

Short C.V.

Name : Said Salah Eldin Hamed Elnashaie

Position Title and Institutions :

- Professor Emeritus of Chemical Engineering, Cairo University, Cairo, Egypt (1968-1992)
- Adjunct Professor, New Mexico Tech. Albuquerque, NM, USA (2010-)
- Adjunct Professor University of British Columbia, Vancouver, B.C., Canada (2006-)

Recent Previous Positions:

- Dean of Colleges of Engineering and Information Technology (IT), Sinai University, N.Sinai, Egypt (August 2008- August 2009)
- Quentin Berg Chair Professor of Sustainable Development (SD)Engineering, Pennsylvania State University PA , USA (August 2006- August 2008)
- Visiting Professor , Chemical and Biological Engineering Department University of British Columbia, Vancouver, B.C., Canada (May 2005- June 2006)
- Professor of Chemical Engineering, Auburn University, Auburn, Alabama, USA (January 2000- May 2005)
- Senior Consultant, Chemonics-Egypt (1996-1999).
- Vice-President EESS (Energy and Environmental Services and Systems), Cairo, Egypt (1997-1999)
- Professor of Chemical Engineering, Universiti Putra Malaysia (UPM), Malaysia (1996-1997)
- Professor of Chemical Engineering, King Saud University, Saudi Arabia (1986-1996)

Nationality: Egyptian

E-mail addresses : nashaie@gmail.com

Education:

- Ph.D. Chemical Engineering (University of Edinburgh, U.K.,1973).
- M.Sc. ChemicalEngineering (University of Waterloo, Canada,1971),
- B.Sc.Chemical Engineering(Cairo University,Egypt ,1968),

Summary of Some Achievements:

He published over 350 papers in international Journals/Conferences, 4 books and 2 chapters by international publishers all related directly/indirectly to SD, Bio-Fuels (BFs) and Integrated Bio-Refineries (IBRs). From the very beginning of his career his research work was always related directly or indirectly to SD, BFs and IBRs. During the first two decades of his career his concentration was on mathematical modeling, bifurcation and chaotic behavior of chemical and biochemical reacting systems. After a period of developing theoretical works in these fields his work started to become oriented towards more practical and industrial problems using mathematical modeling, bifurcation and chaos theory principles. One of his papers looking at the practical relevance of bifurcation and chaos was awarded distinction : , from the International Journal of Chemical Reactor Engineering (IJCRE):

He investigated many important industrial processes (Fluid Catalytic Cracking (FCC), UNIPOL process for the production of polyethylene, bio-ethanol fermenters, etc) using data from industry and advanced mathematical modeling and bifurcation analysis to uncover some of the important characteristics of these units: controlling instability and chaos when they are harmful and utilizing them when they are useful.

Beside mathematical optimization of different chemical and biochemical processes, both lumped and distributed systems, he also introduced conceptual optimization regarding the configuration of the equipment in some cases (e.g.: fluidized bed instead of fixed bed) or the mode of operation in others (e.g.: Continuous Stirred Tank fermenter operated in the unstable operation mode instead of steady operation) or both (e.g.: spatiotemporal chaotic operation of fixed bed immobilized fermenters. This is under investigation).

He developed novel membrane fluidized bed reformers for the efficient production of hydrogen and novel chaotic fermenter for the production of bio-ethanol and is working on the development of a spatiotemporal packed bed membrane fermenter for the production of bio-ethanol and bio-butanol.

He developed a methodology for these novel developments and called it: " Sequential De-bottlenecking" and described its basis in one of his Industrial Engineering Chemistry (IEC) Research papers.

He published many papers regarding these novel designs and also patented some of them.

In the last two decades he gathered his research momentum and took it in the direction of SD, BFs and IBRs and in 2006 he became the Quentin Berg Chair Professor for Sustainable Development in Penn State University, USA. He developed new courses for the subject for the different engineering disciplines and developed the main concepts of these fields using a novel Integrated System Approach (ISA) based on System Theory (ST). Prof. Elnashaie has been a Chemical Engineer for over 40 years (since graduating from Cairo University on 1968); and has been a university faculty member on 1974 when he started his career as an Assistant Professor of Chemical Engineering in Cairo University. He has always been heavily involved in teaching, research and consultancy in chemical and bio-chemical reaction engineering and lately concentrated on Sustainable Development(SD) and related subjects.

Publications: > 350 papers in international refereed journals and conferences, e.g. (Latest 10 publications) see Annex

He gave a large number of plenary/invited lectures on the above in conferences/universities in different countries around the world. A sample of such recent lectures are:

Invited lectures in universities (examples):

- 1- Biochemical and Thermo-chemical Processes Coupling for Integrated Bio-refineries and Sustainable Development, University of British Columbia(UBC), November, 2008, Vancouver, BC, Canada
- 2- Integrated System Approach to Bio-Fuels and Integrated Bio-Refineries, Global Forum On Green Industry Initiative : "Competitiveness and Innovation through Green Products and Processes“ , May, 2009, Cairo, Egypt.
- 3- Integrated System Approach (ISA) to Sustainable Development, Bio-Fuels and Bio-Refineries , Missouri University of Science and Technology (MUST), August, 2009, Rolla, USA
- 4- Integrated System Approach (ISA) to Sustainable Development (SD) Bio-Fuels(BFs) and Integrated Bio Refineries (IBRs). *Towards the First IBR in the Arab World*, Egyptian Business Men Society. December, 2009, Cairo, Egypt.
- 5- Development(D); Sustainable Development(SD); Integrated System Approach(ISA) ; Multi-Disciplinary (MD) Research and Novel Technologies(NTs) Using Renewable Raw Materials (RRMs), Egyptian Chemical Engineers Society, December, 2009, Cairo, Egypt
- 6- Integrated System Approach (ISA) to Sustainable Development (SD), Global Warming (GW), Bio-Fuels (BFs) and Integrated Bio-Refineries (IBRs), University Putra Malaysia (UPM) , January, 2010, Malaysia.
- 7- Three Classes of Membrane Reactors/ Bio-Reactors:
 - a) Membrane Catalytic Steam Reformers, Dehydrogenation and Integrated Autothermal Reactors.
 - b) Membrane Reactors for Esterification and Trans- Esterification for Production of Bio-diesel.
 - c) Membrane Fermenters for Alcohol Production, New Mexico Technical University, January, 2010 , Albuquerque, NM , USA.

• **Examples of Recently Invited Lectures in Conferences :**

- 1- At the conference: Entrepreneurs in the Shade of Global Trade, Jeddah, Saudi Arabia, (Title of Lecture: Entrepreneurs and Their Role in Sustainable Development), November, 2009
- 2- At Egyptian Petroleum Research Institute (EPRI), Cairo, Egypt, (Title of lecture: Sustainable Development, Global Warming, Bio-Fuels and Integrated Bio-Refineries), February, 2010
- 3- At the conference for: The Role of Informatics and Computer Technology (ICT) in Development Sustainability, Cairo, Egypt, (Title of lecture: Integrated System Approach to Informatics, Sustainable Development and Bio-Refineries), February, 2010
- 4- At CONGRESO NACIONAL PREPARATORIO BAHÍA BLANCA CIQyDS 2010“La ingeniería Química y su aporte al desarrollo sostenible”, CENTRO DE INGENIEROS DE BAHÍA BLANCA – AYACUCHO 732 BAHÍA BLANCA, Argentina, (Title of lecture: Integrated Bio-Refineries (IBRs) As Sustainable Replacements for Petroleum and Petrochemical Industries), April,2010
- 5- At The International Workshop On Industrial Biotechnology , The France-Egypt Year Of Science And Technology, 2010 , Egypt , (Title of lecture: Linking Sustainable Development To Bio-Fuels, Elementary Bio-Refineries and Integrated Bio-Refineries), July, 2010

He was also invited to teach a number of workshops on SD, BFs and IBRs, examples include:

- Integrated System Approach to Bio-Fuels and Integrated Bio-Refineries, Three days , Bio-fuels and Bio-refineries Workshop. New Mexico Technical University,(NMTU), USA, August 2009
- Bio-fuels and Bio-refineries Contribution to Sustainable Development, ONE DAY WORKSHOP at the COLLEGE of ENGINEERING, KING ABDUL AZIZ UNIVERSITY, JEDDAH, KSA On: November, 2009

He is now a Professor Emeritus , Cairo University, Cairo, Egypt. Lives full time in Egypt and collaborate in research with his ex-students in Cairo University and Research Institutes.

Now he is also an adjunct Professor of Chemical/ Biological Engineering at New Mexico Tech, USA and University of British Columbia, Canada. He has supervised a good number of Master and PhD students and taught workshops on SD, BFs and IBRs in different universities around the world.

Other positions he previously held include:

- **Chemical Engineering Department, Cairo University, Cairo Egypt:** Assistant lecturer (1969-1974), Assistant professor(1974–1979), Associate Professor(1979-1984), Full Professor (1984-1992). He retired on 1992.
- Professor of Chemical Engineering ,King Saud Univ. , Saudi Arabia (1986-1996).
- Professor of Chemical Engineering, Universiti Putra Malaysia(UPM, Malaysia (June, 1996- June 1997).
- Vice-President, Energy & Environmental Services & Systems (EESS), (1997-1999).

- Senior Consultant, Chemonics-Egypt(1996-1999).
- Professor of Chemical Engineering ,Auburn University(2000- 2005).
- Professor of Chemical and Biological Engineering , University of British Columbia, Vancouver, B.C., Canada (May 2005- June 2006)
- Dean of College of Engineering Sciences and College of Information Technology (IT), Sinai University, N.Sinai, Egypt (August 2008- August 2009)

His areas of research interest include:

Sustainable Development (SD) Engineering, Engineering Mathematics and Mathematical Modeling, Production of Clean Fuels (Hydrogen, bioethanol,biobutanol and biodiesel), Environmental Engineering,Process Modeling and Computer Simulation, Dynamics and Control, Novel Catalytic and Biocatalytic Reactors, Catalytic Reactors in the Petrochemical, Petroleum Refining and Biochemical Industries, Bio-refineries, Membrane Enzyme Systems , Membrane Catalytic Reactors, Bifurcation , instability and Chaos in Chemical and Biochemical Systems , Control of Chaos, Process Control and Optimization for the Chemical and Biochemical Industries , Computer Modeling in the Manufacture and Processing of Electronic components ,Production of phosphoric acid and DCP , In-Process-Modification for industrial/hazardous waste minimization.

He is a very strong believer of the great value and importance of multidisciplinary research and apply this to the formulation of his research groups.

His work includes novel developments regarding SD/BFs/IBRs. His strong background on mathematical modeling of catalytic/bio-catalytic processes as well as non-linear dynamics; bifurcation and chaotic behavior of chemical and bio-chemical systems gave him an advantage in introducing novel configurations and modes of operation for efficient processes.

Recent Resaerch Activities in Egypt:

Professor Elnashaie returned to Egypt on 2008, before coming to Egypt he was always collaborating with colleagues and ex-students and helped them to win few USA-Egypt grants.

On 2007 he formulated a SD research group at the Chemical Engineering Department, Cairo University from young collegeues and ex-students and worked together to develop a multidisciplinary understanding of SD, BFs and IBRs utilizing ISA based on ST. The effort resulted on a detailed paper on the subject published in a Canadian Journal:

- Said S.E.H.Elnashaie, Seif-Edeen Fateen, Ahmed El-Ahwany and Tarek M.Mostafa, Integrated System Approach to Sustainability. Bio-Fuels and Bio-Refineries, Bulletin of Science, Technology & Society, Vol.28, No.6, December 2008, pp.510-520

The work of the group is continuing.

He also formulated, after coming back to Egypt on 2008, research groups in the National Research Council(NRC) and Egyptian Petroleum Institute(EPRI) and also Sinai University all of them are multidisciplinary groups working on the development of efficient technologies for the production of:

1. Bio-ethanol from lignocelluloses wastes
2. Bio-diesel from bio-mass through the production of syngas followed by Fischer Tropsh
3. process.
4. Bio-diesel through the esterification of bio-oils from energy crops(e.g.: Jatropha)
5. Bio-diesel from algae.

In collaboration with a colleague at Menofia University , Egypt (Prof. Gamal Ibrahim), they wrote a chapter (>80 pages) on biohydrogen for a hydrogen encyclobidia which is under publication.

He is also collaborating with a number of investors to develop BFs and IBRs projects in Egypt.

Publications , Books , Patents , Designs, Consultancy and Graduate Students

Publications: > 350 papers in international refereed journals and conferences, e.g. (Latest 10 publications) see Annex. :

- 1- Zhongxiang Chen, and Said S.E.H. Elnashaie, Optimization of Reforming Parameter and Configuration for Hydrogen Production, *AIChE J.*, 51(5), p1467-1481, 2005.
- 2- Zhongxiang Chen, and Said S.E.H. Elnashaie, Bifurcation and Its Implications for a Novel Auto-thermal Circulating Fluidized Bed Membrane Reformer for the Efficient Pure Hydrogen Production, *Chemical Engineering Science*, 60(15), p4287-4309, 2005.
- 3- Zhongxiang Chen, and Said S.E.H. Elnashaie, Economics of the Clean Fuel Hydrogen in a Novel Auto-thermal Reforming Process, *Industrial & Engineering Chemistry Research*, 44(13), p 4834-4840, 2005.
- 4- Said Elnashaie and Andrés Mahecha-Botero, Towards Understanding Alzheimer's and Parkinson's, the chemical engineer (tce), 770, pp.29-31, 2005
- 5- Chen, Z. and Elnashaie, S.S.E.H., "Bifurcation Behaviour During the Hydrogen Production in Two Compatible Configurations of a Novel Circulating Fluidized Bed Membrane Reformer", *Chemical Engineering Research and Design*, 83(A6), pp. 679-685, 2005
- 6- Chen, Z. and Elnashaie, S.S.E.H., "Auto-thermal CFB Membrane Reformer for Hydrogen Production from Heptanes", *Chemical Engineering Research and Design*, 83(A7), pp. 893-899, 2005
- 7- John R. Grace, Said Elnashaie and Jim Lim, Hydrogen Production in Fluidized Beds with In-Situ Membranes, *International Journal of Chemical Reactor Engineering*, Vol.3, Article A41, pp.1-17 , 2005
- 8- Andres Mahecha-Botero, John Grace, Said S.E.H. Elnashaie and C Jim Lim, Comprehensive Modeling of Gas Fluidized-Bed Reactors Allowing for Transients, Multiple Flow Regimes and Selective Removal of Species, *International Journal Of Chemical Reactor Engineering*, Vol.4, Article A11, pp.1-21, 2006
- 9- Andrés Mahecha-Botero, Parag Garhyan, S.S.E.H. Elnashaie, Non-linear characteristics of a membrane fermentor for ethanol production and their implications". *No-linear Analysis: Real World Applications*, Vol.7, issue 3, pp. 432-457, 2006 (top 25 papers in Journal, no.21)
- 10- Said S.E.H. Elnashaie, Zhongxiang Chen, Parag Garhyan, Pradeep Prasad, and Andres Mahecha-Botero, Practical Implications of Bifurcation and Chaos in Chemical and Biological Reaction Engineering, *International Journal of Chemical Reactor Engineering*, Vol.4, Review R1, pp.1-44, 2006 (Top Journal paper for 2006)
- 11- Kim Johnsen, John R. Grace, Said S.E.H. Elnashaie, Leiv Kolbeinsen^c and Dag Eriksen, Modelling of Sorption- Enhanced Steam Reforming in a Dual Fluidized Bubbling Bed Reactor, *Industrial Engineering Chemistry Research*, 45 (12), 4133 -4144, 2006.
- 12- Parag Garhyan, Andres Mahecha-Botero and Said.S.E.H. Elnashaie, Complex Bifurcation/ Chaotic Behavior of Acetylcholinesterase and Choline-acetyltransferase Enzymes System. *Applied Mathematical Modelling*, 30 (9), p.824-853, Sep 2006
- 13- Zhongxiang Chen, Friedrich Po, John R. Grace, C. Jim Lim, Said Elnashaie, Andrés Mahecha-Botero, Mohammad Rakib, Yoshinori Shirasaki, Isamu Yasuda, Sorbent-enhanced/membrane-assisted steam methane reforming, *Chemical Engineering Science*, Vol.63, pp.170 – 182, 2008
- 14- Said S.E.H. Elnashaie; Zhongxiang Chen and Pradeep Prasad; Efficient Production and Economics of Clean-Fuel Hydrogen. *International Journal of Green Energy*, 4, 249-282, 2007
- 15- Said S.E.H. Elnashaie and John Grace; Complexity, Bifurcation and Chaos in natural and Man-Made Lumped and Distributed Systems; *Chemical Engineering Science*, 62, 3295-3325, 2007
- 16- John Grace, Heping Cui and Said S.E.H. Elnashaie; Non-Uniform Distribution of Two-Phase Flows Through Parallel Identical Paths, *The Canadian Journal of Chemical Engineering*, 85, 662-668, October 2007
- 17- Mohamed E. E. Abashar and Fahad M. Alhabdan and Said S. E. H. Elnashaie, Staging Distribution of Oxygen in Circulating Fast Fluidized-Bed Membrane Reactors for the Production of Hydrogen , *Ind. Eng. Chem. Res.*, 46, 5493-5502, 2007
- 18- R.C. Ciocci, I. Abou-Mahfouz and Said S.E.H. Elnashaie, Analysis to Develop Hydrogen Production from Bio-oils; *Proceedings of the 2007 ASME International Mechanical Engineering Congress and Exposition*, November 11-15, Seattle, Washington, USA, 2007
- 19- Zhongxiang Chen, Friedrich Po, John R. Grace, C. Jim Lim, Said Elnashaie, Andrés Mahecha-Botero, Mohammad Rakib, Yoshinori Shirasaki, Isamu Yasuda, Sorbent-enhanced/membrane-assisted steam methane reforming, *Chemical Engineering Science*, 63, 170-182, 2008

- 20- Nabeel S. Abo-Ghander, John R. Grace , Said S.E.H. Elnashaie and C. Jim Lim, Modeling of a novel membrane reactor to integrate dehydrogenation of ethylbenzene to styrene with hydrogenation of nitrobenzene to aniline, *Chemical Engineering Science*, 63, 1817– 1826, 2008
- 21- Said Elnashaie, The big picture, the chemical engineer (tce), UK, May, pp.26-28, 2008
- 22- Said S.E.H.Elnashaie, Seif-Edeen Fateen, Ahmed El-Ahwany and Tarek M.Mostafa, Integrated System Approach to Sustainability. Bio-Fuels and Bio-Refineries, *Bulletin of Science, Technology & Society*, Vol.28, No.6, pp.510-520, December 2008
- 23- M.E.E.Abashar, F.M.Alhabdan and Said S.E.H.Elnashaie; Discrete Injection of Oxygen Enhances Hydrogen Production in Circulating Fluidized Bed Membrane Reactors, *International Journal of Hydrogen Energy*, 33 , 2477 – 2488, 2008
- 24- Alenazey, F., Dave, C. B., Elnashaie, S. S. E. H., Susu, A. A., and Adesina, A. A., Coke removal from deactivated Co-Ni steam reforming catalyst using different gasifying agents: An analysis of the gas-solid reaction kinetics, *Catalysis Communications*, 65, 5454-5462, 2008
- 25-I.H.Mustafa,G.Ibrahim,A.Elkamel,S.S.E.H.Elnashaie,P.Chen,Non-linear feedback modeling and bifurcation of the acetylcholine neurocycle and its relation to Alzheimer's and Parkinson's diseases, *Chemical Engineering Science* Vol.64, pp.69-90, 2009
- 26-Andres Maheca- Botero; John, Grace, Elnashaie, S.S.E.H. and Jim Lim, C., Advances in Modeling of Fluidized-Bed Catalytic Reactors: A Comprehensive Review, *Chem. Eng. Comm.*, Vol.196, pp. 1375–1405, 2009
- 27-Andrés Mahecha-Boteroa, Zhongxiang Chen, John R. Grace, S.S.E.H. Elnashaie, C. Jim Lim, M. Rakib, Isamu Yasuda, Yoshinori Shirasaki, Comparison of fluidized bed flow regimes for steam methane reforming in membrane reactors: A simulation study, *Chemical Engineering Science*, Vol.64, 3598 – 3613, 2009
- 28-Feraih S. Alenazey, Chirag Dave, Said S.E.H. Elnashaie, Alfred Susu, Adesoji A. Adesina, Simultaneous Coke Reduction with Improved Syngas Production during Propane Steam Reforming using Forced CO₂ Cycling, [Chemical Product and Process Modeling, Vol. 4 \(2009\) / Issue 5 / Special Issue - WCCE8 2009](#)
- 29-Mohammad A. Rakib , John R. Grace , C. Jim Lim , Said S.E.H. Elnashaie , Bahman Ghiasi , Steam reforming of propane in a fluidized bed membrane reactor for hydrogen production, *International Journal of Hydrogen Energy (IJHE)*, in press, 2010
- 30-I. H Mustafa, A. Elkamel, S.S.E.H. Elnashaie, P. Chen, G. Ibrahim, Effect of Cholineacetyltransferase and Choline Recycle Ratio on Bifurcation, Modeling and Chaotic Behavior of Acetylcholine Neurocycle and Their Relation to Alzheimer’s and Parkinson’s Diseases, *Chemical Engineering Science*, in press, 2010
- 31-Mohammad A. Rakib, John R. Grace, C. Jim Lim, and Said S.E.H. Elnashaie, Modeling of a Fluidized Bed Membrane Reactor for Hydrogen Production by Steam Reforming of Hydrocarbons, *Ind. Eng. Chem. Research (IECR)*, in press, 2010
- 32-Mohammad A. Rakib, John R. Grace, C. Jim Lim, Said S.E.H. Elnashaie, Mark Epp, Ali Gulamhusein, Tony Boyd, Alan Keelan, Pilot scale experimental setup for hydrogen production from higher hydrocarbons: Safety considerations and implementation, *IJHE*, in press, 2010
- 33-Abashar, M.E.E. and Elnashaie, S.S.E.H, Dynamic and Chaotic Behavior of Periodically Forced Fermentors for Bio-ethanol production, *Chem. Engng. Sci.*, in press, 2010

Books and Chapters:

- 1.Elnashaie, S.S.E.H. and Elshishini, S.S., “Modeling, Simulation and Optimization of Industrial Fixed Bed Catalytic Reactors”, 500 pages, publisher: Gordon and Breach Science Publishers, London, (published, December 1993).
- 2.Elnashaie,S.S., A chapter (87 pages) entitled: “Mathematical Modeling of Diffusion and Microkinetics in the Processing of Electronic Components”, in a book entitled: “Catalyzed Direct Reactions of Silicon”, edited by K.H. Lewis and Rethwish – Publisher: Elsevier (published, 1993).
- 3.Elnashaie, S.S.E.H. and Elshishini , S.S. “Dynamic Modeling, Bifurcation and Chaotic Behaviour of Gas-Solid Catalytic Reactors”, 650 pages, publisher: Gordon and Breach Science Publishers, London (published July 1996).
4. Elnashaie,S.S.E.H. and Garhyan,P. “Conservation Equations and Modeling of Chemical and Biochemical Processes”, 700 pages, Marcel Dekker,NY,USA (Published, 2003)
5. Elnashaie,S.S., and Uhlig,F., Numerical Techniques for Chemical and Biological Engineers using MATLAB, ~ 700 pages(Springer, USA, January (Published, 2007).

6. - Chapter (86 pages), Gamal Ibrahim and Said S.E.H.Elnashaie, Bio-hydrogen Production, Present and Future, Encyclopedias of Hydrogen, in press, 2010.

Patents:

1. Adris, A.M., Grace, J., Lim, C. and Elnashaie, S.S.E.H., “Fluidized Bed Reaction System for Steam/ Hydrocarbon Gas Reforming to Produce Hydrogen, US Patent no. 5,326,550 Date: June 5, 1994.
2. Adris,A.M., Grace,J., Lim,C. and Elnashaie,S.S.E.H.’ “Fluidized Bed Reaction System for Steam/ Hydrocarbon Gas Reforming to Produce Hydrogen, Canadian Patent no. 2,081,170, Date: December 24, 2002
3. Said S.E.H. Elnashaie, Zhongxiang Chen, and Pradeep Prasad, A Novel Circulating Fluidized Bed Reformer for the Production of Pure Hydrogen for Fuel Cells from Liquid Hydrocarbons, U.S. Provisional Patent #60,467,072, May 1, 2003.
4. Said S.E.H.Elnashaie and Parag Garhyan, Chaotic Fermentation of Etahnol, US Full Patent #10/978,293 filled on 10/29/2004.. Published 4th August 2005, **Pub. No.: US 2005/0170483 A1**
5. Said S.E.H. Elnashaie and Parag Garhyan, A Novel Chaotic Fermentor for the Efficient Production of Fuel Ethanol , Provisional patent, AUTD# 03-025, 2003
6. Said Elnashaie and Pradeep Prasad (2003), Novel Circulating Fluidized Bed Membrane Reformer Using Carbon Dioxide Sequestration, U.S. Provisional Patent #60/515,882, Filing Date: Oct 30, 2003

Design of Industrial Plants:

Complete computerized design of a 30,000 tons/year DCP plant for ARASCO, Saudi Arabia, 1995

Consultant for development of bio-ethanol plant from rice straw, 3 million tons/year

Recent Consultancy:

1) Climax Engineered Materials for production of Molybdenum . A Phelps Dodge Company , Sahuarita, Arizona, USA .

2) Membrane Reactor Technology(MRT), Vancouver, BC, Canada.

Graduate Students he supervised and the students obtained their degrees: 30 Master and 20 PhD.

Graduate Students being supervised by him at the present time: 5 Master, 7 PhD