associate, Principal Engineering Associate; Chief Engineer.*

Managerial Experience:

At Air Products, supervised and coordinated teams of about a dozen chemical engineers; provided technical leadership in the areas of gas separation and gas liquefaction; provided linkage between research, development, process, and business groups; supported technical sales; prepared R&D budgets and planned long and short-term R&D projects. Established a state-of-the art Process Synthesis group for separation process evaluation, development and commercialization.

Instrumental in developing and driving Air products' "New Waves" document that set out some major growth opportunities for Air Products based on the emerging social and technological trends and many of the opportunities were implemented.

Research Interests:

Solution processed electronic devices including solar cells; Nanoparticle synthesis and use; Energy systems analysis; Energy transformation and use issues for solar, natural gas, coal, biomass and hydrogen economy; Novel separation processes using distillation, membranes and adsorption; Process development; Cryogenics and gas liquefaction processes.

Patent Activities:

- One hundred and twenty-eight U. S. patents; nearly five hundred non-U.S. patents; and eight pending US Patent Applications.
- The patented ideas have been applied to over 100 operating plants with the total capital investments of multibillion dollars.

Publications and Presentations

- Two hundred Forty-five technical papers (One hundred eighty-four in refereed journals, six book chapters)
- Two hundred twenty seven technical presentations and two hundred seventy six invited lectures
- Co-author of ten annual technology symposium papers. This is a prestigious proprietary annual symposium at Air Products and Chemicals

Professional Societies:

- Member of the American Chemical Society (ACS), Institute of Electrical and Electronic Engineers (IEEE), Material Research Society (MRS), Sigma-Xi, U.S. National Academy of Engineering (NAE); Fellow of the American Institute of Chemical Engineers (AIChE), American Academy of Arts and Sciences (AAAS), Indian National Academy of Engineering (INAE) and National Academy of Inventors (NAI).

Professional Service:

- AIChE's Separations Division: Second Vice Chair to Chair and then past Chair (1993-1995); Awards Committee Member (1992-1994); Publications Committee Co-Chair (1992-1994)
- Chair, AIChE's 2nd Topical Conference on Separations (1995)
- AIChE Publications Quality Team, Member (1995-1996)
- IChemE's Distillation and Absorption '97 Conference, Technical Committee Member (1995 -1997)
- U.S. Member of International Institute of Refrigeration (IIR): Commission A3 (1996-1999), Commission A2 (2000-2007); vice President of commission A2 (2003-2007)
- Trustee CACHE Corporation (1997 - 2005)
- Chemical Engineering Technology Operating Council (CTOC) of AIChE: Member (1999-2007); Vice Chair and then Chair (2001-2002)

- Consulting Editor, Separations, AIChE Journal (1999 - 2008)
- Fifth International Conference on Foundations of Computer-Aided Process Design (FOCAPD), Organizing Committee Member (1999)
- 12th Intersociety Cryogenic Symposium in Atlanta, Co-Chair (2000)
- Chair, Gordon Research Conference 2000 on Separation and Purification
- Member, AIChE Awards Committee (1999-2003)
- Member, Search Committee for AIChE Journal's Chief-Editor (2000)
- Review Committee Member, International Dictionary of Refrigeration, IIR (2001-2003)
- Advisory Council member, School of Chemical and Biochemical Engineering, Cornell University (2002-2007)
- Member, U.S. National Research Council (NRC) Committee on Alternatives and strategies for Future Hydrogen Production and Use (2002-2004)
- Member, Bourns College of Engineering Council of Advisors, University of California, Riverside (2003 – 2005)
- Workshop participant, NRC Committee on Novel Approaches to the Management of Greenhouse Carbon (2003)
- Member, Department of Energy's (DOE) Hydrogen Merit Review Panel, NETL, Pittsburgh (2003, 2004, and 2007)
- Member, Technology Board, Air Products and Chemicals (2004-2007)
- Co-chair, Sixth FOCAPD (2004)
- Consultant, Air Products and Chemicals (2004- 2014)
- Member, U.S. National Academy of Engineering (NAE) Nominating Committee (2005)
- Member, NAE Peer Committee, Chemical Engineering Section (2004-2007)
- Co-chair, National Science Foundation (NSF) Workshops on 'Separations Research Needs for the 21st Century', (2004)
- Member, NRC Panel on Fuel Cell Research (2004)
- Participant, AIChE Board's Strategy Planning Meeting (2004)
- Member, International Advisory Committee, Joint IIChE and AIChE conference, Mumbai, India (2004)
- Co chair, Energy Workshop at the Joint IIChE and AIChE conference, Mumbai, India (2004)
- Participant, U.S. Department of Energy's workshop on Separations (2005)
- Member, NSF Panel on Process Design and Control (2005)
- Member, AIChE Energy Commission (2005-2007)
- Member, NRC Board on Energy and Environmental Sciences (2005-11)
- Member, NRC Panel on DOE's Integrated Gasification Combined Cycle R&D Program (2005)
- Panel member, The H-Prize, Panel chaired by the U.S. Representative Bob Inglis, Chairman of the Science Research Subcommittee, U.S.Congress (2005)
- Member, Scientific Committee, Distillation & Absorption (2006)
- Member, AIChE Board of Directors (2006-2008)
- Member, NSF Panel on Separations (2006)
- Member, AIChE Fellow Review Committee (2006 – 2008)

- Member, NRC Committee on Assessment of Resource Needs for Fuel Cell and Hydrogen Technologies (2006-2008)
- Chemical Engineering Department Advisory Committee member, Worcester Polytechnic Institute, Worcester, MA (2007- 2012)
- Member, Technical Advisory Board, Dow Chemical (2007- 2014)
- Member, Technical Advisory Board, Kyrogen Ltd. (2007-2010)
- Member, Technical Advisory Board, Weyerhaeuser (2008- 2009)
- Member, AIChE Board Award Committee, (2008)
- Member, International Scientific Committee, Distillation & Absorption (2010)
- Member, AIChE International Committee, (2008 – 2009)
- Member, Technical Advisory Committee, FOCAPD (2009)
- Member, Scientific Committee, 10th International Symposium on Process Systems Engineering, PSE'09, Brazil (2009)
- Member, National Academies' Renewables Panel for the Committee on America's Energy Future (2007-2008)
- Participant, NRC planning meeting for a Carbon Summit (2009)
- Member, NRC Committee on Plug in Hybrid Electric Vehicles (PHEV) (2009-2010)
- Member, Engineering Advisory Board, Genomatica (2009 - 2013)
- Member, Wanger Institute for Sustainable Energy Research (WISER) Board of Advisors, IIT Chicago (2009-)
- Member, International Program Committee, ESCAPE-21, Greece
- Member, Technical Advisory Board, ATMI (2010-2012)
- Guest member, European Federation of Chemical Engineering's (EFCE) Working Party on Fluid Separations (2010-)
- Member, Editorial Advisory Board, Industrial & Engineering Chemistry Research (2010-2012)
- Member, Board of Trustees AIChE Foundation (2011)
- Member, Editorial Board, Current Opinion in Chemical Engineering (2011- 2021)
- Vice Chair, Chemical Engineering Section, NAE (2011)
- Member, Editorial Advisory Board, Chemical Engineering Progress (2012- 2020)
- Chair, Chemical Engineering Section, NAE (2012)
- Team Member for the NSF international benchmarking study on Systems Engineering for Renewable and Clean Energy Manufacturing (SEEM), (2012)
- Member, Department of Chemical and Biomolecular Engineering Advisory Council, University of Delaware (2012-)
- Member, Scientific Committee, Distillation & Absorption-Conference 2014 in Friedrichshafen, Germany.
- Member, Consulting Editors Board, AIChE Journal (2012-).
- Member, Editorial Board, Chemie Ingenieur Technik - Chemical Engineering and Technology – Energy Technology (2012-)
- Member, Aspen Tech Academy, Aspen Tech (2012 - 2017)
- Member, Scientific Committee, 7th International Symposium on Feedstock Recycling of Polymeric materials (7th ISFR), New Delhi, India, October 2013
- Participant, National Academy of Engineering (NAE) workshop on 'Educate to Innovate', Washington DC, October, 2013

- Member, International Programming committee, 8th International Conference on Foundations of Computer-Aided Process Design (FOCAPD 2014), Seattle, July, 2014
- Member, International Advisory Committee, Second International Conference on Advanced Materials for Power Engineering (ICAMPE-2016), Kottayam, Kerala, India.
- Member, International Conference on Sustainable Chemical Product and Process Engineering (SCPPE), International Academic Committee, Nanjing, China, June (2016).
- Member, Department of Chemical and Biomolecular Engineering Advisory Council, Lehigh University (2016- 2020)
- Member, International Advisory Team, International Conference on Emerging Materials and Applications (ICEMA), Allahabad, India, Feb., 2017
- Member, Scientific Advisory Committee, Separations Technology IX: New Frontiers in Media, Techniques, and Technologies, Engineering Conferences International (ECI), Albufeira, Portugal, March 2017
- Member, Committee on Membership (CoM), National Academy of Engineering, (2017-2020)
- Member, International Program Committee, Process Systems Engineering, PSE 2018, San Diego, July, 2018
- Member, Scientific Committee, Distillation & Absorption conference, Florence, Italy, September 2018
- Panel Member, Role of Indian Diaspora in Capacity Building for Affordable Solar Power, Presentation of solar strategy to Indian Prime Minister Narendra Modi, External Affairs Minister Sushma Sawraj and Energy Minister R. K. Singh, August, 2018
- Editorial Board member, Journal of Advanced Manufacturing and Processing (2018-Present)
- Panelist, Role of Indian Diaspora in Capacity Building for Affordable Solar Power, 15th Pravasi Bharatiya Divas (PBD) Convention, Varanasi, India, January 2019
- Member, International Programming Committee (IPC), Foundations of Computer Aided Design (FOCAPD) 2019
- Member, International Advisory Committee, Third International Conference on Advanced Materials for Power Engineering (ICAMPE), Kottayam, Kerala, India, August 2019
- Committee Member, SCPPE 2019, 5th International Conference on Sustainable Chemical Product and Process Engineering, Tianjin, China, June – July, 2019
- Member, Technical Review panel for the Materials and Chemicals Science & Technology Directorate, National Renewable Energy Lab (NREL), Golden, CO, (2019-Present)
- Member, Penn State Chemical Engineering External Review Committee, University Park, PA, 2019
- Consultant for the project ‘Establishment of an Integrated Model Farm Utilizing Modern Technologies for Local Agricultural Commodities in Kuwait’, Kuwait Institute for Scientific Research (KISR), Kuwait, 2019
- Member, European Federation of Chemical Engineering (EFCE) Excellence Award in Fluid Separations, (2020- Present)

- Member, International Program Committee (IPC), 14th International Symposium on Process Systems Engineering (PSE), Kyoto (Japan), July 2022.
- Member, Scientific Committee of Distillation and Absorption, Toulouse, 2022
- Panelist, Sustainable Fuels, Vaishvik Bhartiya Vaigyanik (VAIBHAV) Summit, October 2020
- Panelist, Advanced Materials, Vaishvik Bhartiya Vaigyanik (VAIBHAV) Summit, October 2020
- Member, Advisory Board, Department of Sustainable Engineering, IIT Kanpur, India (2021- Present)
- Member, NAE Energy Working Group, 2021-

Awards and Honors:

- Youngest Ever Recipient of the Air Products' Prestigious Chairman's Award (1992)
- Extraordinary Quality Award from Air Products and Chemicals (1992)
- Presidential Citation for Outstanding Achievement from the University of Delaware (1995)
- Institute Award for Excellence in Industrial Gases Technology from the AIChE (1998)
- Clarence G. Gerhold Award, Separations Division, AIChE (2001)
- Alkyl Amines Dr. B. D. Tilak Chemcon Distinguished Speaker, Indian Institute of Chemical Engineers (IIChE) 2001
- Honorary Fellow, Indian Institute of Chemical Engineers (2001)
- Who's Who in the World, (Marquis, 18th Edition, 2001)
- Diamond Award for Inventor on One Hundred United States Patents, Air Products and Chemicals (2001)
- Member, U. S. National Academy of Engineering, NAE (2002)
- BAYER Lecture, Carnegie Mellon University (April, 2002)
- Air Products' Equipment Innovation Award for The AP-X™ Hybrid LNG Process (2003)
- J&E Hall Gold Medal, Institute of Refrigeration, UK (2004)
- Who's Who in America, Who's Who in Science and Engineering, Who's Who in Finance & Business
- Regents' Lecturer, University of California, Los Angeles (2004)
- Distinguished Faculty Seminar: Advanced Power Sources, University of Michigan, Ann Arbor (2004)
- Professor B. D. Tilak Visiting Fellowship Lecture, Institute of Chemical Technology, University of Mumbai, India (2004)
- AIChE Institute Lecturer (2005)
- Chemical Engineering Practice Award, AIChE (2006)
- V.V. Mariwala Visiting Professorship, UICT, Mumbai, India (2007)
- Industrial Research Institute (IRI) Achievement Award (2007)
- Chemical Weekly's Padmashri Dr. G. P. Kane CHEMCON Distinguished Speaker Award, IIChE (2007)
- AIChE Fuels and Petrochemicals Division Award (2008)
- Lecture on 'Energy Systems Analysis' voted as the best presentation at the Pan American Institute (PASI) workshop, Argentina (2008)
- W.R. Marshall Founders' Lecture, University of Wisconsin (2008)
- Tis Lahiri Lecture, Vanderbilt University (2008)
- C. K. Murthy Memorial Lecture, IIChE (2008)

- Inaugural winner of Excellence in Gas Processing Award, Annual Gas Processing Symposium, Qatar (2009)
- AIChE Fellow (2009)
- Pirkey Lecture, University of Texas, Austin (2010)
- Hugh M. Hulbert Memorial Lecture, Northwestern University, (2011)
- Hess Lecture, University of Virginia, (2011)
- AIChE Founders Award (2011)
- Foreign Fellow, Indian National Academy of Engineering (2011)
- ExxonMobil Visiting Chair Professor, Department of Chemical and Biomolecular Engineering, National University of Singapore, (2011-2014)
- National Medal of Technology and Innovation from the President of the United States of America, (2011), (The highest honor given by the U.S. goverment for Technology and Innovation)
- Ken Nobe Founders Lecture, Univ. of California, Los Angeles (2012)
- Distinguished Alumnus Award, Indian Institute of Technology, Kanpur (2012)
- Padmavibhushan Professor M. M. Sharma CHEMCON Distinguished Speaker Award, IIChE (2012)
- Fellow, American Academy of Arts and Sciences, AAAS (2013)
- Shreve Award for excellence in Teaching, Chemical Engineering, Purdue University, (2013)
- Allan P. Colburn Honorary Lecturer, E. I. du Pont de Nemours and Company (2013)
- Annual KAIST CBE Global Distinguished Lecturer, Korea, (2013)
- Fellow, National Academy of Inventors (2014)
- Texas A&M University Institute for Advanced Study Faculty Fellow, Texas A&M (2014 -2015)
- Morrill Award, Purdue University (2014)
- Prof. C.V. Seshadri Memorial Distinguished Lecture, IIT Bombay, Mumbai, India, (2014)
- Distinguished Lindsay Lecturer, Texas A&M University, (2014)
- Distinguished Member, The National Society of Collegiate Scholars, NSCS (2014)
- TIAS Eminent Scholar Lecturer, Texas A&M University (2015)
- Berkeley Lectures, Univ. of California, Berkeley (2015)
- Schlumberger Lecture, DB. Robinson lecture series, University of Alberta, Edmonton, Canada, (2015)
- Inducted in Purdue Innovator Hall of Fame (2015)
- Shinnar Lecture, Chemical Engineering Department, City College of New York, (2016)
- American Chemical Society Award in Separations Science and Technology (2017)
- Member, Sigma Xi (2017)
- Peter V. Danckwerts Lecture at the 10th World Congress of Chemical Engineering, Barcelona, Spain (2017)
- AIChE Alpha Chi Sigma Award (2017)
- Distinguished WISER lecture, IIT Chicago, Chicago, IL, (2018)
- EDEY (Energy doctoral school) Distinguished Lecture in Energy, EPFL, Lausanne, Switzerland (2018)

- Appointed Guest Professor, Tianjin University, Tianjin, China (2018-2020)
- Solenis Bharat Ratna Professor CNR Rao CHEMCON Distinguished Lecture, IIChE (2018)
- Distinguished Lecture of the Missouri Science & Technology Academy of Chemical Engineers, Rolla, MO, (2019)
- Dr. Balwant S. Joshi Distinguished Visiting professorship, Institute of Chemical Technology, Mumbai, India (2019-2020)
- RENEW Innovation Lecture, State University of New York (SUNY), Buffalo, NY, (2019)
- Philip C. Wankat Graduate Teaching Award in Chemical Engineering for 2018-2019, Davidson School of Chemical Engineering, Purdue University (2019)
- Panelist, Meet the Innovators, AIChE (2019)
- One of the Most Impactful Faculty Inventors of FY 2019, Purdue University.
- Spinks lecture, University of Saskatchewan, Canada, (2022).
- BASF Distinguished Lecture, Wayne State University, Detroit, MI, (2022)
- Chandrakanta Kesavan Lecture, Indian Institute of Technology, Kanpur, India (2022)
- Distinguished Visiting Professor, Department of Sustainable Energy Engineering, Indian Institute of Technology, Kanpur, India (2022-)

Former MS Students Ankita Jain, Jeff Chen, Chinmay Joglekar (Purdue), Bethlehem Negash, Robert Boyne (Micron), Wasiu Peter Oladipupo (Purdue)

Former Ph.D. Students Easa Al-Musleh (ExxonMobil), Essam AlRuqobah (Kuwait University), Joseph Andler, Robert Balow (NRL), Kevin Brew (IBM), Nathan Carter (Monsanto), Jose Adrian Chavez Velasco (Hugh-Baker, Mexico), Harshavardhan Choudhari (Shell), John Degenstein (Three Cities Research), Swapnil Deshmukh (Lam Research), Ryan Ellis (Abbvie), Grayson M. Ford (Lam Research), Piotr Gawecki (Shell), Emre Gencer (MIT), Arun Giridhar (Purdue), Brian Graeser, Qijie Guo (DuPont), Charles Hages (HZB), Xianyi Hu (Intel), Joshua Huff (Marathon Petroleum), Zheyu Jiang (Corteva), Mahaprasad Kar (ExxonMobil), Mark Koeper (Intel), Yiru Li (Sinopec), Gautham Madenoor Ramapriya (ABB Bangalore), Dharik Mallapragada (MIT), Tony J. Mathew (Argonne National Lab), Scott McClary (Sandia National Lab), Steven McLeod, Dhairya Mehta (Shell), Caleb Miskin (ASM), Hye -Yeon Park (Samsung), Rugved Pathare (ExxonMobil), Taufik Ridha (ExxonMobil), David Rokke (Advance Materials), Vishesh H. Shah (Reliance, India), Eric Sheets (Johnson Matthey) , Anirudh Shenvi (Consultant, India), Navneet R. Singh (Bayer), Radhakrishna Tumbalam Gooty (NETL),Vinod Venkatakrishnan (Shell), Bryce Walker (Intel), Wei-Chen (David) Yang (NIST), Sara Yohe (ExxonMobil), Ruihong Zhang (Intel), Xin Zhao (Apple).

Current Shubhanshu Agarwal, Juan Alban Dominguez, Zewei Chen, Shuaikang Du, Daniel Hayes, Ana Murray, Akash Nogaja, Apurva Pradhan, Edwin Rodriguez, Robert Spilker, Ryan Swope, Jonathan Turnley, Varsha, Kiruba Catherine Vincent, Kyle Weideman,

Postdoctoral Associates	J. H. Moon (S. Korea), V. Bhat (India), U. Nallasivam (India), A. Smeltz (United Technology), H. Zhang (ExxonMobil, Singapore), Caleb Miskin (ASM), Parham Mobed (Aspen Tech), Brian Graeser, Shreyash Hadke (North Western University).