

Nirupam Aich
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Environmental and Water Resources Engineering
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Education

PhD, 2015, Environmental and Water Resource Engineering, University of Texas, Austin, TX
Dissertation: *'Environmental Implications of Higher Order Fullerenes and Conjugated Nanostructures'*
Advisor: Dr. Navid Saleh.

M.S., 2012, Civil Engineering, University of South Carolina, Columbia, SC
Thesis: *'Method Development for Transmission Electron Microscopy of Carbon Nanotubes and for Distributed Sensing with Triboluminescent Materials in the Premise of Sustainable Infrastructure'*

B.Sc., 2009, Chemical Engineering, Bangladesh University of Engineering & Technology, Bangladesh

Professional Experience

01/16-Present: Assistant Professor, University at Buffalo, SUNY, Buffalo, NY
01/14-12/15: Graduate Research Assistant, University of Texas, Austin, TX
01/10-12/13: Graduate Research Assistant, University of South Carolina, Columbia, SC

Fellowships and Honors

1. National Research Council (NRC) Research Associateship Award for Postdoctoral Research at the US Environmental Protection Agency, National Academy of Sciences, 2015. (Declined)
2. Certificate of Appreciation for 5 years of service, American Chemical Society, 2015
3. Certificate of Appreciation, Women in Engineering Program, University of Texas at Austin, 2015
4. Walter L. and Reta Mae Moore Graduate Fellowship, University of Texas at Austin, 2014
5. National Graduate Student Award, ENVR Division, American Chemical Society, 2014
6. Sustainable Nanotechnology Organization (SNO) Student Award, 2013
7. SPARC Graduate Fellowship, University of South Carolina, 2013
8. M. Bert Storey Endowed Graduate Fellowship, University of South Carolina, 2011-2012
9. University of South Carolina Travel Grants, 2010-2011
10. Dean's List Scholarship, Bangladesh University of Engineering & Technology, 2009
11. Wasi-Shirin Scholarship, Bangladesh University of Engineering & Technology, 2008-2009
12. University Merit Scholarship, Bangladesh University of Engineering & Technology, 2006-2009
13. Technical Scholarship, Bangladesh University of Engineering & Technology, 2004-2009

Research Interests

1. Sustainable nanomaterials for energy and environment
2. Environmental implications of nanomaterials
3. Emerging contaminant fate and remediation in aquatic systems
4. Nano-education for multi-disciplinary students

Teaching

CIE500ENV: Environmental Nanotechnology.

CIE562/441ENV: Ecological Engineering/Environmental Process Modeling.

Research Grant

1. USC, SPARC: Aggregation behavior of indium tin oxide nanoparticles in aquatic environment: Addressing hetero-aggregation problem (Completed; 07/2013-06/2014). Role: Co-PI.

Peer-Reviewed Journal Articles

1. Saleh, N.B., Milliron, D., **Aich, N.**, Katz, L.E., Liljestrand, H.M., Kirisits, M.J., “Importance of doping, dopant distribution, and defects on electronic band structure alteration of metal oxide nanoparticles: Implications for reactive oxygen species”, *Sci Tot Envr*, **2016**. (Online)
2. **Aich, N.**, Boateng, L. K., Sabaraya, I. V., Das, D., Flora, J. R. V., Saleh, N. B., “Aggregation kinetics of higher order fullerenes in aquatic systems.” *Environ. Sci. Technol.*, **2016**, 50 (7), 3562–3571.
3. Saleh, N.B., Chambers, B.*, **Aich, N.***, Plazas-Tuttle, J., Kirisits, M.J., “Mechanistic lessons learned from metallic nanomaterials’ antimicrobial studies: Implications for nano-biofilm interactions”, *Special Issue for Frontiers in Microbiology*, **2015**, 6.
4. Khan, I.A., Afrooz, A.R.M.N., **Aich, N.**, Schierz, P.A., Flora, J.R.V., Ferguson, P.L., Sabo-Attwood, T., Saleh, N.B., “Change in chirality of semiconducting single-walled carbon nanotubes can overcome anionic surfactant stabilization: A systematic study of aggregation kinetics”, *Environ Chem*, **2015**, (Online)
5. Saleh, N.B., **Aich, N.**, Plazas-Tuttle, J., Lead, J.R., Lowry, G.V., “Research strategy to determine when novel nanohybrids pose unique environmental risks”, *Environ Sci: Nano*, **2015**, 2, 11-18. **(Cover Article)**
6. **Aich, N.**, Plazas-Tuttle, J., Lead, J.R., Saleh, N.B., “A Critical review of nanohybrids: synthesis, applications, and environmental implications”, *Environ Chem*, **2014**, 11, 609-623. **(Cover Article)**
7. Saleh, N.B., Afrooz, A.R.M.N., Bisesi, J.H.Jr., **Aich, N.**, Plazas-Tuttle, J., Sabo-Attwood, T., “Emergent properties and toxicological considerations for nanohybrid materials in aquatic systems”, *Nanomaterials*, **2014**, 4, (2), 372-407. **(Featured Article in 2014)**
8. **Aich, N.***, Kim, E.*, El-Batanouny, M., Plazas-Tuttle, J., Yang, J.K., Saleh, N.B., Ziehl, P., “Detection of crack formation and stress distribution for carbon fiber reinforced polymer specimens through triboluminescent-based imaging”, *Journal of Intelligent Material Systems and Structures*, **2014**, DOI: 10.1177/1045389x14535017.
9. Chambers, B.A., Afrooz, A.R.M.N., Bae, S., **Aich, N.**, Katz, L., Saleh, N.B., Kirisits, M.J., “Effects of chloride and ionic strength on physical morphology, dissolution, and bacterial toxicity of silver nanoparticles”, *Environ Sci Technol*, **2014**, 48, 761-769.
10. **Aich, N.**, Boateng, L., Flora, J.R.V., Saleh, N.B., “Preparation of non-aggregating aqueous fullerenes in highly saline solutions with a biocompatible non-ionic polymer”, *Nanotechnology*, **2013**, 24, (39), 395602.
11. Khan, I.A., **Aich, N.**, Afrooz, A.R.M.N., Flora, J.R.V., Ferguson, P.L., Sabo-Attwood, T., Saleh, N.B., “Fractal structures of single-walled carbon nanotubes in biologically relevant conditions: Role of chirality vs. media conditions”, *Chemosphere*, **2013**, 93, (9), 1997-2003.

12. **Aich, N.**, Apalla, A., Saleh, N.B., Ziehl, P., "Triboluminescence for distributed damage assessment in cement based materials". *Journal of Intelligent Material Systems and Structures*, **2013**, 24, (14), 1714-1721. (One of the top five downloaded papers from the journal in 2013)
13. **Aich, N.**, Zohhadi, N., Khan, I.A., Matta, F., Ziehl, P., Saleh, N.B., "Applied TEM approach for micro/nanostructural characterization of carbon nanotube reinforced cementitious composites", *J Res Updates Poly Sci*, **2012**, 1, (1), 14-23.
14. **Aich, N.**, Flora, J.R.V., Saleh, N.B., "Preparation and characterization of stable aqueous higher order fullerenes", *Nanotechnology*, **2012**, 23, (5), 1-7.

Book Chapters

1. **Aich, N.**, Saleh, N.B., and Plazas-Tuttle, J., "Fullerenes, higher fullerenes, and their hybrids: Synthesis, characterization, and environmental considerations", in *Carbon Nanomaterials for Advanced Energy Systems*, Lu, W., Baek, J-B., Dai, L., John Wiley and Sons, Inc., 2015. ISBN: 978-1-118-58078-3
2. Saleh, N.B., Afrooz, A.R.M.N., **Aich, N.**, Plazas-Tuttle, J., "Aggregation kinetics and fractal structure of nanomaterials in environmental systems" in *Engineered Nanoparticles and the Environment: Biophysicochemical Processes and Biotoxicity*, 2016. (In Press)
3. Zohhadi, N.; **Aich, N.**; Matta, F.; Saleh, N. B.; Ziehl, P., "Graphene Nanoreinforcement for Cement Composites" in *Nanotechnology in Construction*, Sobolev, K. and Shah, S.P. (Eds.), Springer New York: 2015; pp 265-270.
4. Saleh, N. B.; Lead, J. R.; **Aich, N.**; Das, D.; Khan, I. A., "Environmental Interactions of Geo-and Bio-Macromolecules with Nanomaterials" in *Bio-Inspired Nanotechnology-From Surface Analysis to Applications*, Knecht, M., Walsh, T (Eds.), Springer New York: 2014; pp 257-290.

Patent (Issued)

Saleh, N., Ziehl, P., Matta, F., **Aich, N.**, Zohhadi, N., Khan, I. A., "Polymeric additive for strength, deformability, and toughness enhancement of cementitious materials and composites." US patent application no. 13/892,780.

Invited Talk

1. **Aich, N.**, "Environmental implications of nanomaterials and nanohybrids", December 17, 2013, Department of Chemical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.

Peer Reviewed Conference Papers

1. Enam, F., Mursalat, M., Guha, U., **Aich, N.**, Anik, M.I., Khan, M.S., "Characterizing dental erosion potential of beverages and bottled drinking water in Bangladesh", 2014, *Proc. International Conference on Chemical Engineering (ICChE, 2014)*, December 29-30, Dhaka, Bangladesh.
2. Zohhadi, N., **Aich, N.**, Khan, I.A., Matta, F., Saleh, N., and Ziehl, P., "Graphene nanoplatelet reinforcement for cement composites", 2015, accepted, *Proc. 5th International Symposium on Nanotechnology in Construction (NICOM-5)*, May 24-26, 2015, Chicago, IL, Sobolev, K. and Shah, S.P. (Eds.).

3. Zohhadi, N., **Aich, N.**, Khan, I.A., Matta, F., Saleh, N., and Ziehl, P., (2012), "Graphene nanoreinforcement for cement-based composites", 2012, *Proc. 4th International Symposium on Nanotechnology in Construction (NICOM4)*, Konsta-Gdoutos, M.S. (Ed.), May 20-22, 2012, Crete, Greece, Paper 178, 7 p.

Conference Proceedings and Presentations

1. Saleh, N. B., Aich, N., Das, D., Kirisits, M. J., Sabo-Attwood, T., "Microbial interactions of carbon nanotube-titania-platinum nanohybrid electrocatalyst", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.
2. Afolabi, M., Masud, A., **Aich, N.**, "Graphene-based magnetic nanohybrids for organic contaminant removal from water", NSF-REU Program for Environmental Engineering Solutions for Pollution Prevention (EESPP), August 10, 2016, University at Buffalo, The State University of New York, Buffalo, NY.
3. Saleh, N.B., **Aich, N.**, Das, D., Kirisits, M.J., Sabo-Attwood, T., "Microbial interactions of carbon nanotube-titania-platinum nanohybrid electrocatalyst", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.
4. Das, D., Sabaraya, I.V., **Aich, N.**, Saleh, N.B., "Aggregation kinetics of carbon nanotube and metal or metal oxide nanohybrids in aquatic environment", 250th ACS National Meeting, August 16-20, 2015, Boston, MA.
5. **Aich, N.**, Rigdon, W.A., Das, D., Plazas-Tuttle, J., Bisesi, J.H.Jr., Ngo, T., Huang, X., Sabo-Attwood, T., Saleh, N.B., "Assessing environmental sustainability of novel carbon-nanotube-titania-platinum nano-hybrid electrocatalysts", 2015 Workshop on Electrochemistry, Center for Electrochemistry, The University of Texas, February 7-8, 2015, Austin, Texas.
6. **Aich, N.**, Rigdon, W.A., Das, D., Plazas-Tuttle, J., Bisesi, J.H.Jr., Ngo, T., Huang, X., Sabo-Attwood, T., Saleh, N.B., "Assessing environmental sustainability of novel carbon-nanotube-titania-platinum nano-hybrid electrocatalysts", Graduate and Industry Networking (GAIN) 2015, Graduate Engineering Council, The University of Texas, February 4, 2015, Austin, Texas.
7. Bisesi, J.H.Jr., Ngo, T., **Aich, N.**, Rigdon, W., Huang, X., Saleh, N.B., Sabo-Attwood, T., "Analysis of the contributions of component materials to the toxicity of hybrid nanomaterials", 9th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials (ICEENN), September 7-11, 2014, Columbia, SC.
8. **Aich, N.**, Rigdon, W.A., Das, D., Plazas-Tuttle, J., Huang, X., Saleh, N.B., "Hybridization with titania changes aggregation kinetics of carbon nanotubes", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX.
9. Saleh, N.B., **Aich, N.**, Chambers, B.A., Afrooz, A.R.M.N., Kirisits, M.J., "Influence of tin doping on environmental interactions of nano indium oxides in aqueous systems", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX.
10. Saleh, N.B., **Aich, N.**, Rowles, L.S., "Synthesis and characterization of carbonaceous nanomaterial-multimetallic hybrids for simultaneous removal of radioactive and organic contaminants: A case study on navajo nation", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX.

11. Das, D., **Aich, N.**, Irin, F., Green, M.J., Saleh, N.B., "Surface coating dependent aggregation kinetics of graphene suspensions", 247th ACS National Meeting, March 16-20, 2014, Dallas, TX.
12. **Aich, N.**, Das, D., Saleh, N.B., "Extent of tin doping influences nano indium tin oxide's aggregation behavior in aqueous systems", Second Sustainable Nanotechnology Organization Conference, November 3-5, 2013, Santa Barbara, CA.
13. Saleh, N.B., **Aich, N.**, Plazas-Tutle, J. Lead, J.R., Rigdon, W., Huang, X., "Are nanohybrid environmental implication studies overdue?", Second Sustainable Nanotechnology Organization Conference, November 3-5, 2013, Santa Barbara, CA.
14. Daniels, K.M., **Aich, N.**, Miller, K.P., Andrews, J., Shetu, S., Daas, B.K., Sudarshan, T.S., Saleh, N.B., Decho, A.W., Chandrashekhar, M.V.S., "Real-time sensing of *E. coli* biofilm growth using epitaxial graphene", 2013 IEEE Sensors, November 3-6, 2013, Baltimore, Maryland.
15. Zohhadi, N., **Aich, N.**, Matta, F., Saleh, N.B., Ziehl, P., "Bio-Inspired polymeric binder for sustainable and resilient cement composites", Conference of the ASCE Engineering Mechanics Institute, Northwestern University, August 4-7, 2013, Evanston, IL.
16. Zohhadi, N., **Aich, N.**, Matta, F., Saleh, N.B., Ziehl, P., and Kidane, A., "Graphene nanoreinforcement for cement-based composites", in 4th Advances in Cement-Based Materials: Characterization, Processing, Modeling and Sensing, July 8-10, 2013, University of Illinois at Urbana-Champaign, IL.
17. Zohhadi, N., **Aich, N.**, Matta, F., Saleh, N.B., Ziehl, P., "Graphene nano-platelets and multi-walled carbon nanotubes for high-performance cement composites", 7th M.I.T. Conference on Computational Fluid and Solid Mechanics, June 12-14, 2013, Boston, MA.
18. **Aich, N.**, Flora, J. R. V., Boatang, L., Saleh, N.B. "Size tuned aqueous nC₆₀s and nC₇₀s stabilized with biocompatible surface coatings", 245th ACS National Meeting, April 7-11, 2013, New Orleans, LA.
19. Daniels, K.M., **Aich, N.**, Miller, K.P., Daas, B.K., Sudarshan, T.S., Saleh, N.B., Decho, A.W., Chandrashekhar, M.V.S., "Biological sensing applications of epitaxial graphene", 54th Annual Electronic Materials Conference (EMC 2012), June 20 – 22, 2012, Pennsylvania State University, State College, PA.
20. Shah, V., Haiduk, B., Collins, D., Afrooz, A.R.M.N., **Aich, N.**, Rispoli, F., Saleh, N.B., "Aggregation and antimicrobial activity of copper nanoparticle suspension", 243rd ACS National Meeting, Mar 25-29, 2012, San Diego, CA.
21. Matta, F., Saleh, N.B., Ziehl, P., Zohhadi, N., **Aich, N.**, and Khan, I.A., "Graphene nanoreinforcement for damage-tolerant cement-based composites", 1st Annual World Congress of Nano-S&T, October 23-26, 2011, Dalian, China.
22. **Aich, N.**, Saleh, N.B., "Aggregation kinetics of endohedral metallofullerene-single-walled carbon nanohorn and nanotube peapods", 241st ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.
23. **Aich, N.**, Saleh, N.B., "Aggregation kinetics of higher order fullerenes in aquatic environment", 241st ACS National Meeting, Mar 27-31, 2011, Anaheim, CA.

24. **Aich, N.**, Saleh, N.B., "Aggregation Kinetics of Fullerene-Single-walled Carbon Nanotube Hybrids", 240th ACS National Meeting, Aug 22-26, 2010, Boston, MA.
25. Saleh, N.B., Afrooz, A.R.M.N., **Aich, N.**, Khan, I.A., "Filtration of anisotropic and hybrid nanomaterials", 240th ACS National Meeting, Aug 22-26, 2010, Boston, MA.
26. Saleh, N.B., Afrooz, A.R.M.N., **Aich, N.**, Khan, I.A., "Saturated porous media transport of anisotropic and hybrid nanomaterials", Environmental Effects of Nanoparticles and Nanomaterials, SETAC-Clemson University, Aug 22-26, 2010, Clemson, SC.

Reviewer

Journal Manuscript

Chemosphere, Environmental Science and Technology, Journal of Hazardous Materials, International Journal of Nanomedicine, Advanced Science Focus, Ecotoxicology and Environmental Safety.

Proposal

National Science Foundation - CBET 2016

Others

AEESP SSC Academic Job Application Review 2016

Workshops

1. NSF-AEESP Grand Challenges Workshop, Redefining Environmental Engineering and Science, Rice University, March 30-April 1, 2016.
2. NUE: Workshop on Problem-Based Learning for Nanotechnology, Columbia, SC, August 19-20, 2013.

Services and Outreach Activities

1. Mentor, Research Experience for Undergraduates, Environmental Engineering Solutions for Pollution Prevention, University at Buffalo (SUNY), 06/2016-Present.
2. Member, Undergraduate Studies Committee, Civil, Structural and Environmental Engineering, University at Buffalo, 06/2016-Present.
3. Poster Judge, 8th Annual Postdoctoral Symposium, University at Buffalo, June 10, 2016.
4. Outreach Program, Science is Elementary, Westminster Charter School, Buffalo, NY, May 5, 2016.
5. Judge, Cockrell School Undergraduate Poster Exhibition, UT Austin, April 21, 2015.
6. Panelist, Equal Opportunity in Engineering: Considering Graduate School, University of Texas at Austin, October 29, 2014.

Professional Affiliations

Association of Environmental Engineering & Science Professors (AEESP), Sustainable Nanotechnology Organization (SNO), American Water Works Association (AWWA), American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), Material Research Society (MRS).

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