

CURRICULUM VITA

Name: ARUP K. SENGUPTA, Ph.D., P.E. (Pennsylvania), BCEE

Current Rank: P.C. Rossin Professor
Department of Civil and Environmental Engineering
Department of Chemical Engineering
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Citizenship: Naturalized U.S. Citizen

Education:

Ph.D. Environmental Engineering, University of Houston, 1984
M.S. Environmental Engineering, University of Houston, 1982
B.S. Chemical Engineering, Jadavpur University, India, 1973

Professional Society Membership/Fellowship:

American Chemical Society (ACS)
American Society of Civil Engineers (ASCE Fellow)
American Water Works Association (AWWA)
Association of Environmental Engineering & Science Professors (AEESP)
American Academy of Environmental Engineers and Scientists (AAEES)
Water Environment Federation (WEF)
American Institute of Chemical Engineers (AIChE)

Professional Experience:

1973-1980	Process Development Engineer, Kuljian Corporation, Philadelphia, PA 19104
1980-1984	Graduate Student, Civil and Environmental Engineering Department, University of Houston, TX
1985-1990	Assistant Professor, Department of Civil and Environmental Engineering, Lehigh University
1990-1994	Associate Professor, Department of Civil and Environmental Engineering, Lehigh University
1994-Present	Professor, Department of Civil and Environmental Engineering, Lehigh University
1998-2005	Chairperson, Dept. of Civil & Environmental Engineering
Fall, 1996	Visiting Professor, Loughborough University, England
Summer, 1997	Visiting Professor, Army Engineering Institute, Quito, Ecuador

Major National and International Awards:

- **2012 Intel Environmental Award** for Technology Innovation Benefiting Humanity (From over 700 nominations from more than sixty countries. Award included a trophy and a cash prize of \$ 75,000 for ongoing contaminants mitigation research for improvement of public health)
- **2011-2012 Fulbright-Nehru Senior Fellowship** to the Indian Institute of Science in Bangalore, India for developing sustainable water technology in South and Southeast Asia.
- **2009 Astellas Foundation Award** from the American Chemical Society (ACS) for scientific research that improves public health (consists of an award lecture and \$30,000 for continuation of research).
- **“Better World Report 2009: Innovations from Academic Research That Positively Impact Global Health”**, SenGupta’s research toward alleviation of human sufferings caused by drinking of arsenic-contaminated water was included among 22 research projects from US research universities.
- **2009 Lawrence K. Cecil Award** from the American Institute of Chemical Engineers (AIChE) for outstanding contributions in the field of environmental engineering.
- One of the five **2008 Outstanding Civil Engineering Achievement (OCEA)** projects by the American Society of Civil Engineers (ASCE). (Arsenic Crisis in the Indian Subcontinent: Sustainable Engineering Solution)
- **2008 Dhirubhai Ambani Award** from the Institution of Chemical Engineers (IChemE) in the United Kingdom for Engineering Innovation to provide potable water to the Resource-Poor arsenic-affected people.
- **2007 Grainger Silver Prize Award** from the National Academy of Engineering (NAE) for providing sustainable engineering solution for arsenic-contaminated drinking water in the Indian subcontinent.
- **2007 Hillman Graduate Student Advising Award** from Lehigh University
- **2005 Mondialogo Engineering Award** from Daimler-Chrysler and **UNESCO** for the arsenic removal project in West Bengal, India
- **2004 International Ion Exchange Award in Cambridge University**, England from the Separation Science and Technology Division of the Society of chemical Industry (SCI) in the United Kingdom.
- **2001 Frontier Research Award** from the Association of Environmental Engineering and Science Professors (**AEESP**) and Malcolm Pirnie Inc.
- **2001 Professional Research Award** from the Pennsylvania Water Environment Association (**PWEA**).

- **1999 Industrial Ecology Fellowship** Award from the National Science Foundation (**NSF**) and Lucent Technologies.
- **1995 Eleanor and Joseph Libsch Award** from Lehigh University for outstanding achievement in research.
- **1996 USANC Founders' Award** as the US Author of the best paper published in Water Research Journal during 1995 calendar year.
- **1994 Rudolph Hering Medal** (Best research paper in *J.Env.Eng.Div*) Award from the American Society of Civil Engineers (ASCE)
- **1993 Best Paper Award** published in AWWA Jour. from the Research Division of the American Waterworks Association (AWWA)
- **Awarded University Gold Medal** for ranking first in B.S. in Chemical Engineering, at Jadavpur University, India in 1973.

Graduate Student Research Paper Awards

2010 Ellen Gonter graduate student research paper award to Prasun Chatterjee from the Environmental Chemistry Division of the American Chemical Society. Chatterjee, P. and SenGupta, A.K. "Sensing of Toxic Metals Through pH Changes: Concept and Experimental Validation." *AIChE Jour.* (2009). Vol.55, 11, 2997-3004.

2006 outstanding graduate student paper award to John E. Greenleaf from the Environmental Chemistry Division of the American Chemical Society. Greenleaf, J.E. and SenGupta, A.K. "Environmentally Benign Hardness Removal Using ion Exchange Fibers and Snowmelt", *Environ. Sci. Technol.* (2006), 40, 370-376.

1999 outstanding graduate student paper award to Ping Li from the Environmental Chemistry Division of the American Chemical Society. Li, P. and SenGupta, A.K. "Genesis of Selectivity and Reversibility for Sorption of Synthetic Aromatic Anions onto Polymeric Sorbents", *Environ. Sci. Technol.* (1998), 32, 23, 3756-3766.

1993 Graduate Research Award to Yuewei Zhu from the Separations Division of American Institute of Chemical Engineers (AIChE). Zhu, Y. and SenGupta, A.K., "Sorption enhancement of some hydrophilic organic solutes through polymeric ligand exchange," *Environ. Sci. Technol.* (1992), 26, 10, 1990-98.

Honors and Recognitions:

Editor, "*Reactive and Functional Polymers Jour.*" Elsevier Science (from 1996-2006).

Editor: Ion Exchange & Solvent Extraction: Series of Advances, Marcel Dekker, Inc. (since 2000).

International Editorial Board, *"Transaction Part B: Process Safety and Environmental Protection."* Institution of Chemical Engineers, England (2000-2006).

US Patents and Inventions:

- SenGupta, A.K. U.S. Patent No. 5,304,309 awarded in 1994 on "Cyclic Process for Selective Coagulant Recovery from Clarifier Sludge."
- SenGupta, A.K. and D. Zhao. U.S. Patent No. 6,136,199 awarded in 2000 on "Selective Removal of Phosphate and Chromate by Ion Exchange."
- SenGupta, A.K. and Prakash, P. US Patent No. 6,495,047 awarded in 2002 on "Process for Selective Coagulant Recovery from Water Treatment Plant Sludge."
- SenGupta, A.K. and Cumbal, L.H. US Patent No. 7,291,578 awarded in 2007 on "Hybrid Anion Exchanger for Selective Removal of Contaminating Ligands from Fluids and Method of Manufacture Thereof."
- SenGupta, A.K.; P. Li; J.B.Murray; et al US Patent No. 7,540,965 awarded in June 2, 2009 on " Process for Treating Concentrated Salt Solutions containing Dissolved Organic Carbon (DOC)."
- SenGupta, A.K. and Sarkar, S. US Patent No. 7901577 awarded in March 8, 2011."Brackish and Sea Water Desalination By A Hybrid Ion Exchange/Nanofiltration (HIX-NF) Process."
- SenGupta, A.K. and Chatterjee, P. US Patent No. 8187890 awarded May 29, 2012. "Rapid Sensing of Toxic Metals with A New Hybrid Material Through pH Changes."
- SenGupta, A. K. et al. US Patent Application 20120234765, Sept 20, 2012. "Method of Treatment of Produced Water from Gas Shale and Recovery of Important Divalent Ions."
- SenGupta, A.K. and Surapol Padungthon. US patent Application 13/860,984, April 11, 2013. "Hybrid Anion Exchanger impregnated with Zirconium Oxide Nanoparticles for Selective Removal of Contaminating Ligands."

Editor: Books and Special Volumes

1. SenGupta, A.K. (Editor). Ion Exchange Technology: Advances in Pollution Control. CRC Press (Technomic Publishing Co.). 1995, Boca Raton, FL.
2. SenGupta, A.K. and Elimelech, M. (Co-Editors). Special Issue: *Colloids and Surfaces:Physicochemical and Engineering Aspects*, 2001, Vol. 191, Nos. 1-2.
3. SenGupta, A.K. (Editor). Environmental Separation of Heavy Metals: Engineered Processes. CRC Press. 2002, Boca Raton, FL.
4. SenGupta, A. K. (Co-edited with W. Holl, N. Kabay and M. Streat). Special Issue

Dedicated to Prof. Fred Helfferich: *Reactive & Functional Polymers J.*, 2007, Volume 67, Issue 12.

5. SenGupta, A. K. (Editor). *Ion Exchange and Solvent Extraction: A Series of Advances*, 2007, Volume 18, Taylor and Francis Group, Boca Raton, Florida.

Invention Commercialization:

1. First regenerable Polymeric/Inorganic Hybrid Ion exchanger material has been commercialized (US Patent No. 7,291,578) and over one million pounds has been manufactured and is currently in use in the US and five other countries for arsenic and phosphorus removal. More than one million people in both the developing and the developed world drink arsenic-safe water through use of the hybrid anion exchanger.
2. Coagulant (alum) recovery process (US Patent No. 6,495,047 in 2002) is under development using a single-stage Nafion exchange membrane.

International Activities and Charitable Foundation:

For over twelve years, SenGupta's group in association with Bengal Engineering and Science University (BESU) and the Indian Institute of Science in India, the Institute of Technology in Cambodia (ITC) and Institute of Technology in Buenos Aires (ITBA) has been involved in developing sustainable arsenic removal systems and sharing the technology with other countries confronted with relatively high arsenic concentration in groundwater. Altogether 250 well-head community based arsenic removal units are in use in remote villages of West Bengal, India bordering Bangladesh, Cambodia and Laos. Over 250,000 villagers now drink arsenic-safe water from these units.

With a recent award from NCIIA (National Collegiate Invention and Innovation Alliance), SenGupta is collaborating with Institute of Technology (ITC) in Cambodia to install sustainable arsenic removal units in schools and villages in Cambodia in Southeast Asia.

With the assistance of like-minded Lehigh University graduate students and researchers, SenGupta created not-for-profit "The Tagore-SenGupta Foundation" to address water, sanitation and education related problems in the developing world.

www.thetsfoundation.org

The foundation recently won the Reed-Elsevier First Prize to install Sustainable Arsenic Removal Systems in Affected Communities (SARSAC) in Cambodia and southeast Asia.

Teaching:

Reaction Kinetics in Environmental Engineering

Environmental Water Chemistry

Adsorption, Ion Exchange and membrane science in Environmental Processes

Research Interests:

Characterization and Innovative Use of Polymeric and Hybrid Sorbents; Reactive Polymers and Specialty Membranes in Environmental Separation and Pollution Related Problems; Separation Processes and Reaction Kinetics; Development of Sustainable Technologies.

Major University Service Accomplishments:

Chair, Department of Civil and
Environmental Engineering

1998-2005

Lead professor to introduce BS, MS and Ph.D. programs in environmental engineering at Lehigh University

Ph.D. and MS Graduates:

Supervised 15 Ph.D. dissertations and 32 MS theses.

Undergraduate Research Scholars

Over twenty (20) undergraduate students (Lehigh and other universities) have worked in my laboratory through NSF and other corporate research grants. Six of them have been co-authors in *peer-reviewed journal* publications.

Research Funding:

Received over sixty research grants from federal agencies (NSF, USEPA, USDA and DoD), Commonwealth of Pennsylvania, independent non-profit research organizations and foundations (e.g., AWWARF, NCIIA), and private industries.

PUBLICATIONS

Refereed: (Archival Peer-Reviewed Journals)

1. German, M. S., SenGupta, A.K. and Greenleaf, J.E. "Hydrogen ion (H⁺) as a driver for energy efficient sustainable processes: Opportunities and Challenges." (Feature Article) *Environ. Sci. Technol.* (2013). 47, 5, 2145-2150.
2. Greenleaf, J. E. and SenGupta, A.K. "Carbon dioxide regeneration of ion exchange resins and fibers." *Solvent Extraction and Ion Exchange* (2012). 30:350-371
3. Sarkar, S., Greenleaf, J.E., Uy, Davin, SenGupta, A.K. "Sustainable Engineered Processes to Mitigate the Global Arsenic Crisis: Challenges and Progress." *Annual Rev. Chem. Biomol. Eng.* (2012), 3: 497-517.
4. Sarkar, S., Guibal, Eric., Quignard, F. and SenGupta, A.K. "Polymer-Supported Metal and Metal and Metal Oxide nanoparticles: Synthesis, Characterization and Applications." *Jour. of Nanoparticles Research* (2012), 14:715-739.
5. Sarkar, S. SenGupta, A.K. Greenleaf, J. et al. "Energy Recovery from Acid-Base Neutralization Process through pH-sensitive Polymeric Ion Exchangers." *Ind.Eng.Chem.Res.* (2011), 50, 12293-298.
6. Chatterjee, P.K. , SenGupta, AK. "Interference-free detection of trace copper in the presence of EDTA and other metals using two complementary chelating polymers." *Colloids and Surfaces A: Physico chemical and Engineering Aspects*

(2011) 384, 432-441.

7. Chatterjee, P. K., Sengupta, A. K., "Toxic Metal Sensing through Novel Use of Hybrid Inorganic and Polymeric Ion-Exchangers." *Solvent Extraction and Ion Exchange*. (2011) 29(3),398-420
8. Padungthon, S., Greenleaf, J.E., SenGupta, A.K., (2010) Carbon Dioxide Sequestration through Novel Use of Ion Exchange Fibers (IX-Fibers). *Chem. Engr. Res. and Design*. (2011) 89, 1891-1900.
9. Sarkar, S., Chatterjee, P.K., Cumbal, L. and SenGupta, A.K. "Hybrid ion exchanger supported nanocomposites: Sorption and sensing for environmental applications." *Chemical. Eng. Jour.* 166 (2011), 923-931.
10. Sarkar, S., SenGupta, A.K. and Prakash, P. Feature Article in *Environmental Science and Technology* "The Donnan Membrane Principle: Opportunities for sustainable engineered processes and materials." (2010) 44, 4, 1161-1166.
11. An, B., Fu, Z., Xiong., Zhao, D., and SenGupta, AK. "Synthesis and characterization of a new class of polymeric ligand exchangers for selective removal of arsenate from drinking water." *React. Func. Polym.* (2010), 70, 8, 497-507.
12. El-Moselhy, M.M., SenGupta, A.K. and Smith, R. "Carminic acid modified anion exchanger for the removal and preconcentration of Mo(VI) from wastewater." *Jour. Hazardous Materials*. (2011) 185, 1, 442-446.
13. Sarkar, S., Greenleaf, JE., Gupta, A., Ghosh, D., Blaney, LM., Bandyopadhyay, P., Biswas, RK., Dutta, AK., SenGupta, AK. "Evolution of community-based arsenic removal systems in remote villages in West Bengal, India: Assessment of decade-long operation." *Water. Res.* (2010). 44, 5813-5822.
14. Bullough, F., Weiss, DJ., Dubbin, WE, Coles, BJ, Barrott, J., and SenGupta, AK. "Evidence of competitive adsorption of Sb(III) and As(III) on activated alumina." *Ind. Eng. Chem .Res.* (2010), 49, 5, 2521-2524.
15. Beker, U., Cumbal, L., Duranoglu, D., Kucuk, I. and SenGupta, A. K. "Preparation of Fe oxide nanoparticles for environmental applications: Arsenic removal." *Environ Geochem Health* (2010), 32,4, 291-296.
16. Chatterjee, P. and SenGupta, A.K. "Sensing of Toxic Metals Through pH Changes: Concept and Experimental Validation." *AIChE Jour.* (2009). Vol.55, 11, 2997-3004.
17. Greenleaf, J. and SenGupta, A.K. "Flue gas carbon dioxide sequestration during water softening with ion exchange fibers." *Jour. Environ. Engr. ASCE.* (2009)' 135, 6, 386-396.
18. Sarkar, S. and SenGupta, A.K. "A hybrid ion exchange-nanofiltration process for energy efficient desalination of brackish/sea water." *Wat. Sci. Technology:Wat. Supply (WSTWS)*. (2009), 9.4, 369-377.

19. Lin, J-C and SenGupta, A. K. "Hybrid anion exchange fibers with dual binding sites: Simultaneous and Reversible Sorption of perchlorate and arsenic." *Env. Eng. Sci.* (2009). 26, 11, 1673-1683.
20. Sarkar, S. and SenGupta, A. K. "A new hybrid ion exchange-nanofiltration (HIX-NF) process for energy-efficient desalination." *Jour. Memb. Sci.* (2008), 324, 76-84.
21. Sarkar, S., Blaney, L.M., Gupta, A., Ghosh, D. and SenGupta, A.K. "Arsenic removal from groundwater and its safe containment in a rural environment: Validation of a sustainable approach." *Environ. Sci. Technol.* (2008), 42, 4268-4273.
22. Blaney, L. M., Cinar, S. and SenGupta, A.K. "Hybrid anion exchanger for trace phosphate removal from water and wastewater." *Water Res.* (2007). 41, 1603-1613.
23. Sarkar, S., Blaney, L.M., Gupta, A., Ghosh, D. and SenGupta, A.K. "Use of ArsenX^{np}, a hybrid anion exchanger, for arsenic removal in remote villages in the Indian subcontinent." *Reactive and Functional Polymers.* (2007). 67, 1599-1611.
24. Blaney, L.M., Sarkar, S. and SenGupta, A.K. Comment on "Arsenic Removal from Groundwater by Household Sand Filters: Comparative Field Study, Model Calculations, and Health Benefits", *Environ. Sci. Technol.* (2007), 41(3), 1051-1052.
25. Puttamaraju, P. and SenGupta, A.K. "Evidence of tunable on-off sorption behaviors of metal oxide nanoparticles: Role of ion exchanger support" *Ind. Eng. Chem. Res.* (2006), 45, 7737-7742.
26. Greenleaf, J.E., Lin, J. C. and SenGupta, A. K. "Two novel applications of ion exchange fibers: Arsenic removal and chemical-free softening of hard water" *Environ. Prog.* (2006), 25, 4, 300-311.
27. Mukherjee, P. and SenGupta, A. K. "Some observations about electrolyte permeation mechanism through reverse osmosis and nanofiltration membranes." *Jour. Membr. Sci.*, (2006), 278, 301-307.
28. Greenleaf, J.E., SenGupta, A.K. "Environmentally Benign Hardness Removal Using Ion Exchange Fibers And Snowmelt" *Environ. Sci. Technol.*, (2006), 40, 370-376.
29. Blaney, L. and SenGupta, A.K. Correspondence on "Landfill-stimulated iron reduction and arsenic release at the Coakley superfund site (NH)" *Environ. Sci. Technol.* (2006), 40, 12, 4037-4038.
30. Prakash, P. and SenGupta, A.K., "Modeling Al³⁺/H⁺ ion transport in Donnan membrane process for coagulant recovery." *AIChE Jour.*, (2005), 51, 1, 333-344.
31. Cumbal, L.H. and SenGupta, A.K. "Preparation and characterization of magnetically active dual-zone sorbent" *Ind. Eng. Chem. Res.*, (2005), 44, 600-605.

32. Cumbal, L., SenGupta, A.K. "Arsenic Removal Using Polymer-Supported Hydrated Iron (III) Oxide Nanoparticles: Role of Donnan Membrane Effect." *Environ. Sci. Technol.* (2005), 39, 6508-6515.
33. Sarkar, S., Gupta, A., Biswas, R. K., Deb, A.K., Greenleaf, J.E., and SenGupta, A.K. (2005). Well-head arsenic removal units in remote villages of Indian subcontinent: Field results and performance evaluation *Water Res.*, 39,10, 2196-2206.
34. Prakash, P., Hoskins, D. and SenGupta, A.K. "Application of homogeneous and heterogeneous cation-exchange membranes in coagulant recovery from water treatment plant residuals using Donnan membrane process." *Jour. of Mem. Sci.*, (2004), 237, 131-144.
35. Li, P. and SenGupta, A.K. "Sorption of hydrophobic ionizable organic compounds (HIOCs) onto polymeric ion exchangers." *Reactive & Functional Polymers*, 60 (2004), 27-39.
36. Henry, W.D., Zhao, D., SenGupta, A.K. and Lange, C. "Preparation and characterization of a new class of polymeric ligand exchangers for selective removal of trace contaminants from water." *Reactive & Functional Polymers*, 60 (2004), 109-120.
37. Petruzzelli, D., Dell'Erba, A., Liberti, L., Norarnicola, M., SenGupta, A.K. "A phosphate selective sorbent for the REM NUT® process: field experience at Massafra Wastewater Treatment Plant." *Reactive & Functional Polymers*, 60, (2004), 195-202.
38. DeMarco, M. J.; SenGupta, A.; Greenleaf, J. (2003) "Arsenic removal using a polymeric/inorganic hybrid sorbent", *Water Research*, 37, 164 - 176.
39. Cumbal, L., Greenleaf, J., Leun, D., and SenGupta, A.K. "Polymer supported inorganic nanoparticles: Characterization and environmental applications", *Reactive Polymers*, (2003), 54, 167-180.
40. Petruzzelli, D., De Florio, L., Dell'Erba, A., Liberti, L. and SenGupta, A.K. "A new phosphate-selective sorbent for the Rem Nut process." *Water Science & Technology* , 48 , (2003), (1): 179-184.
41. Mukherjee, P. and SenGupta, A.K. "Ion exchange selectivity as a surrogate indicator of relative permeability of ions in reverse osmosis processes", *Environ. Sci. Technol.*, (2003), 37, 1432-1440.
42. Greenleaf, J.E., Cumbal, L., Staina, I., and SenGupta, A.K. "Abiotic As(III) oxidation by hydrated Fe(III) oxide (HFO) microparticles in a plug flow columnar configuration", *Trans IChemE*, (2003), Vol. 81, Part B, 87-98.
43. Prakash, P., SenGupta, A. K. (2003) "Selective Coagulant Recovery from Water Treatment Plant Residuals Using Donnan Membrane Process", *Environ. Sci. Technol.*, 37, 4468-4474.
44. Li, P. and SenGupta, A.K. "Entropy-driven selective ion exchange for aromatic ions and the role of cosolvents" *Colloids and Surfaces*, (2001), 191, 123-132.
45. Sengupta, S. and SenGupta, A.K. "Chelating ion-exchangers embedded in PTFE

- for decontamination of heavy-metal-laden sludges and soils" *Colloids and Surfaces*, (2001), 191, 79-95.
46. Zhao, D. and SenGupta, A.K. "Ligand separation with a copper(II)-loaded polymeric ligand exchanger" *Ind. Eng. Chem. Res.*, (2000), Vol. 39, No. 2, 455-462.
 47. Leun, D. and SenGupta, A.K. "Preparation and characterization of magnetically active polymeric particles (MAPPs) for complex environmental separations" *Environ. Sci. Technol.*, (2000), 34, 3276-3282.
 48. Li, P. and SenGupta, A.K. "Intraparticle diffusion during selective ion exchange with a macroporous exchanger" *Reactive Polymers* (2000), 44, pp. 273-287.
 49. Li, P. and SenGupta, A.K. "Intraparticle diffusion during sorption of trace contaminants: effect of gel vs. macroporous morphology." *Environ. Sci. Technol.*, (2000). 34, 24, 5193-5200.
 50. Zhao, D. and SenGupta, A.K. "Ultimate removal of phosphate using a new class of anion exchangers" *Water Research* (1998), Vol. 32, 5, 1613-1625.
 51. Mitra, I., SenGupta, A.K., Kugelman, I. J. and Creighton, R. "Evaluating composite ion exchangers for improved stability of anaerobic biological reactors" *Water Research* (1998), Vol 32, No. 11, 3267-3280.
 52. Li, P. and SenGupta, A.K. "Genesis of selectivity and reversibility for sorption of synthetic aromatic anions onto polymeric sorbents" *Environ. Sci. & Technol.*, (1998), Vol. 32, No. 23, 3756-3766.
 53. Zhao, D., SenGupta, A.K. and Stewart, L. "Selective removal of Cr(VI) oxyanions with a new anion exchanger" *Ind.Eng.Chem.Res.*, (1998), Vol. 37, No. 11, 4383-4387.
 54. Mitra, I.N., SenGupta, A.K. and Kugelman, I.J. "Improving stability of anaerobic biological reactors using composite ion exchanger" *Wat. Sci. Tech.*, (1998), Vol. 38, No. 8-9, pp. 369-376.
 55. Sengupta, S. and SenGupta, A. K., "Heavy-metal separation from sludge using chelating ion exchangers with non-traditional morphology" *Reactive Polymers* (1997), 35, 111-134.
 56. Zhao, D. and SenGupta, A.K., "Selective removal and recovery of phosphate in a novel fixed-bed process." *Water Sci. Tech.*, (1996), Water Sci. Tech. 1996, Vol. 33, No. 10-11, pp. 139-147.
 57. Sengupta, S. and SenGupta, A.K., "Solid phase heavy metal separation using composite ion-exchange membranes," *Hazardous Waste and Hazardous Materials*, (1996), Vol. 13, 2, pp. 245-263.
 58. Gao, Y., SenGupta, A.K., and Simpson, D., "A new hybrid inorganic sorbent for heavy metals removals in fixed beds," *Water Research* (1995), Vol. 29, 9, 2195-2205.

59. Zhao, D., SenGupta, A.K. and Zhu, Y., "Trace contaminants sorption through polymeric ligand exchange." *Ind. Eng. Chem. Res.*, (1995), 34, 2676-2684.
60. Shi, B. and SenGupta, A.K., "Leaching behavior of fly ash piles: the phenomenon of delayed rise in toxic concentrations" *Jour. Envir. Sys.*(1995), 24, 1, 87-93.
61. SenGupta, A.K. and Zhu, Y., "Selective and reversible ligands sorption through a novel regeneration scheme." *Ind. Eng. Chem. Res.* (1994), 33, 2, 382-386.
62. Sengupta, S. and SenGupta, A.K., "Characterizing a new class of sorptive/desorptive ion exchange membranes for decontamination of heavy-metal-laden sludges." *Environ. Sci. Technol.* (1993), 27, 10, 2133-2140.
63. SenGupta, A.K. and Shi, B., "Selective alum recovery from clarifier sludge: a new two-step process using composite membranes." *AWWA Jour.* (1992). Jan. 1992, 96-103.
64. Zhu, Y. and SenGupta, A.K., "Ligand exchange for anionic solutes." *Reactive Polymers.* (1992). 17, 229-37.
65. SenGupta, A.K. and Zhu, Y., "Metals sorption onto chelating polymers: a unique role of ionic strength." *AIChE Jour.* (1992). 38, 1, 153-57.
66. Ramana, A. and SenGupta, A.K., "A new class of selective sorbents for arsenic and selenium oxy-anions." *Envir. Eng. Div. Jour., ASCE.* (1992). 118, 5, 755-775.
67. Zhu, Y. and SenGupta, A.K., "Sorption enhancement of some hydrophilic organic solutes through polymeric ligand exchange," *Environ. Sci. Technol.* (1992), 26, 10, 1990-98.
68. SenGupta, A.K., Zhu, Y., and Hauze, Diane, "Metal-ion-binding onto chelating exchangers with multiple nitrogen donor atoms." *Environ. Sci. Technol.* (1991). 25, 481-88.
69. Zhu, Y., Millan, E., SenGupta, A.K., "Toward separation of toxic metal cations by chelating polymers: some noteworthy observations." *Reactive Polymers.* (1990). 13, 241-253.
70. SenGupta, A.K., Discussion on the paper titled "Evaluating multicomponent adsorption in fixed beds," *Journal of the Environmental Engineering Division, ASCE*, (1989), Vol. 115, No. 2., 490-493.
71. SenGupta, A.K., Khan, L.I. and Kugelman, I.J., "Ion-exchange resins for improved stability in biological and enzymatic reactors." *AIChE Jour.* (1989). Vol. 35, 10, 1745-48.
72. SenGupta, A.K., Subramonian, S. and Clifford, D. "More on the mechanism and some important properties of chromate ion exchange," *Journal of the Environmental Engineering Division, ASCE*, (1988), Vol. 114, 1, pp. 137-153.

73. SenGupta, A.K., "A unified approach to interpret some unusual observations in heterogeneous ion exchange," *J. Colloid & Interface Sci.*, (1988). Vol. 123, May, 1988, pp. 201-215.
74. SenGupta, A.K. and Lim, L., "Modeling chromate ion-exchange processes," *AIChE. Journal*, (1988). Vol. 34, No. 12, pp. 2019-2029.
75. SenGupta, A.K., Roy, T. and Jessen, D., "Modified anion-exchange resins for improved chromate selectivity and increased efficiency of regeneration," *Reactive Polymers*, (1988), 9, 293-299.
76. SenGupta, A.K. and Clifford, D.A., "Important process variables in chromate ion exchange," *Environ. Sci. Technol.*, (1986). Vol. 20, Feb., pp. 149-155.
77. SenGupta, A.K. and Clifford, D.A., "Chromate ion-exchange mechanism for cooling water," *Ind. Eng. Chem. Fundam.*, (1986). 25, pp. 249-258.
78. SenGupta, A.K., "Anomalous ion-exchange characteristics of polynuclear metal complexes," *Jour. Chromatography*, (1986). Vol. 368, pp. 319-328.
79. SenGupta, A.K. and Clifford, D.A., "Some unique characteristics of chromate ion exchange," *Reactive Polymers*, (1986). Vol. 4, pp. 113-130.
80. SenGupta, A.K., Clifford, D. A. and Subramonian, S., "Chromate Ion-Exchange Process at Alkaline pH," *Water Research*, (1986), Vol. 20, No. 9, 1177-84.

Invited and Keynote Lectures

Partial List of Selected Invited Lectures:

- **Columbia University, New York, Superfund Research program**, March 18, 2013 "Mitigating Global Arsenic Crisis Through Innovations: past progress and Future Challenges."
- **Keynote Lecture at GeoGen 2013 in Addis Ababa, Ethiopia**, Feb 6, 2013. "Genesis of Hybrid Nanosorbent to Mitigate Global Fluoride and Arsenic Crisis."
- **Invited Lecture at the NSF-Govt of India Workshop on Water at IIT-Chennai, India** Jan 7, 2013. "Development of Appropriate Water Technology: From Research Laboratory to Masses in the Field."
- **Invited Lecture at Yale University**, Nov 7, 2012 "The Donnan Membrane Principle in Ion Exchange Processes: New Approaches and Enhanced Sustainability."
- **Plenary lecture at the International Ion Exchange Conference in Cambridge University, UK**, Sept 19, 2012. "The Donnan membrane Principle in Ion Exchange Processes: New Opportunities."
- **Tribhuban University in Kathmandu, Nepal**, March 7, 2012 "Mitigating arsenic crisis in the Indian subcontinent: Sustainable Approach."

- **ASCE (India) Section in Jadavpur University, Kolkata**, July 22, 2011. Title: “Developing Water Technology: From Research laboratory to Masses in the field”
- **Chicago ACS and AIChE Joint Lecture in Chicago, IL**, January 19, 2011
“Role of Chemistry and Engineering Principles in Mitigating Global Arsenic Crisis”
- **ACS Astellas Foundation Award Lecture at the ACS National Meeting in Boston, MA**, August 22, 2010. Global Arsenic Crisis in Drinking Water: New Findings for Sustainable Solution.
- **Johns Hopkins University in Batimore, MD**, March 2, 2010. Using Donnan membrane Principle for Sustainable Environmental Processes and Materials.
- **Lawrence K. Cecil Award Lecture at AIChE Annual Meeting in Nashville**, November 9, 2009. Hybrid Ion Exchange: From Decontamination to Desalination
- **Imperial College, London, Chemical Engineering Department**, October 26, 2009. From the Donnan Membrane Principle to Sustainable Engineered Processes.
- **Russian Academy of Science, Moscow**, June 18, 2009. Hybrid Ion Exchange: From Decontamination to Desalination.
- **University of Texas at Austin**, March 5, 2009. Department of Civil and Environmental Engineering, Sustainable Arsenic Removal Systems in the Indian Subcontinent.
- **2009 Arsenic Congress** in Izmir, Turkey, January 21-23. Performance of Arsenic-selective Reusable Adsorbent.
- **2008 UNESCO Global Water Crisis Meeting at the University of California, Irvine** December 1-4. Lecture Title: Sustainable Engineering Solution for Arsenic Removal in Remote Villages in the Indian Subcontinent.
- **2008 Eastern Mediterranean Chemical Engineering Congress in Italy**, May 25-29 (sponsored by the National Science Foundation in the US). Lecture Title: Hybrid Ion Exchangers (HIXs) for Removal and Sensing of Trace Contaminants.
- **Princeton University, New Jersey**. Department of Civil and Environmental Engineering, May 6, 2008. Title: Sustainable Engineering Solution for Arsenic Crisis in the Indian Subcontinent.
- “Engineering for the Developing World” Seminar Series by **Materials Research Laboratory at the University of California in Santa Barbara (UCSB)**. Lecture Title: “The Arsenic Crisis in the Developing World: A Sustainable Engineering Solution” on April 15, 2008.
- **2007 NEERI Distinguished Lecture at the CHEMCON Congress** under the auspices of the **Indian Institute of Chemical Engineers in Kolkata, India**,

Dec.27-29, 2007. Title: Development and Characterization of A New Class of Hybrid Ion Exchangers for Environmental Application. (NEERI= National Environmental Engineering Research Institute).

- African Science and Academic Development Initiative (ASADI) Conference in **Dakar, Senegal** under the auspices of the US National Academy of Science (NAS) Nov. 11-15, 2007. Title: Chemical Contaminants in Groundwater: Sustainable Engineering Solution.
- **Cornell University, Ithaca, New York**. Department of Civil and Environmental Engineering, Oct 11, 2007. Title: Arsenic Crisis in the Indian Subcontinent: A Sustainable Engineering Solution.
- Keynote Lecture at the International Conference on Ion Exchange (ICIE'2007) **Japan, Chiba University** Oct 15-19. Title: Sensing Toxic Metals Using New Hybrid Inorganic Ion Exchangers.
- Swiss Federal Institute of Environmental Science and Technology (EAWAG), **Zurich, Switzerland**, June 18-19, 2007. Title: Arsenic Crisis in the Developing World: Sustainable Engineering Solution.
- IPICYT, Research Institute in **San Luis Potosi, Mexico** under the auspices of Mexican Academy of Science, August 20-24, 2007. Five Consecutive Lectures on "Environmental Applications of Ion Exchange."
- Beyer Distinguished Lecture in the Department of Civil and Environmental Engineering, **University of Houston**, April 27, 2007. Title: Arsenic Crisis in the Indian Subcontinent: Sustainable Engineering Solution.
- Invited Lecture at the ACS Presidential Symposium on "Going With the Flow: Water Sustainability." **ACS Chicago Meeting**, March 27, 2007. Title: The Role of Chemistry for a Sustainable Solution to Arsenic Crisis in the Indian Subcontinent.
- **The University of Delaware**, Department of Civil and Environmental Engineering, March 23, 2007. Title: Arsenic Crisis in the Indian Subcontinent: Sustainable Engineering Solution.
- Invited Keynote Lecture at 2007 Engineering Conference International (ECI) Meeting on Water Reuse in **Tomar, Portugal** February 11-15, 2007. Title: Arsenic Crisis: Sustainable Engineering Solution.
- Invited Lecture at the International Workshop on Frontiers and Interfaces of Ion Exchange (IEW' 2006) in **Antalya, Turkey** sponsored by the National Science Foundation, USA, June 11-15, 2006. Title: Donnan Principle Based Hybrid Nanosorbent
- **Argentina Atomic Center and University, Buenos Aires**, October 2, 2006. Title: Donnan Principle Based Nanosorbent for Arsenic Removal.
- PERMEA 2005 plenary lecture at Membrane Science and technology Conference in **Polamica Zdroj, Poland** (Sept. 18-22, 2005). Lecture title "Donnan Membrane

Principle: Fundamentals and Opportunities for Application in Environmental Separation.

- Lappeenranta University of Technology, **Lappeenranta, Finland**, August 8-9, 2005. Title: Removal of Trace Metals Using Chelating Exchangers with Nitrogen Donor Atoms.
- Plenary lecture at the International Congress of Science and Technology in **ESPE, Quito, Ecuador** October 26-28, 2005. Title: Polymer Supported Nanoparticles in Environmental Separation.”
- 2004 Water For People Specialty seminar at the **University of New Hampshire**, October 14, 2004. Lecture title “A Holistic Approach Towards Arsenic Removal in the Indian Subcontinent.”
- 2004 Plenary Lecture at the International Polymer Technology Conference in **Prague, Czech Republic**. Title: Functionalized Polymers In Environmental Processes.
- Invited Lecture at **McGill University, Canada**. March 9, 2004. Lecture title “Polymer Supported Inorganic Nanoparticles: A Hybrid Reusable Arsenic-Selective Sorbent.”
- Keynote Lecture at 2003 International Conference on Ion Exchange (ICIE’03) in **Kanazawa Institute of Technology in Japan**. Lecture title “Novel Use of Ion Exchange Selectivity in Predicting Electrolyte Permeability for Reverse Osmosis Processes.”