

## 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  
1 West packer Avenue  
Lehigh University, Bethlehem, PA 18015  
Telephone: (610) 758-3534 (Work)  
Fax: (610) 758-6405  
e-mail id: [arup.sengupta@lehigh.edu](mailto:arup.sengupta@lehigh.edu)

### 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 Institute of Chemical Engineers (AIChE) (Fellow)  
National Academy of Inventors (NAI) (Fellow)

### 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, Environmental Engineering, Lehigh University
1990-1994	Associate Professor, Environmental Engineering, Lehigh University
1994-Present	Professor, 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
Spring, 2012	Senior Fulbright Scholar to Indian Institute of Science, India

### Major National and International Awards:

- **2018 AEESP Steve Dentel Global Outreach Award** in New Orleans at the WEFTEC Meeting
- **2016 Hall of Fame Inductee in the City of Bethlehem** at the 275<sup>th</sup> anniversary of the city for international contribution for his research impact in providing safe drinking water (Induction ceremony held on 25<sup>th</sup> June, 2016)
- **2016 VentureWell Sustainability Impact Award** at the 20<sup>th</sup> Anniversary meeting in Portland, Oregon for development of appropriate water technology and social entrepreneurship
- **2014 NAI (National Academy of Inventors) Fellow** Inducted in March 20, 2014 at the California Institute of Technology for the invention and commercialization of hybrid anion exchanger nanotechnology in eight different countries (HAIX-NanoZr).
- **2013 Lehigh University Hilman Faculty Award** for excellence through impact of research
- **2012 Intel Environmental Award (Tech Awards)** for Technology Innovation Benefiting Humanity (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).

Chaired NSF-Sponsored international workshop entitled "**Frontiers and Interfaces of Ion Exchange**" June 11-15, 2006 in Antalya, Turkey attended by delegates from 12 different countries..

### **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." (Commercialized)
- 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. 7,901,577 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. 8,187,890 awarded May 29, 2012. "Rapid Sensing of Toxic Metals with A New Hybrid Material Through pH Changes."
- SenGupta, A.K. and Surapol Padungthon. US patent No. 9,120,093 B2, September 1, 2015. "Hybrid Anion Exchanger impregnated with Zirconium Oxide Nanoparticles for Selective Removal of Contaminating Ligands."

- SenGupta, A.K., Padungthon, S., German, M and Li, J. US Patent No 9,731983 B2, August 15, 2017. "Ion Exchange Methods for Treating Water Hardness."
- SenGupta, A. K. and Li, J. US Patent # 10,125, 033 Nov 13, 2018 "Self-regenerating anion exchange process for treating shale gas flow-back waste water."
- SenGupta, A.K., Dong, H. US Patent # 10472261, 11<sup>th</sup> December, 2019 "Contaminants removal with Simultaneous Desalination using Carbon Dioxide Regenerated Hybrid Ion Exchange Nanomaterials (HIX-Nano)."

### Single Authored Book:

Title: ***Ion Exchange in Environmental Processes*** (476 pages)

Publisher: John Wiley & Sons, Hoboken, New Jersey (2017)

ISBN No. 9781119157397

### 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 removal. More than two million people in both the developing and the developed world drink arsenic-safe water through use of the hybrid anion exchanger nanomaterials.
2. Coagulant (alum) recovery process (US Patent No. 6,495,047 in 2002) is under development using a single-stage Nafion exchange membrane.
3. First silica removal technology using a silica-selective sorbent (Si-Sorb) was successfully demonstrated in the Orange County Water District (OCWD) to treat RO reject under the auspices of Trevis System for enhanced water recovery from treated municipal wastewater. Si-Sorb was effective in eliminating silica fouling onto FO/RO membrane Inc in California.
4. Hybrid ion exchangers dispersed with nanoscale ZrO<sub>2</sub> (HIX-NanoZr) ( US patent No. 9,120,093 B2, September 1, 2015) is in use for field trials in Kenya and India for fluoride

removal from contaminated groundwaters.

5. Removal and recovery of phosphorus from treated wastewater and runoff using a hybrid ion exchange nanosorbent now serves as an important reference for the current focus on the food-energy-water nexus.

### **International Activities and Founding New Organizations:**

With his like-minded students and co-workers, SenGupta founded two non-profit and one tech start-up company to apply technology to mitigate water crisis in both the developing and the developed world:

[www.thetsfoundation.org](http://www.thetsfoundation.org)

[www.techhumanface.org](http://www.techhumanface.org)

[www.drinkwellsystems.com](http://www.drinkwellsystems.com)

These organizations have independently received national and international awards. Over 2 million people around the world drink arsenic- and fluoride-safe water through inventions made at Lehigh University.

### **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 21 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 totaling approximately 8 million US dollars from federal agencies (NSF, USEPA, USDA, Department of State and DoD), Commonwealth of Pennsylvania, independent non-profit research organizations and foundations (e.g., AWWARF, NCIIA), Department of Science and Technology in India and private industries.

## PUBLICATIONS

### Refereed: (Archival Journals)

1. German, M., Dong, H., Schevets, A., Smith, R. and SenGupta, A.K. "Field Validation of Self-regenerating ion exchange-membrane (RIX-M) process to prevent sulfate and silica fouling." *Desalination* (2019) 469, 11 4093
2. Shepsko, C., Dong, H. and SenGupta, A.K. "Treated Municipal Wastewater Reuse: A holistic approach using hybrid ion exchange (HIX) with concurrent nutrient recovery and CO<sub>2</sub> sequestration." *Sustainable Chem. Eng.* (2019) 7, 9671-9679.
3. Dong, H, Shepsko, C, German, M and SenGupta, A. K. "Hybrid Ion Exchange Desalination (HIX-Desal\_ of impaired brackish water using pressurized CO<sub>2</sub> as the source of energy and regenerant." *Environ. Sci. Technol. Lett* (2018) DOI:10.1021/acsestlett. 8b00487
4. German, M, Watkins, T, Chowdhury, M, Chatterjee, P Rahman, M, Seingheng, H and SenGupta, A.K. "Evidence of Economically Sustainable Village-Scale Microenterprises for Arsenic Remediation in Developing Countries" *Environ. Sci. Technol.* (2019): DOI: [10.1021/acs.est.8b02523](https://doi.org/10.1021/acs.est.8b02523)
5. Phillips, D, Sen Gupta, B, Mukhopadhyay, S and SenGupta, A.K. "Arsenic and fluoride removal from contaminated drinking water with HAIX-Fe-Zr and HAIX-Zr resin beads." *Jour. Environ Management* (2018), 132-142.
6. Tian Yu, SenGupta, A. K. and Brown, D. G. "In-situ Stability of Control of Energy-Producing Anaerobic Biological Reactors through Novel Use of Ion Exchange Resins." *Sustainable Chemistry & Engineering* (2017) DOI: [10.1021/acssuschemeng.7b02435](https://doi.org/10.1021/acssuschemeng.7b02435)
7. Li, Jinze, Koner, S., German, M. and SenGupta, A.K. "Aluminum Cycle Ion Exchange Process for Hardness Removal: A New Approach for Sustainable Softening." *Environ. Sci. Technol.* (2016): DOI: [10.1021/acs.est.6b03021](https://doi.org/10.1021/acs.est.6b03021)
8. SenGupta, A.K. German, M., Chatterjee, P. et al. "Breakthrough Technology or Breakthrough Solution: What Are we Really After?" *Environ. Sci. Technol* (2017). Viewpoint DOI: [10.1021/acs.est.6b05540](https://doi.org/10.1021/acs.est.6b05540)
9. Smith, R.C. and SenGupta, A.K. "Mixed Anion Exchange Resins for Tunable Control of Sulfate–Chloride Selectivity for Sustainable Membrane Pretreatment." *Industrial & Engineering Chemistry Research Ind. Eng. Chem. Res.* (2016): DOI: [10.1021/acs.iecr.5b03081](https://doi.org/10.1021/acs.iecr.5b03081).

10. Smith, R.C. and SenGupta, A.K. "Integrating tunable anion exchange with reverse osmosis for enhanced recovery during inland brackish water desalination." *Environ. Sci. Technol.* (2015), 49, 5637-5644.
11. Padungthon, S., German, M., Wiryathamcharoen, S. and SenGupta, A.K. "Polymeric anion exchanger supported Zr(IV) oxide nanoparticles: A reusable hybrid sorbent for selective trace arsenic removal." *Reactive and Func. Polym.* (2015), 93, 84-94.
12. Stanton, B. et al. "MDI Biological laboratory arsenic summit: Approaches to limiting human exposure to arsenic." *Curr Envir Health Rpt.* (2015) DOI 10.1007/s40572-015-0057-9.
13. Smith, R.C., Li, J., Padungthon, S. and SenGupta, A.K. "Nexus between polymer support and metal oxide nanoparticles in hybrid nanosorbent materials (HNMs) for sorption/desorption of target ligands." *Front. Environ. Sci. Eng.* (2015) DOI 10.1007/s11783-015-0795-9.
14. Padungthon, S., Li, J., German, M and SenGupta, A.K. "Hybrid anion exchanger with dispersed zirconium oxide nanoparticles: A durable and reusable fluoride-selective sorbent." *Environ. Engr. Sci.* (2014), 31, 7, 360-372.
15. Ghosh, D., Sarkar, S., SenGupta, A.K. and Gupta, A. "Investigation on the long-term storage and fate of arsenic obtained as a treatment residual: A case study." *Jour. Hazardous Materials* (2014) 271, 302-310.
16. Padungthon, S. and SenGupta, A.K. Comments on "Polymerization of silicate on hematite surfaces and its influence on arsenic sorption." *Environ. Sci. Technol.* (2013), 47, pp 5514-5515.
17. German, M. S., SenGupta, A.K. and Greenleaf, J.E. "Hydrogen ion (H<sup>+</sup>) as a driver for energy efficient sustainable processes: Opportunities and Challenges." (Feature Article) *Environ. Sci. Technol.* (2013). 47, 5, 2145-2150.
18. German, M.S., Seingheng, H and SenGupta, A.K. "Mitigating arsenic crisis in the developing world: Role of Robust, reusable and selective hybrid anion exchanger (HAIX)." *Science of the Total Environment* (STOTEN) (2013) <http://dx.doi.org/10.1016/j.scitotenv.2013.10.092>
19. Smith, R., Mukherjee, P. and SenGupta, A.K. Comment on "Experimental energy barriers to transporting anions through nanofiltration membranes." *Environ. Sci. Technol.* (2013) 47, 8985-8986.
20. 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

21. 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.
22. 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.
23. 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.
24. Chatterjee, P.K., SenGupta, A.K. "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.
25. 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
26. 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.
27. 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.
28. 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.
29. An, B., Fu, Z., Xiong., Zhao, D., and SenGupta, A.K. "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.
30. 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.
31. Sarkar, S., Greenleaf, J.E., Gupta, A., Ghosh, D., Blaney, L.M., Bandyopadhyay, P., Biswas, R.K., Dutta, A.K., SenGupta, A.K. "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.

32. 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.
33. 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.
34. 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.
35. 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.
36. 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.
37. 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.
38. 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.
39. 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.
40. 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.
41. Sarkar, S., Blaney, L.M., Gupta, A., Ghosh, D. and SenGupta, A.K. "Use of ArsenX<sup>np</sup>, a hybrid anion exchanger, for arsenic removal in remote villages in the Indian subcontinent." *Reactive and Functional Polymers.* (2007). 67, 1599-1611.
42. 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.
43. 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.
44. 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.
45. 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.
  46. Greenleaf, J.E., SenGupta, A.K. "Environmentally Benign Hardness Removal Using Ion Exchange Fibers And Snowmelt" *Environ. Sci. Technol.*, (2006), 40, 370-376.
  47. 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.
  48. Prakash, P. and SenGupta, A.K., "Modeling  $Al^{3+}/H^+$  ion transport in Donnan membrane process for coagulant recovery." *AIChE Jour.*, (2005), 51, 1, 333-344.
  49. Cumbal, L.H. and SenGupta, A.K. "Preparation and characterization of magnetically active dual-zone sorbent" *Ind. Eng. Chem. Res.*, (2005), 44, 600-605.
  50. 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.
  51. 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.
  52. 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.
  53. Li, P. and SenGupta, A.K. "Sorption of hydrophobic ionizable organic compounds (HIOCs) onto polymeric ion exchangers." *Reactive & Functional Polymers*, 60 (2004), 27-39.
  54. 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.
  55. 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.
  56. DeMarco, M. J.; SenGupta, A.; Greenleaf, J. (2003) "Arsenic removal using a polymeric/inorganic hybrid sorbent", *Water Research*, 37, 164 - 176.

57. Cumbal, L., Greenleaf, J., Leun, D., and SenGupta, A.K. "Polymer supported inorganic nanoparticles: Characterization and environmental applications", *Reactive Polymers*, (2003), 54, 167-180.
58. 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.
59. 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.
60. 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.
61. Prakash, P., SenGupta, A. K. (2003) "Selective Coagulant Recovery from Water Treatment Plant Residuals Using Donnan Membrane Process", *Environ. Sci. Technol.*, 37, 4468-4474.
62. 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.
63. 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.
64. 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.
65. 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.
66. Li, P. and SenGupta, A.K. "Intraparticle diffusion during selective ion exchange with a macroporous exchanger" *Reactive Polymers* (2000), 44, pp. 273-287.
67. 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.
68. 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.
69. Mitra, I., SenGupta, A.K., Kugelmann, 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.
70. 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.

71. 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.
72. 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.
73. 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.
74. 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.
75. 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.
76. 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.
77. Zhao, D., SenGupta, A.K. and Zhu, Y., "Trace contaminants sorption through polymeric ligand exchange." *Ind. Eng. Chem. Res.*, (1995), 34, 2676-2684.
78. 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.
79. 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.
80. 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.
81. 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.
82. Zhu, Y. and SenGupta, A.K., "Ligand exchange for anionic solutes." *Reactive Polymers.* (1992). 17, 229-37.
83. SenGupta, A.K. and Zhu, Y., "Metals sorption onto chelating polymers: a unique role of ionic strength." *AIChE Jour.* (1992). 38, 1, 153-57.

84. 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.
85. 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.
86. 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.
87. 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.
88. 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.
89. 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.
90. 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.
91. 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.
92. SenGupta, A.K. and Lim, L., "Modeling chromate ion-exchange processes," *AIChE. Journal*, (1988). Vol. 34, No. 12, pp. 2019-2029.
93. 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.
94. SenGupta, A.K. and Clifford, D.A., "Important process variables in chromate ion exchange," *Environ. Sci. Technol.*, (1986). Vol. 20, Feb., pp. 149-155.
95. SenGupta, A.K. and Clifford, D.A., "Chromate ion-exchange mechanism for cooling water," *Ind. Eng. Chem. Fundam.*, (1986). 25, pp. 249-258.
96. SenGupta, A.K., "Anomalous ion-exchange characteristics of polynuclear metal complexes," *Jour. Chromatography*, (1986). Vol. 368, pp. 319-328.
97. SenGupta, A.K. and Clifford, D.A., "Some unique characteristics of

chromate ion exchange," *Reactive Polymers*, (1986). Vol. 4, pp. 113-130.

98. 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)**

- **Water Quality Technology Conference (WQTC) of AWWA, Dallas, TX**, November 5, 2019 "Nanotechnology Enabled Adsorbents in Water and Wastewater Treatment."
- **World Bank Water Week, Washington DC, April 4, 2019** "Village-scale Arsenic- and Fluoride-Mitigation in the Indian Sub-continent and Southeast Asia."
- **Russian Academy of Science, Moscow, Russia**, July 9, 2018 "Hybrid Ion Exchange Nanotechnology (HIX-Nano): Underlying Science and Global Application in Water-Energy nexus Sector."
- **Columbia University, Earth and Environmental Engineering**, October 12, 2017 "Global Applications of Hybrid Ion Exchange Nanotechnology (HIX-Nano); From Decontamination to Desalination."
- **International Conference on Sustainable Water Processing, Sitges, Spain**, 11-14 September, 2016 "Development and Global Application of Hybrid Ion Exchange Nanotechnology"
- **Nanotechnology Conference in Quito, Ecuador**, Nov 19, 2015 "HAIX Nanosorbent for Trace Contaminants Removal."
- **Michigan State University**, October 23, 2015, Plenary lecture at the ESPP Symposium. "Transforming Global Arsenic and Fluoride Crisis into an Economic Opportunity."
- **University of Technion, Haifa, Israel**, March 4, 2014, "From Desalination to Decontamination: Water Technology Innovations through Hybrid Processes and Hybrid Materials."
- **Indian Institute of Technology, Bombay, India**, July 25, 2014, "Water Technology Innovations through Hybrid Processes."
- **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 Sustainability 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 Baltimore, 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.
- 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."