

**KARTIK CHANDRAN**

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**RESEARCH INTERESTS**

- Environmental and public health microbiology, environmental biotechnology, microbial ecology of engineered biological waste and water treatment reactors, development and application of novel biokinetic estimation tools, elucidation of microbial biochemical degradation pathways, bioprocess modeling and parameter identification for complex biotransformations

**PROFESSIONAL AND RESEARCH POSITIONS**

**Columbia University in the City of New York**

(September 2005 – to date)	Assistant Professor	Henry Krumb School of Mines, Department of Earth and Environmental Engineering
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**Virginia Polytechnic Institute and State University**

(June 2004 – August 2005)	Research Associate	Via Department of Civil and Environmental Engineering
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**Metcalf and Eddy of New York, Inc.**

(September 2001 – May 2004)	Senior Technical Specialist	Chief Engineer's Research Group
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**The University of Connecticut**

(March 1999 – August 2001)	Post-Doctoral Research Fellow	Department of Civil and Environmental Engineering
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**The University of Connecticut**

(August 1995 – February 1999)	Graduate Research Assistant	Department of Civil and Environmental Engineering
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**EDUCATION**

**Ph. D. University of Connecticut, Environmental Engineering, 1999**

**Advisor:** Dr. Barth F. Smets

**Dissertation Title:** Biokinetic Characterization of Ammonium and Nitrite Oxidation by a Mixed Nitrifying Culture using Extant Respirometry

**B. S. (Honors) Indian Institute of Technology (formerly University of Roorkee), Roorkee, Chemical Engineering, 1995**

**HONORS AND AWARDS**

- Appointed to the External Advisory Committee, Undergraduate Environmental Engineering Program, Stevens Institute of Technology, Hoboken, NJ (2008)
- Research Director of New York City Biological Nitrogen Removal Applied Research Program (2008)
- Visiting Professor, Delft University of Technology, hosted by Prof. Mark van Loosdrecht, Department of Biochemical Engineering (2008)



- Invited Speaker on External COD Workshop hosted by Water Environment Research Foundation, December 12-13, 2007 Washington D.C. **(2007)**
- Nominated to Board of Directors, New York Water Environment Association NYC Chapter **(2007)**
- National Research Council, National Academies of Science Summer Faculty Fellowship award, hosted by the United States Environmental Protection Agency Headquarters, Cincinnati, OH, **(Summer 2007)**.
- Presidential Advisory Committee (Columbia) for the New York State Foundation for Science Technology and Innovation (NYSTAR) on Water Treatment **(2007)**.
- Travel award to attend AEEESP Research and Education Conference, Virginia Tech, Blacksburg, VA
- Top ranked research paper in research symposium of the Annual Water Environment Federation Technical Exhibition and Conference WEFTEC, **(2006)**.
- Invited Speaker on Nutrient Removal Workshop hosted by Water Environment Research Foundation, March 9-11, 2006 Washington D.C. **(2006)**
- Harry L. Kinsell Award for excellence in technical publications – Metcalf and Eddy. Awarded for authorship of the top technical publication in Metcalf and Eddy worldwide **(2002, 2003)**
- Platinum Award for Engineering Excellence - Implementation of SHARON in New York City– American Council of Engineering Companies **(2004)**
- Diamond Award for Engineering Excellence - Application of biotechnology tools for froth control– American Council of Engineering Companies **(2004)**
- National Environmental Achievement Award – Association of Metropolitan Sewerage Agencies **(2003)**
- Diamond Award for Engineering Excellence - Dual phase digestion for froth control and sCOD production – American Council of Engineering Companies **(2003)**
- University of Connecticut Research Foundation Doctoral Dissertation Fellowship **(1999)**
- DC Rastogi Junior Year Topper Trust Scholarship **(1994 - 1995)**. One annual award conferred upon the top junior year student.
- Best Paper Award at INFLUX' 94, - Annual IEEE All India Symposium **(1994)**
- Indian Institute of Technology, Roorkee Merit Scholarship **(1991 - 1995)**. Awarded to the top 8 students per discipline every semester.

## PUBLICATIONS: PEER REVIEWED JOURNAL ARTICLES

(Student, Post-Doctoral and advisee contributors are underlined)

1. Baytshtok, V., H. Lu, H. Park, S. Kim, R. Yu, and **K. Chandran** 2008 “Impact of varying electron donors on the molecular microbial ecology and biokinetics of methylotrophic denitrifying bacteria”. *Biotechnology and Bioengineering*, accepted, in press.
2. Yu, R., and **K. Chandran** 2008 “Gene expression analysis of aerobic autotrophic denitrification by *Nitrosomonas europaea* 19718”. *Water Environment Research*, **Invited Paper**, submitted, under expedited review
3. Baytshtok, V., S. Kim, R. Yu, H. Park and **K. Chandran** 2008 “Molecular and biokinetic characterization of methylotrophic denitrification using nitrate and nitrite as terminal electron acceptors”. *Water Science and Technology*, 58(2), 359-265
4. Ahn, J-H., R. Yu and **K. Chandran** 2008 “Distinctive microbial ecology and biokinetics of autotrophic ammonia and nitrite oxidation in a partial nitrification bioreactor”. *Biotechnology and Bioengineering*, 100(6), 1078-1087.
5. **Chandran, K.** and N. Love 2008 “Physiological state, growth mode and oxidative stress play a role in Cd(II)-mediated inhibition of *Nitrosomonas europaea* 19718”. *Applied and Environmental Microbiology*. 74(8), 2447-2453.
6. **Chandran, K.**, Z. Hu and B. F. Smets 2008 “A critical comparison of extant batch respirometric and substrate depletion assays for estimation of nitrification biokinetics”. *Biotechnology and Bioengineering*, 101(1), 62-72.



7. **Chandran, K.** and B. F. Smets **2008** “Biokinetic characterization of the acceleration phase in autotrophic ammonia oxidation”. *Water Environment Research*, 80(8), 732-739 doi: 10.2175/106143008X296442
8. Carrico, B., F. DiGiano, N. Love, P. Vikesland, **K. Chandran**, E. M. Fiss, A. Zaklikowski **2008** “Impact of disinfection switching on water quality in distribution systems” *Journal of the American Water Works Association*, 100(10), 104-116.
9. Guisasola, A., **K. Chandran**, B. F. Smets, J. A. Baeza, J. Carrera, and J. Lafuente. **2006**. Observation and mathematical description of the acceleration phenomenon in batch respirograms associated with ammonium oxidation. *Water Science and Technology* 54(8) 181-188.
10. **Chandran, K.** and B. F. Smets. **2005** “Optimizing experimental design to estimate ammonia and nitrite oxidation biokinetic parameters from batch respirograms”. *Water Research*. 39(20) 4969-4078.
11. **Chandran, K.**, Z. Hu and B. F. Smets **2005** “Applicability of an extant batch respirometric assay in describing dynamics of ammonia and nitrite oxidation in a nitrifying bioreactor”. *Water Science and Technology*. 52 (10-11) 503-508.
12. Hu, Z., **K. Chandran**, D. Grasso and B. F. Smets. **2004**. “Comparison of nitrification inhibition in batch and continuous flow reactors.” *Water Research*. 38:3949-3959
13. Hu, Z., **K. Chandran**, D. Grasso and B. F. Smets. **2003**. “Nitrification inhibition by ethylenediamine-based chelating agents.” *Environmental Engineering Science*, 20: 219-227.
14. Hu, Z., **K. Chandran**, D. Grasso and B. F. Smets. **2003**. “Impact of metal sorption and internalization on nitrification inhibition.” *Environmental Science and Technology*. 37:728-734.
15. Hu, Z., **K. Chandran**, D. Grasso and B. F. Smets. **2002**. “Effect of nickel and cadmium speciation on nitrification inhibition.” *Environmental Science and Technology*. 36:3074-3078.
16. Hu, Z., **K. Chandran**, B. F. Smets and D. Grasso. **2002** “Evaluation of a rapid physico-chemical method for the determination of extant soluble COD”. *Water Research*. 36(3) : 617-624
17. **Chandran, K.** and B. F. Smets. **2001** “Estimating autotrophic biomass yield coefficients from batch ammonia and nitrite oxidation respirograms”. *Water Research*. 35(13): 3153-3156.
18. **Chandran, K.** and B. F. Smets. **2000** “Applicability of two-step models in estimating nitrification kinetics from batch respirograms under different relative dynamics of ammonia and nitrite oxidation”. *Biotechnology and Bioengineering*. 70(1): 54-64.
19. **Chandran, K.** and B. F. Smets. **2000**. “Single-step nitrification models erroneously describe batch ammonia oxidation profiles when nitrite oxidation becomes rate limiting”. *Biotechnology and Bioengineering*. 68(4): 396-406.
20. Venkateswarlu, K., B. F. Smets, **K. Chandran** and J. C. Spain. **1998**. “High affinity *p*-Nitrophenol oxidation by *Bacillus sphaericus* JS905”. *FEMS Microbiology Letters*. 166: 115-120.
21. **Chandran, K.**, J. V. Accashian, and B. F. Smets. **1996**. Discussion of “Li, K. Y. and Y. B. Zhang, 1996. Oxygen transfer limitation of a respirometer. *Water Environment Research* 68, 36-41”. *Water Environment Research* 68 (6): 1084-1086.

#### PUBLICATIONS: BOOKS AND MONOGRAPHS

1. Driscoll, T. P., J. Barber, **K. Chandran** *et al.* **2008**. Industrial Wastewater Management, Treatment, and Disposal, WEF Manual of Practice No. FD-3, Third Edition. Publisher: Water Environment Federation, Alexandria, VA and McGraw Hill, ISBN: 0071592385 / 9780071592383.
2. Vikesland, P. J., N. Love, **K. Chandran** and F. A. DiGiano. **2007**. Seasonal Chlorination Practices and Impacts to Chloraminating Utilities. Publisher: American Water Works Research Foundation, U.S. Environmental Protection Agency, ISBN-10: 158321478X, ISBN-13: 978-1583214787.
3. Smets, B.F., J. Semon-Brown, R. Sharp, **K. Chandran**, Z. Hu and D. Grasso. **2003**. “Inhibition of Biological Nitrogen Removal, Microbiology, Physical Chemistry and Process Engineering”. *Long Island Sound Studies Program, EPA Region I and Connecticut Department of Environmental Protection*.
4. Smets, B. F., **K. Chandran**, and R. G. Riefler **2001**. Biodegradation of Individual Organic Contaminants, p. Sec. 3-3-1. In S. E. Powers (ed.), AEEESP Environmental Engineering Processes Laboratory Manual.



5. Smets, B. F., **K. Chandran**, and R. G. Riefler **2001**. Estimation of Biokinetic Parameters, p. Sec. 3-3-2. In S. E. Powers (ed.), AEESP Environmental Engineering Processes Laboratory Manual.
6. **Chandran, K. 1999**. "Biokinetic Characterization of Ammonium and Nitrite Oxidation by a mixed Nitrifying Culture using Extant Respirometry". Ph.D. Dissertation, University of Connecticut, Storrs, CT.

## PUBLICATIONS: PEER REVIEWED CONFERENCE PROCEEDINGS

(Student, Post-Doctoral and advisee contributors are underlined)

1. Yu, R and **K. Chandran 2008** "Gene expression analysis of aerobic autotrophic denitrification by *Nitrosomonas europaea*" *81<sup>st</sup> Annual Water Environment Federation Conference, 2008. Chicago, IL.*
2. Kim, S., H. Park and **K. Chandran 2008** "The fate of tetracycline resistant bacteria in wastewater treatment plants as a function of operating characteristics" *81<sup>st</sup> Annual Water Environment Federation Conference, 2008. Chicago, IL.*
3. Yu, R, B. Lai, S. Vogt. and **K. Chandran 2008** "Impact of growth phase and copper toxicity on elemental composition of *Nitrosomonas europaea*", *American Society for Microbiology 108<sup>th</sup> General Meeting, Boston, MA*
4. Kim, S., H. Park and **K. Chandran 2008** "The impact of various wastewater treatment unit processes on microbial tetracycline resistance", *American Society for Microbiology 108<sup>th</sup> General Meeting, Boston, MA*
5. Baytshtok, V., S. Kim, R. Yu, H. Park and **K. Chandran 2008** "Molecular and biokinetic characterization of methylotrophic denitrification using nitrate and nitrite as terminal electron acceptors", *4<sup>th</sup> Sequencing Batch Reactor Conference. Rome, Italy*
6. Ahn, J-A., Yu, R., Ranade, S. S. and **K. Chandran 2007** "Population dynamics, biokinetics and gaseous nitrogen production from partial nitrification reactors operated under oxygen limited conditions", *80<sup>th</sup> Annual Water Environment Federation Conference, 2007. San Diego, CA.*
7. Baytshtok, V., Kim, S., Yu, R. and **K. Chandran 2007** "Microbial ecology, biokinetics and thermodynamics of methylotrophic denitrification", *80<sup>th</sup> Annual Water Environment Federation Conference, 2007. San Diego, CA.*
8. Ahn, J-A., Ranade, S. S. and **K. Chandran 2007** "Partial nitrification under oxygen limited conditions results in significant greenhouse gas production", *Nutrient Removal 2007 WEF, IWA Specialty Conference Baltimore, MD*
9. **Chandran, K.** and N. Love **2006** "Impact of physiological state and growth mode on Cd(II) mediated inhibition of *Nitrosomonas europaea*", *79<sup>th</sup> Annual Water Environment Federation Conference, 2006. Dallas, TX.*
10. Guisasaola, A., **Chandran, K.**, Smets, B. F., Baeza, J. A., Carrera, J. and J. Lafuente **2006** "Observation and mathematical description of the acceleration phase in batch respirograms associated with ammonium oxidation", *International Water Association World Water Congress and Exhibition. Beijing, China.*
11. Zaklikowski, A., Love, N., Chandran, K. and P. Vikesland **2006** "Effect of temporal breakpoint chlorination practices on the activity and recovery of nitrifying bacteria in chloraminated water" *American Water Works Association Annual Conference and Exposition. San Antonio, TX.*
12. **Chandran, K.**, M. Regan, G. Bowden, R. Pape, B. Bodniewicz, J. Anderson, L. Carrio, J. Sexton, and V. Sapienza **2005** "Optimization of Strategies for Separate Centrate Treatment via Partial Nitrification and Denitrification in New York City Water Pollution Control Plants", *78<sup>th</sup> Annual Water Environment Federation Conference, 2005. Washington, DC.*
13. **Chandran, K.**, Z. Hu and B. F. Smets **2004** ".Applicability of an Extant Batch Respirometric Assay in Describing Dynamics of Ammonia and Nitrite Oxidation in a Nitrifying Bioreactor", *IWA World Water Congress and Exhibition 2004. Marrakech, Morocco.*
14. **Chandran, K.** and B. F. Smets **2004** "Biokinetic Characterization of the Acceleration Phase in Autotrophic Ammonia Oxidation", *77<sup>th</sup> Annual Water Environment Federation Conference, 2004. New Orleans, LA.*



15. **Chandran, K.**, R. Pape, N. Philip, B. Stinson, J. Anderson, L. Carrio, J. Sexton, V. Sapienza and K. Gopalakrishnan **2004** “Hybrid Step-Feed BNR Configuration for Enhanced Nutrient Removal at NYC WPCPs”, *77<sup>th</sup> Annual Water Environment Federation Conference, 2004. New Orleans, LA.*
16. **Chandran, K.**, R. Pape, N. Philip, B. Stinson, J. Anderson, L. Carrio, J. Sexton, V. Sapienza and K. Gopalakrishnan **2004** “Impact of Biological Nitrogen Removal on Chlorination at New York City Water Pollution Control Plants”, *77<sup>th</sup> Annual Water Environment Federation Conference, 2004. New Orleans, LA.*
17. **Chandran, K.**, R. Pape, B. Stinson, J. Anderson, L. Carrio, J. Sexton, V. Sapienza and K. Gopalakrishnan **2004** “Enhanced Step-Feed Biological Nitrogen Removal via Simultaneous Nitrification and Denitrification at New York City WPCPs”, *77<sup>th</sup> Annual Water Environment Federation Conference, 2004. New Orleans, LA.*
18. Pape, R., **K. Chandran**, B. Stinson, J. Anderson, L. Carrio, J. Sexton, V. Sapienza and K. Gopalakrishnan **2004** “Supplemental Methanol Optimization for Enhanced Performance and Kinetics in a Step-Feed BNR Reactor”, *77<sup>th</sup> Annual Water Environment Federation Conference, 2004. New Orleans, LA.*
19. Muller, K., **K. Chandran**, B. Cohen, and P. D. Smith **2004** “Sharing Resources: New York City's Alternative Strategy for Combined Water and Wastewater Treatment Solids Handling”, *AWWA Annual Conference and Exposition, 2004. Orlando, FL.*
20. **Chandran, K.**, I. Ezenekwe, R. Pape, L. Carrio, K. Gopalakrishnan, J. Anderson and B. Stinson **2003**. “Optimization and implementation of froth control and prevention strategies at NYC WPCPs during BNR operation”, *76<sup>th</sup> Annual Water Environment Federation Conference, 2003. Los Angeles, CA.*
21. **Chandran, K.**, **2003**. “Froth control and prevention strategies at for BNR at NYC WPCPs”, *35<sup>th</sup> Mid-Atlantic Industrial and Hazardous Waste Conference 2003. Brooklyn Polytechnic University, Brooklyn, NY. Invited presentation.*
22. Ezenekwe, I., **K. Chandran**, L. Carrio, K. Gopalakrishnan, J. Anderson and B. Stinson **2002**. “A novel application of acid-phase digestion for concurrent sCOD recovery and filament destruction in froth”. *75<sup>th</sup> Annual Water Environment Federation Conference, 2002. Chicago, IL.*
23. Hu, Z., **K. Chandran**, D. Grasso and B. F. Smets. **2002**. “A comparative study of nitrification inhibition by heavy metals: the influence of metal exposure time on biological effect.” *8<sup>th</sup> Annual Industrial Waste Technical and Regulatory Conference, Atlantic City, NJ.*
24. **Chandran, K.**, Hu, Z., Krach, W. and B. F. Smets **2002**. “Dynamics of genotypics, biokinetics and performance in a continuously operated nitrifying bioreactor”. *3<sup>rd</sup> IWA World Congress. Melbourne, Australia.*
25. **Chandran, K.**, Hu, Z. and B. F. Smets **2001**. “Optimal experimental design for estimating ammonia and nitrite oxidation biokinetics from batch respirograms”. *74<sup>th</sup> Annual Water Environment Federation Conference, 2001. Atlanta, GA.*
26. Hu, Z., **Chandran, K.**, B. F. Smets and Grasso, D **2001**. “Evaluation of nitrification inhibition by heavy metals nickel and zinc”. *74<sup>th</sup> Annual Water Environment Federation Conference, 2001. Atlanta, GA.*
27. **Chandran, K.**, Hu, Z. and B. F. Smets **2001**. “Optimal experimental design of batch respirometric assays for biokinetic estimation of ammonia and nitrite oxidation”. *2<sup>nd</sup> IWA World Congress. Berlin, Germany.*
28. Smets, B. F. and **K. Chandran** **2001**. “Measuring activity of individual microbial guilds in the mixed substrate/mixed culture environment of wastewater treatment reactors”. *US-Egypt Workshop in Microbial Ecology. Cairo, Egypt.*
29. Hu, Z, **Chandran, K.**, B. F. Smets and Grasso, D **2001**. “Effect of nickel on nitrifying enrichment cultures”. *32<sup>nd</sup> Mid-Atlantic Industrial and Hazardous Waste Conference, 2001. Manhattan College, Riverdale, NY.*
30. **Chandran, K.**, and B. F. Smets. **2000**. “Dynamics of biokinetics and performance in a nitrifying sequencing batch reactor”. *2<sup>nd</sup> International Water Association International Symposium on Sequencing Batch Reactor Technology. Narbonne, France.*



31. Hu, Z., **K. Chandran,**, Grasso, D and B. F. Smets **2000**. "Evaluation of a rapid physical-chemical method for the determination of extant soluble COD in wastewater". *32<sup>nd</sup> Mid-Atlantic Industrial and Hazardous Waste Conference, 2000. Rensselaer Polytechnic Institute, Troy, NY.*
32. **Chandran, K.** and B. F. Smets. **1999**. "Simultaneous estimation of the biokinetics of ammonium oxidation and nitrite oxidation from a single respirometric profile using a comprehensive two-step nitrification model". *72<sup>nd</sup> Annual Water Environment Federation Conference, 1999. New Orleans, LA.*
33. **Chandran, K.** and B. F. Smets **1999**. "Nitrification inhibition measurement using a rapid extant respirometric assay". *31<sup>st</sup> Mid-Atlantic Industrial and Hazardous Waste Conference, 1999. University of Connecticut, Storrs, CT.*

## INVITED PRESENTATIONS AND COLLOQUIA

- **Chandran, K.** "Molecular based evaluation of the active fraction and biokinetics of methylotrophic denitrification", **WEFTEC Workshop W201: WEF/WERF Nutrient Removal: What the U.S. EPA, WERF, and Others are Doing to Help Address this Challenge**, October 19<sup>th</sup>, 2008, Chicago, IL
- **Chandran, K.** "Use of genomics to study nitrification processes" **Delft University of Technology, Advanced Course in Environmental Biotechnology, Delft, Netherlands**, June 19<sup>th</sup>, 2008
- **Chandran, K.** "Gaseous N emissions from wastewater treatment operations" **Illinois Institute of Technology, Chicago, IL**, April 16<sup>th</sup>, 2008
- **Chandran, K.** "Characterization and optimization of microbial fuel cells for sustainable wastewater treatment" **RUTGERS, The State University of New Jersey, New Brunswick, NJ**, March 11<sup>th</sup>, 2008
- **Chandran, K.** "Insights into the novel microbial ecology and biokinetics of key nitrogen biotransformations", **Civil and Environmental Engineering, University of Connecticut, Storrs, CT**, January 25<sup>th</sup>, 2008
- **Chandran, K.** "Nano-Bio-Info Technologies for Process Monitoring and Control of Bioreactors" **Battelle Ventures, Princeton, NJ**, December 17<sup>th</sup>, 2007
- **Chandran, K.** "Active fraction and biokinetics of methylotrophic denitrification", **Water Environment Research Foundation External Carbon Sources Workshop, District of Columbia Water and Sewer Authority, Washington DC**, December 12<sup>th</sup>, 2007
- **Chandran, K.** "The leading edge of BNR, Old questions, new answers?" **CDM World Headquarters, Cambridge, MA**, May 23<sup>rd</sup>, 2007
- **Chandran, K.** "Contemporary topics related to genomics, physiology and ecology of nitrification" **Department of Biotechnology, Indian Institute of Technology, Madras, India**, May 17<sup>th</sup>, 2007
- **Chandran, K.** "Contemporary topics related to genomics, physiology and ecology of nitrification in engineered systems" **United States Environmental Protection Agency National Risk Management Research Laboratories, Cincinnati, OH**, March 28<sup>th</sup>, 2007
- **Chandran, K.** "State-of-the-art Approaches for Achieving Cost Effective Biological Nutrient Removal" **New York Academy of Sciences Green Science and Environmental Systems Group** sponsored symposium on "Global, Regional and Local Water Quality: Evaluating the Science and the Hype" (co-chaired by Prof. Patricia Culligan, CEEM, Columbia University)



- **Chandran, K.** “Microbiology of Biological Nutrient Removal” **Nutrient Removal 2007 Specialty Conference** jointly hosted by the Water Environment Federation (WEF) and International Water Association (IWA) in Baltimore, MD.
- **Chandran, K.** “Biological Waste Treatment Processes Applicable to Developing Communities” September 30, 2006. **Engineers Without Borders Regional Conference**, Columbia University.
- **Chandran, K.** “Biological wastewater treatment: New questions, same answers?” June 16, 2006. **Metropolitan Water Reclamation District of Greater Chicago**, Chicago, IL.
- **Chandran, K.** “Mechanisms and determination of nitrification inhibition- what, when and where to measure”, March 9, 2006. **Water Environment Research Foundation**, Washington, D.C.
- **Chandran, K.** and N. Love **2006** “Cd(II) mediated inhibition of *Nitrosomonas europaea* is linked to oxidative stress and is impacted by physiological state and growth mode”, April 7, 2006. **RUTGERS, The State University of New Jersey**, New Brunswick, NJ.
- **Chandran, K.** **2003** “Overview of Applied Research Studies on Biological Nitrogen Removal at New York City” **Department of Civil and Environmental Engineering, Worcester Polytechnic Institute**, Worcester, MA

## OTHER PRESENTATIONS

- Chang, T. and **K. Chandran 2008** “ Kinetics of Bioremediation and Electricity Production in a Novel Microbial Fuel Cell” *80<sup>th</sup> Annual New York Water Environment Association (NYWEA) Conference 2008, New York, NY.*
- Ahn, J-A, R. Yu and **K. Chandran 2008** "Population dynamics, biokinetics and gaseous nitrogen production from partial nitrification reactors operated under low dissolved oxygen conditions” *80<sup>th</sup> Annual New York Water Environment Association (NYWEA) Conference 2008, New York, NY.*
- Kim, S., H. Park and **K. Chandran 2008** “The effect of various unit wastewater treatment processes on microbial resistance to tetracycline, a model antibiotic” *80<sup>th</sup> Annual New York Water Environment Association (NYWEA) Conference 2008, New York, NY.*
- **Chandran, K. 2007** “Bioenergetics and Nano-Bio-Info Technologies Paving the Way for a Sustainable Society” *Science and Technology Ventures Where Change Begins: An Introduction to Clean Technologies at Columbia University*
- **Chandran, K. 2007** “Roles of physiological state, growth mode and oxidative stress in Cd(II) mediated inhibition of *N. europaea*” Earth Microbiology Initiative, Columbia University
- **Chandran, K. 2005** “Nano- bio- info- technologies for cost-effective and sustainable wastewater treatment” *Presented to United Water, Thames Water and Yorkshire Water companies in England, UK*
- **Chandran, K., R. Pape, B. Stinson, J. Anderson, L. A. Carrio, J. Sexton, V. Sapienza, and K. Gopalakrishnan. 2004** “Application of Dual-Phase Digestion to Enhance Biological Nitrogen Removal and Froth Reduction”. *76<sup>th</sup> Annual New York Water Environment Association (NYWEA) Conference 2004, New York, NY.*
- **Chandran, K., R. Pape, B. Stinson, J. Anderson, L. A. Carrio, J. Sexton, V. Sapienza, and K. Gopalakrishnan. 2004** “Use of BioWin™ to Develop Comprehensive Operating Strategies for Full-Scale Step-Feed BNR”. *76<sup>th</sup> Annual New York Water Environment Association (NYWEA) Conference 2004, New York, NY.*
- **Chandran K., D. Katehis, B. Stinson, J. Anderson, L. Carrio and K. Gopalakrishnan. 2003.** “Achieving froth control in nutrient removal facilities”. *Annual New England Water Environment Association (NEWEA) Conference, 2003. Boston, MA.*
- **Chandran, K., and B. F. Smets. 2000.** “Factors limiting biological nitrogen removal: nitrification inhibition and nitrogen availability”. *New England Water Environment Association (NEWEA) Technical Specialty Seminar on Biological Nutrient Removal in New England. Storrs, CT.*



- Dahl, K. A., B. F. Smets, **K. Chandran**, J. Brown and G. Howard. **2000**. “Use of a wastewater treatment process simulator for evaluation of alternatives at a biological nitrogen removal facility”. *Annual New England Water Environment Association (NEWEA) Conference, 2000. Boston, MA.*
- **Chandran, K.** and B. F. Smets **1999**. “Estimation of two-step nitrification kinetics using extant respirometry”. *AIChE Annual Spring Meeting, 1999. Houston, TX.*
- Dusza, R. Jr., B.F. Smets and **K Chandran**. **1998**. “Examination of causes that limit complete nitrogen removal and development of remedial alternatives that maximize nitrogen Removal at the Hockanum water pollution control facility”. *Annual New England Water Environment Association (NEWEA) Conference, 1998. Boston, MA.*
- **Chandran, K.** and B.F. Smets **1998**. “Quantification of nitrification kinetics by a rapid automated respirometric technique“. *6<sup>th</sup> Annual Northeast Regional Student Environmental Conference, 1998. University of Massachusetts, Lowell, MA.*
- **Chandran, K.** **1996**. “Biokinetics of dichloromethane degradation by four methylotrophic pure cultures”. *Environmental Scholars Colloquium. University of Connecticut, Storrs, CT.*
- Nguyen, T.N., **K. Chandran**, K. Noll and B.F. Smets. **1996**. “PCR amplification of DCM and L-2 chloropropionic acid specific 2 haloacid dehalogenases“. *4<sup>th</sup> Annual Northeast Regional Student Environmental Conference, 1996. University of Massachusetts, Lowell, MA.*
- **Chandran, K.** **1994**. “The use of artificial neural networks in bioprocess state estimation“. *TECHNOMECH '94. University of Roorkee, Roorkee, India.*
- **Chandran, K.** **1994**. “Alternate energy resources - Liquids from municipal solid waste“. *INFLUX '94 - Annual IEEE All India Symposium. University of Roorkee, Roorkee, India.*

## INVENTIONS

- Gene expression tracking of ammonia oxidizing bacteria, Invention report M-08-021 **2007**, Columbia University
- System and method for achieving partial nitrification, Invention report M-08-022 **2007** Columbia University
- Microbial fuel cell for generating electricity from waste, Invention report M-08-024 **2007** Columbia University
- Developed a Windows™ based parameter identification freeware, EXTPAR, for data acquisition, interpretation, parameter identifiability and optimal experimental design of aerobic biodegradation extant respirometric profiles **1999**, University of Connecticut.
  - o Software algorithms have been employed by research groups at the University of Connecticut, Danish Technical University, McMaster University, University of Cincinnati, Manhattan College and the City of Stamford, CT.

## PROPOSALS AWARDED

- **Biological Nitrogen Removal Applied Research Program.** Kartik Chandran, Research Director, New York City Department of Environmental Protection, **08/01/2008-07/31/2013**
- **Molecular level through whole reactor level characterization of greenhouse nitrogen emission from wastewater treatment operations.** Kartik Chandran (PI), Water Environment Research Foundation and matching support, **04/01/2008-09/30/2009**
- **Molecular Characterization of ANAMMOX Bioreactors.** Kartik Chandran (PI), New York City Department of Environmental Protection, **05/15/2008-05/14/2009**
- **Environmentally Sustainable Wastewater Treatment: Measurement of Gaseous and Nitrogenous-Greenhouse (N-GHG) Emissions from Nitrifying and Denitrifying Activated Sludge** Kartik Chandran (PI), Washington DC Water and Sewer Authority, **09/01/2008-08/31/2009**



- **A metallomics based approach to bacterial physiology and toxicity.** Synchrotron beamtime (**March, 2008**), Department of Energy (DOE), Advanced Photon Source, Argonne National Laboratory, Argonne, IL. Kartik Chandran (PI).
- **Molecular through whole reactor characterization of gaseous nitrogen emission from autotrophic ammonia oxidation pathways.** Kartik Chandran and Mark van Loosdrecht (co-PIs), Delft University of Technology, **06/01/2008-12/31/2008**
- **Molecular based evaluation of the active fraction and biokinetics of methylotrophic denitrification.** Kartik Chandran (PI), Charles Bott (co-PI), Water Environment Research Foundation and matching support, **09/01/2007-08/31/2009**
- **Cost-effective strategies to reduce nitrogen discharges into the Long Island Sound: Optimization of partial nitrification and external COD based denitrification at Stamford WPCA.** Kartik Chandran (PI), National Fish and Wildlife Foundation and matching support, **09/01/2007 – 08/31/2009**
- **Molecular and nano-scale studies into the impact of monochloramine exposure on biofilm formation, chemical stress resistance and cell-surface characteristics of a model nitrifying bacterium** USEPA Summer Faculty Research Fellowship Award, Kartik Chandran (PI); award period: **Summer 2007**. Funding agency: United States Environmental Protection Agency, Cincinnati, OH.
- **The global nitrogen genome project – A key to the evolution and functioning of the modern biosphere.** Co-Principal Investigator Columbia University Initiatives in Science and Engineering. **09/01/2006 – 08/31/2008**.
- **Preliminary investigations into the microbial diversity of denitrifying bacteria in activated sludge,** Kartik Chandran (PI); Funding agency: Washington D.C. Water and Sewer Authority.
- **A metallomics based approach to bacterial physiology and toxicity.** Synchrotron beamtime (**August, 2007**), Department of Energy (DOE) Advanced Photon Source, Argonne National Laboratory, Argonne, IL. Kartik Chandran (PI).
- **Inhibition of Biological Nitrogen Removal (BNR) At POTWs - A Critical Investigation of Microbiology, Physical Chemistry and Process Engineering at a New York BNR Facility.** Co-Principal Investigator with B. F. Smets (University of Connecticut) and R. R. Sharp (Manhattan College). Long Island Sound Research Fund, Environmental Protection Agency Region I. **03/15/2000 - 03/14/2001**.
- **Development of Predictive Tools to Infer Inhibition of Biological Nitrogen Removal at POTWs via Long Term Bench Scale and Full Scale Monitoring.** Co-Principal Investigator with B. F. Smets (University of Connecticut). Connecticut Institute of Water Resources and United States Geological Survey. **March 1, 2001 - February 28, 2002**.

## REVIEWER ACTIVITIES

- **Journals :** Applied and Environmental Microbiology, Journal of Environmental Quality, Biodegradation, Chemosphere, Journal of Applied Microbiology, Journal of Environmental Engineering (American Society of Civil Engineers), Applied Microbiology and Biotechnology, Biotechnology and Bioengineering, Water Research, Water Environment Research, Environmental Engineering Science, Soil & Sediment Contamination: an International Journal, International Journal of Chemical Kinetics



- **Proposals** : National Science Foundation (IOB), United States Environmental Protection Agency, Department of Homeland Security – Science and Technology Directorate, Water Environment Federation – Committee on Industrial Waste Treatment, Disposal and Management

## TEACHING

### University Courses

#### *Sole Instructor*

- Environmental Microbiology: Spring 2006, 2007, 2008. Columbia University
- Environmental Biochemical Processes Fall 2006, 2007, 2008, Summer 2008. Columbia University
- Environmental Engineering Laboratory Spring and Fall 2007, 2008. Columbia University
- Environmental Engineering Design Spring 2004. Smith College
- Water Quality Engineering: Spring 2001. University of Connecticut

#### *Guest Lecturer*

- Advanced Course in Environmental Biotechnology, Delft University of Technology.
- Industrial Ecology: Fall 2005. Columbia University.
- Environmental Engineering Microbiology: Fall 2004. Virginia Polytechnic Institute and State University.
- Environmental Biochemical Processes: Spring 2000 - 2001. University of Connecticut.

#### *Teaching Assistant*

- Environmental Processes Laboratory: (Graduate and senior level undergraduate course). 1997-1999. University of Connecticut.

### Workshops and short courses

- “Kinetics based design and monitoring of BNR reactors”. **2003**. Conducted workshops to introduce graduate and undergraduate students at Rensselaer Polytechnic Institute to reaction specific kinetic tools for designing and monitoring full-scale BNR reactors.
- “Measuring Extant Nitrification Kinetics of Activated Sludge”. **August 29, 2000, January 16, 2001**. Conducted workshops to introduce the personnel at the Stamford Water Pollution Control Authority to a rapid biokinetic monitoring tool, developed at the University of Connecticut.
- Da Vinci Project. An intensive 5-day residential short-course introducing engineering concepts to Connecticut math and science teachers. **August 6-11, 2000**. Demonstration of experiments describing particle removal for drinking water purification.

### Other teaching experience

- “Process design of a novel technology for biologically treating anaerobic digestion centrate”. Metcalf and Eddy Environmental Engineering Senior Design Project. **Fall 2003, Spring 2004**. Technical liaison and instructor for Environmental Engineering students at the University of Connecticut, Rensselaer Polytechnic Institute and Smith College.

## RESEARCH SUPERVISED

### Post-doctoral

- Dr. Sungpyo Kim (November, 2006 - )
- Dr. Ran Yu (February, 2007 - )

### Doctor of Philosophy (Environmental Engineering)

- Ahn, J. H., Columbia University (2010), *Major Advisor*



- Park, H., Columbia University (2010), *Major Advisor*
- Lu, H., Columbia University (2011), *Major Advisor*

#### Master of Science (Environmental Engineering)

- Ahn, J. H. Columbia University, 2007, *Major Advisor*
- Ranade, S. S. Columbia University, 2008, *Major Advisor*
- Feighery, J. Columbia University, 2008, *Major Advisor*
- Zaklikowski, Anna Virginia Polytechnic Institute and State University, 2006. *Supervisor*

### PROFESSIONAL SERVICE

#### University Service

- Co-director (with Prof. Paul Brandt-Rauf, Chair, Environmental Health Sciences, Mailman School of Public Health, Columbia) of the five-year integrated BS-MPH program in Environmental Health Engineering offered by the Department of Earth and Environmental Engineering and the Mailman School of Public Health, Columbia University
- Organizer and Faculty Advisor of the first ever New York State Water Environment Association Student Chapter at Columbia University, current membership is fifteen students.
- Organizer of a workshop titled “Bridging the Gap between Environmental Engineering Research and Practice”, Columbia University, April 28<sup>th</sup>, 2008
- External PhD dissertation examiner, Departments of Chemical Engineering and Civil Engineering and Engineering Mechanics

#### Department Service

- Member, Laboratory Committee
- Member, Junior Faculty Search Committee
- Member, Undergraduate Admissions Committee

#### External Service

- **Scientific Committee**, 1<sup>st</sup> IWA-WEF Wastewater Treatment Modeling Seminar, Mont-Saint-Anne, Quebec, Canada, June 1-3, 2008
- **Panel of Experts on Nutrient Removal** invited to define future research directions by Water Environment Research Foundation, March 7-8, 2007, Baltimore, MD
- **Quoted in MIT Technology Review** on the application of novel technologies related to harnessing energy from solid wastes (February 2007) ([Link](#))
- **Contributor to the Manual of Practice (MOP)** on Disposal, Treatment and Management of Industrial Wastes.
- **External PhD committee** of Doctoral Candidate, S. Govindaradjane, Department of Civil Engineering, Pondicherry Engineering College. Dissertation title: “Studies on the performance and kinetics of UASB and HUASB reactors for treating tapioca-based starch industrial waste stream”.
- **Nominated member of the Research Committee (2006 – to date):** Water Environment Federation
- **Nominated member of the Technical Practice Committee (2003 – to date):** Water Environment Federation
- **Chair:** Leading Edge Research Symposium Sessions, WEFTEC, (2001, 2006, 2007, 2008).
- **Session Chair:** 35<sup>th</sup> Mid-Atlantic Industrial and Hazardous Waste Conference. (2003) Brooklyn Polytechnic University, Brooklyn, NY.



- **Speakers Panel:** NEWEA Technical Specialty Seminar on Biological Nutrient Removal in New England. (2000) University of Connecticut, Storrs, CT.
- **Session Chair:** 31<sup>st</sup> Mid-Atlantic Industrial and Hazardous Waste Conference. (1999) University of Connecticut, Storrs, CT.

## PROFESSIONAL AFFILIATION

- American Society for Microbiology
- New York Academy of Sciences (Invited)
- International Water Association
- Water Environment Federation
- New York Water Environment Association
- Association of Environmental Engineering Science Professors

