Jinkai Xue, Ph.D., P.Eng. (APEGA, APEGS)

Assistant Professor
Cold-Region Water Resource Recovery Laboratory
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RESEARCH INTERESTS

- Resource recovery from wastewater
- Removal of emerging pollutants (such as microplastics) in natural and engineered systems
- Innovative drinking water treatment technologies
- Future-ready water and wastewater engineering in cold regions

RESEARCH AND EMPLOYMENT EXPERIENCE

Tenure-Track Assistant Professor, University of Regina, Canada, 08/2019 – present

- Leading an independent research program on cold-region water resource recovery
- Developed and teaching five undergraduate or graduate courses
- Supervising undergraduate and graduate students
- Serving the University and the society-at-large

100-Talent Plan Associate Professor, Sun Yat-sen University, China, 01/2019 – 08/2019

- Led an independent research program on novel membrane technologies
- Developed and taught undergraduate courses
- Supervised undergraduate and graduate students
- Served the University and the society-at-large

NSERC Postdoctoral Fellow, **University of Waterloo,** Canada, 06/2017 – 12/2018

- Investigating impacts and removal of microplastic contamination in water treatment systems
- Compiling research proposals (won NSERC PDF funding), manuscripts and technical reports
- Delivered speeches in renowned research conferences

Postdoctoral Associate, **University of Minnesota,** Twin Cities, the U.S.A., 11/2016 – 05/2017

- Developed anti-biofouling membranes for removal of pathogenic microorganisms, invasive species and hydrocarbons from ballast water in the Great Lakes region
- Studied bacterial adhesion on nanomaterial-functionalized surfaces
- Synthesized research proposals, manuscripts and technical reports
- Performed podium presentations in prestigious research conferences

Doctoral Researcher, **University of Alberta**, Edmonton, Canada, 09/2012 – 10/2016

- Engineered membrane bioreactors (MBRs) for oil sands tailings water treatment
    - Explored biodegradation pathways of OSPW indigenous naphthenic acids (NAs)
    - Developed effective strategies for membrane fouling mitigation
    - Investigated effects of ozone pretreatment on NA biodegradation, membrane fouling, and microbial community architectures
- Published articles in high-impact journals

- Composed research proposals to facilitate the professor's funding applications
- Presented research findings in regional, national and international conferences

Cost Control Engineer, **China Resources** (2012 revenue: US$52 billion; the 115th of the 2015 Fortune 500), Shanghai, China, 08/2011 – 05/2012

- Executed open tenders (total tender price ~CNY20 M) for selection of strategic partners under a tight schedule
- Liaised with project management team and vendors to ensure effective project implementation

Research Assistant, **KAUST**, Thuwal, Saudi Arabia, 09/2009 – 07/2011

- Scrutinized membrane fouling potentials of effluents from a real MBR facility and a conventional wastewater treatment plant

EDUCATION EXPERIENCE

Ph.D., Environmental Engineering, **University of Alberta**, Edmonton, Canada, 11/2016

- Supervisors: Drs. Mohamed Gamal El-Din and Yang Liu | GPA: 4.0/4.0
- Dissertation title "*Application of Anoxic-Aerobic Membrane Bioreactors (MBRs) for Oil Sands Process-Affected Water (OSPW) Treatment*"

Visiting student, Civil Engineering, University of California, Berkeley, USA, 2010

- Supervisor: Dr. Paulo Monteiro
- Invented a green concrete material based on natural pozzolan by sintering-free methods

M.Sc., Environmental Science and Engineering, **King Abdullah University of Science and Technology (KAUST)**, Saudi Arabia**,** 08/2011

- Supervisor: Dr. Gary L. Amy
- Dissertation title "*Separation, Characterization and Fouling Potential of Sludge Waters from Different Biological Wastewater Treatment Processes*"

B.Sc., Civil Engineering, **Tongji University**, Shanghai, China, 07/2009

- Dissertation title "*Urban Express Ways – Their Functions and Design Principles*"
- Capstone design "*Plan and Design of Airport Express Way Project of Taiyuan City*"

SELECTED RESEARCH GRANTS

1. Principal investigator (PI), 2020 – 2025, NSERC Discovery Grant, "Fundamental Studies on Dynamic Membrane Bioreactor-Based Processes for Wastewater Treatment in Cold Regions," CA$130,000 + CA$12,500, awarded
2. PI, Natural Science and Engineering Research Council of Canada (NSERC) Alliance Grant, 2021 – 2025, "Tackling the challenge of emerging pollutants in wastewater in the Prairies: a novel granular sludge-dynamic membrane bioreactor system," CA$150,000, awarded
3. PI, Canada Foundation for Innovation - John R. Evans Leaders Fund (CFI-JELF), 2022 – 2027, "Cold-Region Water Resource Recovery Laboratory," CA$420,440 ($168,176 from CFI), approved
4. PI, Mitacs Accelerate Grant, 2022 – 2024, "A household-scale granular activated carbon-membrane bioreactor (GAC-MBR) system for water resource recovery in the Prairies region," CA$90,000, awarded
5. PI, President's Seed Fund, 2020 – 2022, "To protect the Water-Health Nexus: A sustainable on-site wastewater management strategy for airports and hospitals," CA$5,000, awarded
6. PI, the Open Grant of the State Key Laboratory of Eco-Hydraulics in Northwest Arid Region, Xi'an University of Technology, China, 2018 – 2020, "Onset of biofouling on ultrafiltration membranes: microscopic mechanisms," ~CA$18,624, completed

7. Co-PI, SK Agriculture Development Fund (ADF), "Managing farm level wetlands: develop practices that support yield, biodiversity, and ecosystem services on Prairie farms," 2021 – 2025, CA$438,130, awarded

TEACHING AND HQP TRAINING EXPERIENCE

Assistant Professor, University of Regina, 08/2019 - present

- Developed and teaching undergraduate courses:
  - *Engineering, Environment, and Society*
  - *Simulation and Decision Making for Engineers*
  - *Applied Microbial Systems*
- Developed and teaching graduate courses:
  - *Industrial Wastewater Management*
  - *Environmental Biotechnology*
- Supervising undergraduate and graduate students

Associate Professor, Sun Yat-sen University, 01/2019 – 08/2019

- Undergraduate course: Introduction to Sponge City, 2019
- Supervised undergraduate research team on novel membrane technologies
- Mentored graduate students

SELECTED SCHOLARSHIPS AND AWARDS WON BY STUDENTS

University of Regina

- 2020, Mitacs Research Training Award (CA$6,000) for graduate student Ms. Afruza Begum
- 2021, Saskatchewan Innovation and Excellence Graduate Scholarship (Jianfei Chen and Seyed Hesam-Aldin Samaei)

SELECTED SCHOLARSHIPS AND AWARDS

University of Regina

- 2022, RCE-SK Education for Sustainable Development Recognition Award (Capstone project "Solar-Driven Mobile Water Treatment System for Agricultural Dugout Water," students: Mark Hellman, Badi Haghighi, Johannes Mutyanda, and Shourya Singh)
- Results in Engineering Young Investigator Award 2022, Elsevier

University of Waterloo

- NSERC Postdoctoral Fellowship (CA$90,000, the Natural Sciences and Engineering Research Council of Canada), 2017

University of Alberta

- Nominated for "the Governor General's Gold Medal for Ph.D. Program Completion", 2016
- Award of Excellence (US$6,000, China Scholarship Council), 2016
- Award of Distinction (CA$10,000, Government of Xinjiang, China), 2016
- Dr. Donald R. Stanley Graduate Scholarship (CA$3,800), 2015
- Alberta Innovates - Technology Futures Graduate Student Scholarship (CA$31,600), 2015
- Graduate Students' Association Professional Development Grant (CA$500), 2015

King Abdullah University of Science and Technology

- KAUST Full Fellowship (US$40,000), 2009
- Discovery Scholarship (US$7,500; Globally ~300 recipients), 2008

Tongji University
- China State Encouragement Award (The Ministry of Education, China), 2008
- First Class Academic Award, 2006

SELECTED EDITORIAL AND REVIEW SERVICES

Editorial
- Guest Editor, Special Issue of *Frontiers of Environmental Science & Engineering*
- Early Career Board Member, *Journals of Environmental Engineering (ASCE)*
- Young Editorial Board Member, *Frontiers of Environmental Science & Engineering*
- Early Career Editorial Board Member, *Results in Engineering* (Elsevier)
- Reviewer Editor, *Frontiers in Water*

Reviewer
- *Water Research* (IF: 11.236)
- *Chemical Engineering Journal* (IF: 13.273)
- *Journal of Cleaner Production* (IF: 9.297)
- *Chemosphere* (IF: 7.086)
- *ACS Industrial & Engineering Chemistry Research (IF: 3.720)*
- *Environmental Science-Nano* (IF: 8.131)
- *Science of the Total Environment* (IF: 7.963)
- *Biochemical Engineering Journal* (IF: 3.978)
- *Canadian Journal of Civil Engineering* (IF: 1.380)
- *Canadian Journal of Microbiology* (IF: 2.419)
- Mitacs grants

SELECTED COMMITTEE MEMBERSHIPS

- 2021 – present, Executive of Council, University of Regina
- 2021 – present, Council Committee on Research, University of Regina
- 2021 – present, Faculty of Graduate Studies and Research Council Committee, University of Regina
- 2020 – present, Academic Market Supplements Committee, University of Regina Faculty Association
- 2019 – present, Faculty of Engineering Planning Committee, University of Regina
- 2020 – 2022, Faculty of Engineering Annual Review Committee, University of Regina
- 2016 – present, Industrial Wastewater Committee, Water Environment Federation
- 2020 – present, Strategic communication and membership administration officer, Chinese Association of Professors in Environmental Engineering & Science (CAPEES)
- 2021 – present, Workshop Committee, Western Canada Water Annual Conference 2022

SELECTED SOCIAL SERVICES

Volunteer expert counsel for the Lumsden Beach Water Treatment Plant, 2020
- Provided technical advice to the plant in finding the reason and possible solution of its abnormal high chlorine demand in their well water.

Vice President of the Resident Association of Michener Park (University of Alberta), 2014

INVENTIONS

1. Mancio, M, **Xue, J**, Valladares, R, Mansour, A, Monteiro, P, 2011. Development of Geopolymers with Saudi Pozzolan (Invention Disclosure - UC Case # B11-0531).

PUBLICATIONS

Journal Articles (*indicates correspondent author; #indicates co-first author. Totally 22 papers since 2016, including 15 first- or correspondent-authored.)

1. Wang, Y; Zheng, X; Xiao, K; **Xue, J**; Ulbricht, Ms; Zhang, Y. (2022) Does time matter? A comparison of fouling caused by polysaccharide, protein, and humic substances on PVDF membranes over different adsorption durations. *Water Research* (submitted).
2. [FESE Editor's Choice] **Xue, J.***; Samaei, S.HA.; Chen, J.; Doucet, A.; Ng, K. (2022) What have we known so far about microplastics in drinking water treatment? A timely review. Frontiers of Environmental Science & Engineering 16, 58. https://doi.org/10.1007/s11783-021-1492-5
3. **Xue, J***; Peldszus, S; Van Dyke, M; Huck, P. (2021). Removal of polystyrene microplastic spheres by alum-based coagulation-flocculation-sedimentation treatment of surface waters. *Chemical Engineering Journal*. 130023.
4. Zhang, Y; Wang, T; Meng, J; Lei, J; Zheng, X; Wang, Y*; Zhang, J; Cao, X; Li, X; Qiu, X; **Xue, J***. (2020). A novel conductive composite membrane with polypyrrole (PPy) and stainless-steel mesh: Fabrication, performance, and anti-fouling mechanism. *Journal of Membrane Science*. 621: 118937.
5. Yu, X; Tang, Y; Pan, J; Shen, L; Begum, A; Gong, Z; **Xue, J***. (2020). Physico-chemical processes. *Water Environment Research*. 92(10): 1751-1769.
6. Zhang, Y; Wang, Y; Cao, X; **Xue, J**; Zhang, Q; Tian, J; Li, X; Qiu, X; Pan, B; Gu, A; Zheng, X*. (2020). Effect of carboxyl and hydroxyl groups on adsorptive polysaccharide fouling: A comparative study based on PVDF and graphene oxide (GO) modified PVDF surfaces. *Journal of Membrane Science*. 595: 117514.
7. Wang, Y; Wang, Z; Zhang, Y; Shi, Z; Kong, Z; Zhong, M; **Xue, J**; Zheng, X*. (2020). Effects of –COOH and –NH2 on adsorptive polysaccharide fouling under varying pH conditions: Contributing factors and underlying mechanisms. *Journal of Membrane Science*. 621: 118933.
8. Chen, Y; Ng, K*; Richter, A; Vu, H; Karimi, N; **Xue, J.** (2020). Spatial analysis of designated outdoor smoking areas: accessibility and land use. Journal of Environmental Planning and Management. : 1-15.
9. Wang, Y; Shen, L; Gong, Z; Pan, J; Zheng, X; **Xue, J***. (2019). Analytical methods to analyze pesticides and herbicides. *Water Environment Research*. 91(10): 1009-1024.
10. Ouyang, W; Chen, T; Shi, Y; Tong, L; Chen, Y; Wang, W; Yang, J; **Xue, J***. (2019). Physico-chemical processes. *Water Environment Research*. 91(10): 1350-1377.
11. **Xue, J**#*; BinAhmed, S; Wang, Z; Karp, N Stottrup, B; Romero-Vargas Castrillón, S*. (2018). Bacterial adhesion to graphene oxide (GO)-functionalized interfaces is determined by hydrophobicity and GO sheet spatial orientation. *Environmental Science and Technology Letters*. 5: 14-19.
12. **Xue, J**; Huang, C; Zhang, Y; Liu, Y*; Gamal El-Din, M*. (2018). Bioreactors for oil sands process-affected water treatment: A critical review. *Science of the Total Environment*. 627: 916-933.
13. Zhang, Y; **Xue, J**; Liu, Y*; Gamal El-Din, M*. (2018). The role of ozone pretreatment on optimization of membrane bioreactor for treatment of oil sands process-affected water. *Journal of Hazardous Materials*. 347: 470-477.
14. Huang, C; Shi, Y; **Xue, J**; Zhang, Y*; Gamal El-Din, M*, Liu, Y*. (2017). Comparison of integrated fixed-film activated sludge (IFAS), moving bed biofilm reactor (MBBR) and membrane bioreactor (MBR) treating recalcitrant organics: Importance of attached biomass. *Journal of Hazardous Materials*. 326: 120-129.
15. Li, C; Begum, A; **Xue, J***. (2020). Analytical methods to analyze pesticides and herbicides. *Water Environment Research*. 92(10): 1770-1785.
16. **Xue, J***; Guo, B; Gong, Z. (2018). Physico-chemical processes. *Water Environment Research*. 90(10): 1392-1438.
17. Liu, C; Guo, B; **Xue, J***. (2018). Analytical methods for pesticides and herbicides. *Water Environment Research*. 90(10): 1323-1347.

18. **Xue, J**; Zhang, Y; Liu, Y*; Gamal El-Din, M*. (2017). Dynamics of naphthenic acids and microbial community structures in a membrane bioreactor treating oil sands process-affected water: impacts of supplemented inorganic nitrogen and hydraulic retention time. *RSC Advances*. 7: 17670-17681.
19. **Xue, J**; Zhang, Y; Liu, Y*; Gamal El-Din, M*. (2016). Treatment of raw and ozonated oil sands process-affected water under decoupled anoxic denitrifying and aerobic nitrifying conditions: a comparative study. *Biodegradation*. 24(7): 247-264.
20. Zhang, Y; **Xue, J**; Liu, Y*; Gamal El-Din, M*. (2016). Treatment of oil sands process-affected water (OSPW) using membrane bioreactor coupled with ozonation: A comparative study. *Chemical Engineering Journal*. 302: 485-497.
21. **Xue, J**; Zhang, Y; Liu, Y*; Gamal El-Din, M*. (2016). Effects of ozone pretreatment and operating conditions on membrane fouling behaviors of an anoxic-aerobic membrane bioreactor for oil sands process-affected water (OSPW) treatment. *Water Research*. 105: 444-455.
22. **Xue, J**; Zhang, Y; Liu, Y*; Gamal El-Din, M*. (2016). Treatment of oil sands process-affected water (OSPW) using an anoxic-aerobic membrane bioreactor with a flat-sheet ceramic microfiltration membrane. *Water Research*. 88(1): 1-11.

Conference Articles

1. Xue, J; Peldszus, S; Van Dyke, M; Huck, P. (2020). Removal of microplastics from real surface waters via coagulation-flocculation: size matters. CSCE Annual Conference 2020 (canceled due to COVID-19), Saskatoon, Canada.
2. Zhang, Y; Xue, J; Gamal El-Din, M. (2017). Biotransformation of aromatic compounds in oil sands process-affected water by Pseudomonads. Proceedings. The 15th International Conference on Environmental Engineering - CSCE 2017 Annual General Conference, Vancouver, Canada
3. Xue, J; Zhang, Y; Liu, Y; Gamal El-Din, M. (2017). When membrane bioreactor meets ozonation: A possible solution to the oil sands process-affected water (OSPW) issue. Proceedings. 15th International Conference on Environmental Engineering - CSCE 2017 Annual General Conference, Vancouver, Canada
4. Liu, Y; Gamal El-Din, M; Zhang, Y; Shi, Y; Choi, J; Hwang, G; Huang, C; Xue, J; Islam, M; Dong, T. (2017). Bioreactors for the treatment of oil sands process-affected water (OSPW). Proceedings. 2017 IWA 10th International Conference on Biofilm Reactors Proceedings, Dublin, Ireland
5. Xue, J; Zhang, Y; Noguchi, H; Liu, Y; Gamal El-Din, M. (2016). Effect of ozone pretreatment on naphthenic acid (NA) biodegradation and membrane fouling behaviors in the subsequent pilot-scale membrane bioreactor (MBR) receiving oil sands process-affected water (OSPW). Proceedings. WEFTEC 2016 – 89th Annual Water Environment Federation Technical Exhibition and Conference, New Orleans, United States
6. Xue, J; Zhang, Y; Liu, Y; Gamal El-Din, M. (2015). The application of anoxic-aerobic membrane bioreactor for oil sands process-affected water (OSPW) treatment. 2015 AWWA/AMTA Membrane Technology Conference and Exposition Proceedings. 2015 AWWA/AMTA Membrane Technology Conference and Exposition, Orlando, United States

PRESENTATIONS

Presentations (# indicates speaker)

1. **Xue, J**#. (2022). Let's talk about microplastic pollution in drinking water treatment. 2022 CSCE Conference, Whistler, BC, Canada (accepted).
2. **Xue, J**#. (2022). The removal of microplastics in drinking water treatment. 2022 AEESP Conference, St. Louis, USA (accepted).
3. [Keynote Speaker] **Xue, J**#. (2022). Water safety and water resource recovery in the climate change context. Northern Saskatchewan Food Security Coalition, SK, Canada.
4. [Invited] **Xue, J**#. (2022). Are our drinking water treatment processes effective in removing microplastics? Department of Biology Seminar, Lakehead University, ON, Thunder Bay, ON, Canada.
5. [Keynote Speaker] **Xue, J**#. (2021). Resource recovery from industrial wastewater. The Saskatchewan Manufacturing Industry Investment and Trade Forum, Regina, SK, Canada.

6. [Invited] **Xue, J**#. (2021). Future-ready wastewater management: Microbe-based water resource recovery in the Circular Economy Framework. Geology Virtual Seminar, Department of Geology, University of Regina, Canada.
7. [Invited] **Xue, J**#. (2021) Do microplastics really matter in drinking water treatment? A preliminary investigation. Nankai Academic Salon, Nankai University, Tianjin, China.
8. [Invited] **Xue, J**#. (2021). The latest understanding of microplastics in drinking water treatment. The 2021 School of Civil Engineering Well-Renowned Experts Seminar Series & the 12th National Summer School for Graduate Students, Southeast University, Nanjing, China.
9. **Xue, J**#; Peldszus, S; Van Dyke, M; Huck, P. (2020). Removal of microplastics from real surface waters via coagulation-flocculation: size matters. CSCE Annual Conference 2020 (canceled due to COVID-19), Saskatoon, Canada.
10. **Xue, J**#; Peldszus, S; Van Dyke, M; Huck, P. (2018). Removal of microplastic particles through coagulation/flocculation and sedimentation. NSERC Chair in Water Treatment Industry Partner Information Day: Addressing Emerging Challenges in Drinking Water Treatment and Supply, University of Waterloo, Waterloo, ON, Canada.
11. **Xue, J#**, Peldszus, S, Van Dyke, M, Huck, P, 2018. Microplastics: an overlooked contaminant in drinking water. 2018 Ontario's Water Conference and Trade Show, Niagara Falls, ON, Canada.
12. **Xue, J#**, Peldszus, S, Van Dyke, M, Huck, P, 2018. Are microplastics of concern for drinking water? NSERC Chair in Water Treatment Industry Partner Information Day, University of Waterloo, Waterloo, ON, Canada.
13. **Xue, J**, BinAhmed, S, Wang, Z, Stottrup, B, Romero-Vargas Castrillón, S#, 2017. Initial adhesion of bacterial cells on surfaces functionalized with graphene oxide: from the perspective of atomic force microscopy-based single-cell force spectroscopy. 2017 AIChE Annual Meeting, Minneapolis, MN, USA.
14. **Xue, J**, BinAhmed, S, Wang, Z, Stottrup, B, Romero-Vargas Castrillón, S#, 2017. The interactions of bacterial cells with model graphene oxide surfaces: insights from single-cell force spectroscopy. The 2017 AEESP Research and Education Conference, University of Michigan, Ann Arbor, Michigan, USA.
15. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2017. When membrane bioreactor meets ozonation: A possible solution to the oil sands process-affected water (OSPW) issue. The 15th International Conference on Environmental Engineering - CSCE 2017 Annual General Conference, Vancouver, BC, Canada.
16. Zhang, Y, **Xue, J**#, Gamal El-Din, M, 2017. Biotransformation of Aromatic Compounds in Oil Sands Process-Affected Water by Pseudomonads. The 15th International Conference on Environmental Engineering - CSCE 2017 Annual General Conference, Vancouver, BC, Canada.
17. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2016. Effect of ozone pretreatment on naphthenic acid (NA) biodegradation and membrane fouling behaviors in the subsequent pilot-scale membrane bioreactor (MBR) receiving oil sands process-affected water (OSPW). WEFTEC 2016 Conference, New Orleans, LA, USA.
7. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2016. Optimization of operating conditions of anoxic-aerobic membrane bioreactors for oil sands porcess-affected water (OSPW) treatment. COSIA-AI-EES Oils Sands Water Conference and Workshops, Calgary, AB, Canada.
8. Zhang, Y#, **Xue, J**, Liu, Y, Gamal El-Din, M, 2016. Effect of ozonation on fouling behaviors of membrane bioreactors for the treatment of oil sands process-affected water (OSPW). COSIA-AI-EES Oils Sands Water Conference and Workshops, Calgary, AB, Canada.
9. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2015. The biological treatment of oil sands process-affected water (OSPW) under anoxic and aerobic conditions. COSIA Innovation Summit 2015, Banff, AB, Canada.
18. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2015. The application of anoxic-aerobic membrane bioreactor for oil sands process-affected water (OSPW) treatment. 2015 AWWA/AMTA Membrane Technology Conference, Orlando, FL, USA.
19. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, Y, 2014. The feasibility of anoxic-aerobic membrane bioreactor for oil sands process-affected water treatment. Helmholtz - Alberta Initiative (HAI) 4th Science Forum, Edmonton, AB, Canada.
20. **Xue, J**#, Zhang, Y, Liu, Y, Gamal El-Din, M, 2014. Startup of anoxic-aerobic membrane bioreactors for oil sands process-affected water (OSPW) treatment. COSIA Oil Sands Water Conference and Workshop 2014, Edmonton, AB, Canada.

21. Liu, Y#, Gamal El-Din, M, Zhang, Y, Shi, Y, Choi, J, Hwang, G, Huang, C, **Xue, J**, Islam, M, Dong, T, 2017. Bioreactors for the treatment of oil sands process-affected water (OSPW). 2017 IWA 10th International Conference on Biofilm Reactors, Dublin, Ireland.
22. Mancio, M, Monteiro, P, **Xue, J**#, Valladares, R, Mansour, A. 2010. Development and characterization of natural pozzolan-based geopolymer cements. ACI Fall 2010 Conven tion, Pittsburgh, PA, USA.