

SOURJYA (SHORJO) BHATTACHARJEE

Assistant Professor

Department of Civil and Environmental Engineering
University of Sharjah, U.A.E
sbhattacharjee@sharjah.ac.ae

EDUCATION

Ph.D. McGill University, Canada	2016
Specialization: Environmental Engineering Department of Civil Engineering and Applied Mechanics	
M.S. Carnegie Mellon University, U.S.A	2011
Specialization: Environmental Engineering Science and Management Department of Civil and Environmental Engineering	
B.Eng. Manipal University, India	2010
Degree: Bachelors of Engineering (B.Eng.) Major: Biotechnology	

RESEARCH INTERESTS

Advanced water treatment, wastewater reuse, resource recovery, contaminants of emerging concern and persistent organic pollutants, Nanotechnology and advanced materials in water treatment

GRANTS, FELLOWSHIPS & AWARDS

Sharjah Sustainability Award, EPAA(1 st Place, Human Health and Protection Domain)	2023
QUWA Research Award, University of Sharjah	2022
Seed Research Fund, University of Sharjah	2021
William and Rhea Seath Awards in Innovation (\$ 17000), McGill University	2017
Idea to Innovation Research Grant (\$125000), NSERC Canada	2017
McGill Engineering Doctoral Award, McGill University	2011-2014
Center in Green Chemistry and Catalysis Graduate Scholarship, McGill University	2013
Graduate Excellence Fellowship, McGill University	2012
Brace Water Resources Fellowship, McGill University	2011
John Bishop Fellowship, McGill University	2011
Graduate Service Assistantship, Carnegie Mellon University	2010

TEACHING & MENTORSHIP EXPERIENCE

Assistant Professor, University of Sharjah Sep 2021-Current

Teaching:

- Man and the environment 0401142 (Fall, Spring, Summer 2022-23)
- Introduction to Environmental Engineering 0401345 (Fall 2021 - Spring 2023)
- Physiochemical Treatment Processes 0401565 (Fall 2021)
- Air Quality and Pollution Control 0401572 (Spring 2022)
- Wastewater treatment and Reuse 0401562 (Spring 2020, Fall 2022)
- Nanomaterials in Water and Wastewater Treatment 0401765 (Spring 2023)
- Senior Design Projects (0401498 & 0401499)

Visiting Assistant Professor, University of Sharjah

Sep 2020-Aug 2021

Teaching:

- Introduction to environmental engineering (0401345, Fall 2020, Spring 2021)
- Introduction to environmental engineering lab (0401346, Summer 2021)
- Solid and hazardous waste management (0401443, Fall 2020)
- Wastewater Treatment and Reuse (0401562, Spring 2021)
- Senior Design Projects (0401498 & 0401499)

Thesis Supervision:

- Fatemah Habib (Co-supervisor, Spring 2021)
- Zakiya Begum (Co-supervisor, Fall 2022)
- Saah Alsmadi (Co-supervisor, Fall 2022)
- Wedad Masoud (Main supervisor, Spring 2023)

Research Team Supervisor, Sharjah Research Academy

Sep 2018-Aug 2020

- Involved in training and leading a team of 8 junior researchers from University of Sharjah and Sharjah Research Academy
- Involved in developing research directions, project outcomes and deliverables
- Mentored junior researchers and masters students on thesis writing and publishing in peer reviewed journals

Supervisor for Masters Student (Lamia Nouroudine), McGill University

Winter 2017

- Project: Life-cycle assessment of novel nanoparticle based biphasic treatment process
- Trained student on nanoparticle synthesis protocols and scaled-up reactor operation
- Collaborated on designing project outcomes and deliverables and procuring LCA parameters and estimation factors

Guest Lecturer, McGill University

Fall 2016

- Provided lecture on the employment of nanoparticles in environmental remediation applications to a class of 25 students (undergraduate and graduate students in environmental engineering)

Teaching Assistant, Engineering Professional Practice (FACC 400), McGill University

Winter 2015

- Total class size – 200 undergraduate students
- Assisted with designing a course on engineering ethics and regulatory frameworks
- Facilitated several panel discussions and debates on current environmental issues such as Plan 2014 Lake Ontario, Alberta Oil sands and TransCanada pipelines

Teaching Assistant, Geo-environmental Engineering (CIVE 451), McGill University

Winter 2014

- Class size – 20 undergraduate students
- Delivered weekly lectures and tutorial sessions on environmental remediation practices for soil and water
- Designed and carried out lab sessions

Project advisor for Masters Student (Paul Takayesu), McGill University

Winter 2014

- Trained student on studying the effects of wastewater matrix on particle aggregation and flocculation using Nanoparticle tracking analysis instrument and provided assistance with advanced data interpretation and validation

Teaching Assistant, Nanomaterials and the Aquatic Environment (CIVE 521), McGill University Fall 2013

- Class size – 12 graduate students
- Assisted course lecturer in development of course materials (assignments, mid-term and final exam questions) for a newly introduced graduate level course

Supervisor for Undergraduate student (Benjamin Palevsky), McGill University Summer 2013

- Trained student on bimetallic nanoparticle synthesis and handling, assisted with designing project objectives and structure, conducted weekly meetings to monitor progress and provided training on lab safety protocols

RESEARCH EXPERIENCE

Post-doctoral Research Associate

Sep 2018 – Aug 2020

Sharjah Research Academy, U.A.E

- **Project: Reuse of treated effluent produced at Al-Saja'a wastewater treatment plant in Sharjah**
 - Joint project between University of Sharjah, Qatra-Besix company and Sharjah Research Academy
 - Involved in assessing current treated effluent water quality at Al-Saja'a and determining presence of contaminants of emerging concern
 - developing lab-scale water treatment system with advanced treatment processes such as reverse osmosis and photocatalytic oxidation
 - Involved in assessing demand for treated wastewater in the industrial area near Al-Saja'a and required water quality by end-users
 - evaluating economical and technical feasibility of reusing water in industrial applications
- **Project: Treatment of contaminated wastewater using advanced materials**
 - Responsible for leading, training and supervising a team of 8 researchers (comprising of research associates and masters students) on implementation of advanced materials for water treatment
 - Projects: photocatalytic degradation and adsorption of selected pharmaceuticals using composites of nano iron, synthesis of novel nanoparticles from palm date waste and removal of heavy metals, removal of phosphate using magnetic nanosorbents, modification of activated carbon with nanomaterials for grey water treatment

Post-doctoral Research Fellow

May 2016 – Aug 2018

McGill University, Canada

- **Project: Scale-up of a novel nanoparticle based biphasic treatment process for contaminated water**
 - Involved in writing and securing scale-up grant valued at \$125,000 and filing patent applications
 - Involved in the planning and scaling up of bench-top water treatment process to 40-liter pilot scale reactor for treatment of chlorinated organics
 - Involved in developing design for reactor and establishing standard operating procedures
 - Scaled up nanoparticle wet-synthesis processes from gram scale to kilogram scale
 - Designed and synthesized highly reactive and economical nanomaterial for water treatment (patent application filed)
 - Successfully demonstrated treatment of 1 kilogram of toxic chlorinated contaminant along with generation of economically viable end products from wastewater

Doctoral Researcher

Aug 2011 – Apr 2016

McGill University, Canada

Advisor: Prof. Subbasis Ghoshal

- Studied advanced reductive degradation of chlorinated solvents and removal of dyes and heavy metals from water using metallic nanoparticles and their composites
- Designed and synthesized nanoparticles with specific reactive properties, size and colloidal stability through surface functionalization with polyelectrolytes, surfactants and inorganic ions – materials studied include nanoparticles of iron, palladium, copper, silver and their bimetallic combinations and composites with activated carbon
- Developed a novel method involving surface functionalized iron nanoparticles for specific targeting and degradation of oil phase chlorinated contaminants with resource recovery (Patent pending)
- Developed expertise in chromatography and inductively coupled spectrometry techniques as well as characterization of particle morphology, size and surface properties using electron microscopy (TEM, cryo-TEM, SEM), sizing (NTA, DLS) and surface characterization techniques (XPS, FTIR)

Independent project researcher

Jan 2011 – May 2011

Carnegie Mellon University, U.S.A

Advisor: Prof. Jeanne M. VanBriesen

- Conducted in-depth review of various techniques to treat produced water from oil exploration and fracking
- Identified drawbacks and required improvements for disposal and management of produced water
- Researched feasibility of implementing biological treatment of produced water consisting of high amounts of total dissolved solids

PEER-REVIEWED PUBLICATIONS

Journal article

Ayyaril, S. S., Shanableh, A., **Bhattacharjee, S.**, Rawas-Qalaji, M., Cagliani, R., & Shabib, A. G. (2023). Recent progress in micro and nano-encapsulation techniques for environmental applications: A review. *Results in Engineering*, 101094. <https://doi.org/10.1016/j.rineng.2023.101094>

Ayyaril, S. S., Khan, M. I., Shanableh, A., **Bhattacharjee, S.**, & de Oliveira, D. M. (2022). Fabrication of nano-activated charcoal incorporated sodium alginate-based cross-linked membrane for Rhodamine B adsorption from an aqueous solution. *DESALINATION AND WATER TREATMENT*, 278, 239-250. <https://doi.org/10.5004/dwt.2022.29055>

Badar, Z., Shanableh, A., El-Keblawy, A., Mosa, K.A., Semerjian, L., Mutery, A.A., Hussain, M.I., **Bhattacharjee, S.**, Tsombou, F.M., Ayyaril, S.S. and Ahmady, I.M. (2022). Assessment of uptake, accumulation and degradation of paracetamol in spinach (*Spinacia oleracea* L.) under controlled laboratory conditions. *Plants*, 11(13), 1626. <https://doi.org/10.3390/plants11131626>

Shanableh, A., **Bhattacharjee, S.**, & Sadik, S. (2021). Evaluating iron-based nanoparticles for ciprofloxacin removal: Date seed extract as a biostabilizing and a bioreducing agent. *Journal of Water Process Engineering*, 44, 102419. <https://doi.org/10.1016/j.jwpe.2021.102419>

Bhattacharjee, S., Habib, F., Darwish, N., & Shanableh, A. (2021). Iron sulfide nanoparticles prepared using date seed extract: Green synthesis, characterization and potential application for removal of ciprofloxacin and chromium. *Powder Technology*, 380, 219-228. <https://doi.org/10.1016/j.powtec.2020.11.055>

- Shanableh, A., **Bhattacharjee, S.**, Alani, S., Darwish, N., Abdallah, M., Mousa, M., & Semreen, M. (2021). Assessment of sulfamethoxazole removal by nanoscale zerovalent iron. **Science of The Total Environment**, 761, 143307. <https://doi.org/10.1016/j.scitotenv.2020.143307>
- Bhattacharjee, S.**, Darwish, N., & Shanableh, A. (2020). Phosphate removal using nanoscale zerovalent iron: Impact of chitosan and humic acid. **Journal of Environmental Chemical Engineering**, 104131. <https://doi.org/10.1016/j.jece.2020.104131>
- Bhattacharjee, S.**, & Ghoshal, S. (2018). Optimal design of sulfidated nanoscale zerovalent iron for enhanced trichloroethene degradation. **Environmental science & technology**, 52(19), 11078-11086. <https://doi.org/10.1021/acs.est.8b02399>
- Bhattacharjee, S.**, & Ghoshal, S. (2018) Sulfidation of nanoscale zerovalent iron in the presence of two organic macromolecules and its effects on trichloroethene degradation. **Environmental science nano**, 5(3), 782-791 <https://doi.org/10.1039/C7EN01205E>. Published under: **Best Papers 2018 – Environmental Science: Nano**
- Bhattacharjee, S.**, & Ghoshal, S. (2016). Phase Transfer of Palladized Nanoscale Zerovalent Iron for Environmental Remediation of Trichloroethene. **Environmental science & technology**, 50(16), 8631-8639. <https://doi.org/10.1021/acs.est.6b01646>
- Bhattacharjee, S.**, Basnet, M., Tufenkji, N., & Ghoshal, S. (2016). Effects of rhamnolipid and carboxymethylcellulose coatings on reactivity of palladium-doped nanoscale zerovalent iron particles. **Environmental science & technology**, 50(4), 1812-1820. <https://doi.org/10.1021/acs.est.5b05074>
- Li, J., **Bhattacharjee, S.**, & Ghoshal, S. (2015). The effects of viscosity of carboxymethyl cellulose on aggregation and transport of nanoscale zerovalent iron. **Colloids and Surfaces A: Physicochemical and Engineering Aspects**, 481, 451-459. <https://doi.org/10.1016/j.colsurfa.2015.05.023>

Conference Proceedings

- Alsmadi, S., Rahmat-Ullah, Z., Hosny, M., **Bhattacharjee, S.**, & Shanableh, A. (2022). Simulation of Wastewater Treatment Performance of Sequencing Batch Reactor under Seasonal Variations Using GPS-X: A Case Study in Sharjah, UAE. In *2022 Advances in Science and Engineering Technology International Conferences (ASET)* (pp. 1-6). IEEE. <https://doi.org/10.1109/ASET53988.2022.9734873>
- Habib, F., Shanableh, A., & **Bhattacharjee, S.** (2021). Removal of Hexavalent Chromium using Iron Nanoparticles Prepared using Date Seed Extract. In *IOP Conference Series: Earth and Environmental Science* (Vol. 835, No. 1, p. 012002). IOP Publishing. <https://doi.org/10.1088/1755-1315/835/1/012002>
- Tayara, A., Shanableh, A., Atieh, M. A., Abdallah, M., **Bhattacharjee, S.**, Mustafa, A., & Al Bardan, M. (2021). Feasibility and impact of greywater recycling in four types of buildings in Sharjah, United Arab Emirates. In *IOP Conference Series: Earth and Environmental Science* (Vol. 725, No. 1, p. 012009). IOP Publishing. <https://doi.org/10.1088/1755-1315/725/1/012009>
- Bhattacharjee, S.**, Dersel, G., Shanableh, A., Darwish, N., & Al-Samarai, M. Challenges & opportunities of wastewater reuse privatization: a case study from Sharjah, UAE. In *2020 Advances in Science and Engineering Technology International Conferences (ASET)* (pp. 1-5). IEEE. <https://doi.org/10.1109/ASET48392.2020.9118342>

PATENTS

- Bhattacharjee, S** and Ghoshal, S., McGill University (2021). Sulfidated nanoscale zerovalent iron emulsions and method of use thereof. U.S. Patent number 11111164.

PROFESSIONAL ACTIVITIES

Community Service

- Department representative, College Media Committee, University of Sharjah 2022-Present
- Track Leader, Waste Management Sustainability Circle, University of Sharjah 2021-Present
- Member, Teaching and Learning Committee, University of Sharjah 2021-Present
- Member, KPI Committee, University of Sharjah 2020-Present
- Member, Accreditation Committee, University of Sharjah 2020-Present
- Journal Reviewer Service
- Journal of Hazardous Materials 2021- Present
- Chemosphere 2021- Present
- Journal of Environmental Engineering and Science 2020-Present
- Journal of Nanostructure in Chemistry 2020-Present

Affiliations

- Association of Environmental Engineering & Science Professors 2018- Present

Speaker at Roundtable Discussion on Wastewater Reuse in the Emirate of Sharjah 2019 Sharjah Research Academy

- Participated in roundtable discussion involving local and international industry and academic experts
- Presented learnings and progress on the wastewater reuse project at Al-Saja'a treatment plant

Workshop co-organizer and co-facilitator 2017

Two-day workshop on **Opportunities and Challenges for Advanced Materials in Water Treatment and Reuse: Targeting Contaminants of Emerging Concern**, McGill University

- Facilitated discussion between industrial and academic stakeholders through nominal group technique
- Involved in the preparation of workshop deliverables and logistics
- Managed and trained volunteers

Conference Presentations (oral presentations)

- Invited speaker at Gordon Research Seminar on Environmental Nanotechnology, Vermont, USA, 2015
- 250th ACS National Meeting, Division of Environmental Chemistry, Boston, USA, 2015
- 14th Global Joint Seminar on Geo-Environmental Engineering, Montreal, Canada, 2015
- 9th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials, South Carolina, USA, 2014

Post Graduate Representative, Environment Committee, McGill University 2013-2014

- Involved in making decisions to improve campus sustainability and allocating funds for on-campus green initiatives

On-campus recycling project coordinator 2010-2011

Green Practices Committee, Carnegie Mellon University

- Responsible for reviewing on campus recycling practices and tracking fate of recycled products
 - Conducted surveys to gauge campus awareness on recycling practices and making recommendations
-