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RESEARCH INTERESTS

Innovative materials and practices for sustainable transportation infrastructure

- 1) Eco-smart cities / Sustainable built environments: e.g., multifunctional coatings, up-cycling of industrial or agro-based byproducts and wastes, permeable pavements, and nano-electrochemical remediation/rehabilitation
- 2) Durable, sustainable, and smart infrastructures: e.g., multiscale engineering and characterization, corrosion protection, preservation/rehabilitation techniques, self-healing concrete, and anti-icing pavement
- 3) Sustainable and resilient transportation systems

TEACHING INTERESTS

- Concrete Durability
- Durable/Sustainable Pavements and Bridges
- Corrosion of Metals
- Construction Materials
- Highway Materials Engineering
- Sustainable Winter Road Operations
- Nanotechnology for Civil and Environmental Engineers

EDUCATION

Ph.D., Polymer Chemistry, 1999 – Chinese Academy of Sciences, Beijing, China
M.S., Industrial & Management Engineering, 2002 – Montana State University, Bozeman, MT
M.S., Applied Chemistry, 1996 – Tianjin University, Tianjin, China
B.S., Corrosion & Protection, 1993 – Beijing Institute of Chemical Technology, Beijing, China

HONORS AND AWARDS

- Outstanding Researcher Award, Department of Civil and Environmental Engineering, Washington State University, presented on April 25, 2018
- Leon Luck Outstanding Faculty Award, Department of Civil and Environmental Engineering, Washington State University, presented on April 25, 2018
- Outstanding Research Faculty Member of 2017-18, Voiland College of Engineering & Architecture, Washington State University
- 2017 Top 1 Per Cent of Peer Reviewers in Materials Science, awarded by Publons
- 2016 ASCE ExCEED (Excellence in Civil Engineering Education) Teaching Fellow, selected by the ASCE Committee on Faculty Development
- AASHTO 2016 Sweet Sixteen High Value Research Project, Co-Principal Investigator.
- Recognized Reviewer, *Journal of Materials Engineering and Performance*, 2016
- Outstanding Reviewer, *Construction and Building Materials Journal*, 2015
- Certificate of Scholarly Achievement, The Friends of Montana State University Library, 2013
- Outstanding Reviewer, CORROSION 2013 Symposium, Orlando, FL.
- Highly Commended Award at the Literati Network Awards for Excellence, 2013 & 2012
- Best Paper (2011-2012), *ASCE Journal of Cold Regions Engineering*.

- Winner of the ITS America 2007 Award for Best “Return on Investment”, Principal Investigator
- Outstanding Research Award, College of Engineering, Montana State University, 2005
- Invited to join Tau Beta Pi (Engineering Honor Society) at Montana State University, Fall 2001
- Honorary Citizenship, City of Bozeman, MT, 2000
- Outstanding Student, Beijing Institute of Chemical Technology, 1992 - 1993

PROFESSIONAL WORK EXPERIENCE

ASSOCIATE DIRECTOR, USDOT Center for Environmentally Sustainable Transportation in Cold Climates (*CESTiCC*), March 2017 - Present

ASSOCIATE DIRECTOR, USDOT Center for Advanced Multimodal Mobility Solutions and Education (*CAMMSE*), November 2016 - Present

FOUNDING DIRECTOR, Laboratory of Corrosion Science & Electrochemical Engineering (CSEE), Washington State University, March 2016 – Present

FOUNDING DIRECTOR, Laboratory for Advanced & Sustainable Cementitious Materials (ASCM), Washington State University, August 2014 – Present

ASSISTANT DIRECTOR, USDOT Center for Environmentally Sustainable Transportation in Cold Climates (*CESTiCC*), August 2014 – March 2017

ASSOCIATE PROFESSOR, Department of Civil and Environmental Engineering, Washington State University, August 2014 – Present

ASSOCIATE DIRECTOR, USDOT Center for Environmentally Sustainable Transportation in Cold Climates (*CESTiCC*), October 2013 – July 2014

RESEARCH PROFESSOR, Civil Engineering Department, Montana State University, July 2012 – August 2014

ASSOCIATE RESEARCH PROFESSOR, Civil Engineering Department, Montana State University, July 2007 – June 2012

FOUNDING DIRECTOR, Corrosion & Sustainable Infrastructure Laboratory, Western Transportation Institute, Montana State University, 2004 – 2014

PROGRAM MANAGER, Winter Maintenance & Effects, Western Transportation Institute, 2005 – 2014

RESEARCH SCIENTIST/ASSOCIATE/AIDE, Western Transportation Institute, 2002-2005

GRADUATE TEACHING ASSISTANT, Department of Mechanical & Industrial Engineering, Montana State University – Bozeman, 2002

GRADUATE RESEARCH ASSISTANT, NSF Engineering Research Center: Center for Biofilm Engineering, Montana State University – Bozeman, 1999-2001

GRADUATE RESEARCH ASSISTANT, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, 1996-1999

GRADUATE RESEARCH ASSISTANT, Department of Materials Science and Engineering, Tianjin University, Tianjin, China, 1993-1996

TEACHING EXPERIENCE

ASSOCIATE PROFESSOR, Department of Civil and Environmental Engineering, Washington State University, August 2014 – Present

CE580/CE600: Graduate Seminars in Geotechnical and Transportation Engineering (1 credit; Spring 2015: 4.5/5.0);

CE501.01: Advanced Topics in Transportation Engineering (3 credits; Concrete Durability;

Fall 2014: 4.38/5.0; Fall 2015: 4.8/5.0);
CE508: Concrete Durability (3 credits; newly developed course, Fall 2016: 4.5/5.0; Fall 2017: 5.0/5.0);
CE501.02: Advanced Topics in Transportation Engineering (3 credits; Corrosion of Metals; Spring 2017: 5.0/5.0);
CE498.01: Special Topics in Civil Engineering (3 credits; Durable/Sustainable Pavements and Bridges; Spring 2015: 4.5/5.0);
CE 472: Durable/Sustainable Pavements and Bridges (3 credits; newly developed course, Spring 2016: 4.0/5.0; Spring 2017: 4.8/5.0);

ADJUNCT ASSOCIATE PROFESSOR, Mechanical & Industrial Engineering Department, Montana State University, 2009-2010 (Instructor for ME 321: Thermodynamics II – 3 credits)
GUEST LECTURER, Civil Engineering Department, Montana State University, 2012 (ECIV 350 Transportation Engineering)
GRADUATE TEACHING ASSISTANT, Department of Mechanical & Industrial Engineering, Montana State University, Spring 2002 (I&ME 458: Production and Engineering Management)

STUDENT AWARDS - SELECTED

Sen Du, John Faber Scholarship, American Coal Ash Association Educational Foundation (ACAAEF), 2018.
Sen Du, Richard Perteet Graduate Fellowship in Civil Engineering, 2018.
Jialuo He, Richard Perteet Graduate Fellowship in Civil Engineering, 2017, and then 2018.
Jialuo He, Simpson Strong-Tie Corrosion Research Scholarship, 2017.
Yan Zhang, Smart & Green Infrastructure Research Scholarship, 2017, and then 2018.
Yan Zhang, Washington Asphalt Pavement Association Scholarship, 2017.
Junliang Wu, Washington Asphalt Pavement Association Scholarship, 2017.
Mehdi Honarvar Nazari, Richard Perteet Graduate Fellowship in Civil Engineering, 2017.
Mehdi Honarvar Nazari. University Transportation Center (UTC) Student of the Year, awarded by the U.S. Department of Transportation, 2017.
Gang Xu, David C. Gross Scholarship, American Coal Ash Association Educational Foundation (ACAAEF), 2017.
Gang Xu, Graduate & Professional Student Travel Grant, Graduate & Professional Student Association (GPSA), Washington State University, Summer 2016 and then Spring 2017
Gang Xu, Student and Young Professional Travel Stipend, TRB Committee on Resource Conservation and Recovery (ADC60), to present at the Asheville NC, 2016 Summer Conference.
Gang Xu, J.F. Osborn Outstanding Graduate Student award, 2016, and then 2018.
Gang Xu, Richard Perteet Graduate Fellowship in Civil Engineering, 2016.
Gang Xu, Russ and Anne Fuller Fellowship for Interdisciplinary Research, Scholarship for the 2016/17 and 2017/18 academic years.
Katie O'Keefe. University Transportation Center (UTC) Student of the Year, awarded by the U.S. Department of Transportation, 2007.

GRADUATE STUDENT SUPERVISION

Ph.D.

- ✓ Gang Xu, “Environmentally friendly pervious concrete made of 100% fly ash binder and enabled by graphene oxide”, Ph.D. in Structural Engineering (Expected July 2018; ABD: Passed the Preliminary Exam)
- ✓ Jialuo He, “Laboratory assessment and modeling of self-healing cementitious materials”, Ph.D. in Structural Engineering (Expected May 2019; ABD: Passed the Preliminary Exam)
- ✓ Mehdi Hanarvar Nazari, “Modeling the environmental fate and transport of roadway deicers and their implications on soil”, Ph.D. in Environmental Engineering (Expected May 2020; Passed the Qualifying Exam)
- ✓ Yan Zhang, “Use of innovative materials for anti-icing asphalt pavement”, Ph.D. in Transportation Engineering (Expected July 2019; Passed the Qualifying Exam)
- ✓ Sen Du, “Hydration mechanism of high volume fly ash concrete and its resistance to salt scaling”, Ph.D. in Transportation Engineering (Expected July 2019)
- ✓ Abdullah Faiz Alasmari, “Use of layer-structured nano-materials to endow asphalt pavement with high resistance to rutting and aging”, Ph.D. in Transportation Engineering (Expected May 2021)
- ✓ Thesis committee member of 14 other Ph.D. students (Rasool Mohebifard, Othman AlShareedah, Ayumi Kalpana Manawadu, Mehrdad Tajalli, S.M.A. Bin Al Islam, Zhidong Zhou, Vahideh Tohidi, Sachinthani Pathirana, Zhao Chen, Milena Rangelov, Quinn M. Langfitt, Weiguang Zhang, Ning Zou, Shenghua Wu)

M.S.

- ✓ Yu Jiang, “Durability advances for reinforced structures in chloride environments”, M.S. in Structural Engineering (Graduated in December 2017)
 - Engineer, Jiangsu Testing Center for Quality of Construction Engineering Co., Ltd.
- ✓ Junliang Wu, “Electrical properties and pavement performance of conductive asphalt concrete containing carbon-based fillers”, M.S. in Transportation Engineering (Expected December 2018)
- ✓ Thesis committee member of 2 M.Sc. students (Benjamin Nantasai, Skyler L. Chaney).
- ✓ Thesis advising at Montana State University: Scott Patrick Jungwirth, “Managing the Environmental Impacts of Chemicals Used for Snow and Ice Control” (May 2014)
 - Engineer, Advanced Engineering and Environmental Services, Inc.
- ✓ Non-thesis advising at WSU: M.Sc. students (John Miller, Xiangrui Li)

OTHER STUDENT SUPERVISION

- ✓ At Washington State University, advised 7 Postdoctoral Research Associates (Wenbing Li, Yaqin He, Kefei Liu, Yan Wang, Xiaofan Liu, Mehdi H. Nazari, Junjie Wan) and 1 Assistant Research Professor (Dr. Zhengxian Yang).
- ✓ At Montana State University, advised 7 Postdoctoral Research Associates (Mehdi H. Nazari, Chunda Xu, Xinjun Wang, Yudong Dang, Yajun Liu, Tuan Anh Nguyen, Xiaodong He).
- ✓ Non-thesis advising at Washington State University: Mentoring undergraduate students (14 in CY2018; 17 in CY2017, 11 in CY2016, 10 in CY2015); Advised 3 Visiting Ph.D. student (Jieqiong Wu from Beihang University, Yi Jia from Southwest Jiaotong University,

Ying Ma from Chongqing University) and two M.S. students (Zhipeng Li and Heng Zhang from Wuhan Polytechnic University)

- ✓ Non-thesis advising at Montana State University: Research Experience for Undergraduates (NSF REU): advised 7 students; Undergraduate Research Experience: advised 4 students; Supervised 46 undergraduate students working on research projects over the last decade. Undergraduate co-authors on 20 peer-reviewed journal papers, 8 conference papers, and 11 project final reports, seven of whom went on to pursue a M.S. or Ph.D. in engineering.

PATENTS - SELECTED

Shi, X. and Xu, G. 2016. Fly ash cementitious compositions. Non-provisional Patent filed on August 26, 2016. PCT/US2016/049048.

PUBLICATION RECORD

Google Scholar: 4,038 citations; H-index of 35; Web of Science: 1,988 citations; H-index of 24; Citations per paper: 17.6. * undergraduate; ** graduate student; ___corresponding author

SELECTED JOURNAL ARTICLES (Total of 115 Indexed in Web of Science)

In Review

1. Xu, G.** , **Shi, X.** The Role of Admixed Graphene Oxide in a Cement Hydration System. *Cement and Concrete Research*, 2018.
2. Du, S.** , **Ge, Y.**, **Shi, X.** High Volume Fly Ash Concretes: The State of Knowledge. *Construction and Building Materials*, 2018.
3. Xie, N., Dang, Y., **Shi, X.** New Insights into How MgCl₂ Deicer Deteriorates Portland Cement Concrete. *Cement and Concrete Research*, 2018.
4. Xie, N., Akin, M., **Shi, X.** Permeable Concrete Pavement: Durability and Environmental Sustainability Review. *Journal of Cleaner Production*, 2018.
5. Zhang, Y.** , Tian, J.** , **Zhong, J.**, **Shi, X.** Anticorrosion Performance of Nacre-Biomimetic GO/Epoxy Coatings on Steel, *Advanced Materials*, 2018.
6. Nazari, M.H.** , Shihab, M.S., Havens, E.A.* , **Shi, X.** An Apple Pomace Derived Green Inhibitor Mitigates the Corrosion of C1010 Carbon Steel in Sodium Chloride. *Scientific Reports*, 2018.
7. Gong, J., Li, Z.** , Zhang, R., Li, J., **Shi, X.** Synergistic Effects of Nano-montmorillonite and Polyethylene Microfiber in Foamed Paste with High Volume Fly Ash Binder. *Journal of Nanoscience and Nanotechnology*, 2018.
8. Nazari, M.H.** , Havens, E.A.* , Muthumani, A., **Shi, X.** Effect of Agro-based Chemicals on the Performance of Salt Brine Anti-icer. *Bioresource Technology*, 2018.

Year 2018

1. Xu, G.** , Zhong, J., **Shi, X.** Influence of Graphene Oxide in a Chemically Activated Fly Ash Binder. *Fuel*, 2018, 226, 644-657. DOI: [10.1016/j.fuel.2018.04.033](https://doi.org/10.1016/j.fuel.2018.04.033).
2. Xu, G.** , **Shi, X.** Graphene Oxide Modified Pervious Concrete with Fly Ash as the Sole Binder. *ACI Materials Journal*, 2018, 115(3), 369-379. DOI: [10.14359/51701126](https://doi.org/10.14359/51701126).
3. Xu, G.** , **Shi, X.** Characteristics and Applications of Fly Ash as a Sustainable Construction Material: A State-of-the-Art Review. *Resources, Conservation & Recycling*, 2018, 136, 95-109. DOI: [10.1016/j.resconrec.2018.04.010](https://doi.org/10.1016/j.resconrec.2018.04.010).

4. Liu, K., Zhang, K., Wu, J., Muhunthan, B., **Shi, X.** Evaluation of Mechanical Performance and Modification Mechanism of Asphalt Modified with Graphene Oxide and Warm Mix Additives. *Journal of Cleaner Production*, 2018, DOI: [10.1016/j.jclepro.2018.05.040](https://doi.org/10.1016/j.jclepro.2018.05.040).
5. Liu, K., Zhang, K., **Shi, X.** Performance Evaluation and Modification Mechanism Analysis of Asphalt Binder Modified by Graphene Oxide. *Construction and Building Materials*, 2018, 163, 880-889. DOI: [10.1016/j.conbuildmat.2017.12.171](https://doi.org/10.1016/j.conbuildmat.2017.12.171).
6. Yang, Z., Zhang, Y.** , **Shi, X.** Impact of Nanoclay and Carbon Microfiber in Combating the Deterioration of Asphalt Concrete by Non-chloride Deicers. *Construction and Building Materials*, 2018, 160, 514-525. DOI: [10.1016/j.conbuildmat.2017.11.059](https://doi.org/10.1016/j.conbuildmat.2017.11.059).
7. He, J.** , Du, S.** , Yang, Z., **Shi, X.** Laboratory Investigation of Graphene Oxide Suspension as a Surface Sealer for Cementitious Mortars. *Construction and Building Materials*, 2018, 162, 65-79. DOI: [10.1016/j.conbuildmat.2017.12.022](https://doi.org/10.1016/j.conbuildmat.2017.12.022).
8. Gong, J., Shen, Z.** , Tong, Y.** , Li, Z.** , **Shi, X.** Electrochemical Chloride Extraction and Inhibitor Injection in Salt-Contaminated Repair Mortar. *International Journal of Electrochemical Science*, 2018, 13(1), 498-513, DOI: [10.20964/2018.01.35](https://doi.org/10.20964/2018.01.35).
9. Chen, Q.** , Liu, Y.** , Liu, G.** , Yang, Q., **Shi, X.**, Gao, H., Su, L., Li, Q. Harvest Energy from the Water: A Self-Sustained Wireless Water Quality Sensing System. *ACM Transactions on Embedded Computing Systems*, 2018, 17(1), Article No. 3. DOI: [10.1145/3047646](https://doi.org/10.1145/3047646).

Year 2017

1. Nazari, M.H.** , Shihab, M.S., Cao, L., Havens, E.A.* , **Shi, X.** A Peony-Leaves-Derived Liquid Corrosion Inhibitor: Protecting Carbon Steel from NaCl. *Green Chemistry Letters and Reviews*, 2017, 10(4), 359-379. DOI: [10.1080/17518253.2017.1388446](https://doi.org/10.1080/17518253.2017.1388446).
2. Xu, G.** , **Shi, X.** Exploratory Investigation into A Chemically Activated Fly Ash Binder for Mortars. *ASCE Journal of Materials in Civil Engineering*, 2017, 29(11), DOI: [10.1061/\(ASCE\)MT.1943-5533.0002075](https://doi.org/10.1061/(ASCE)MT.1943-5533.0002075).
3. Du, S.** , Zhao, H.** , Ge, Y., Yang, Z., **Shi, X.** Laboratory Investigation into the Modification of Transport Properties of High-Volume Fly Ash Mortar by Chemical Admixtures. *ASCE Journal of Materials in Civil Engineering*, 2017, 29(10), DOI: [10.1061/\(ASCE\)MT.1943-5533.0002025](https://doi.org/10.1061/(ASCE)MT.1943-5533.0002025).
4. Du, S.** , **Shi, X.**, Ge. Y. Electron Probe Microanalysis Investigation into High-Volume Fly Ash Mortars. *ASCE Journal of Materials in Civil Engineering*, 2017, 29(7), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001854](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001854).
5. Xie, N., **Shi, X.**, Zhang Y.** Impacts of Potassium Acetate and Sodium Chloride Deicers on Concrete. *ASCE Journal of Materials in Civil Engineering*, 2017, 29(3), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001754](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001754).
6. Nazari, M.H.** , **Shi, X.**, Jackson, E.* , Zhang, Y., Li, Y. Laboratory Investigation of Washing Practices and Bio-based Additive for Mitigating Metallic Corrosion by Magnesium Chloride Deicer. *ASCE Journal of Materials in Civil Engineering*, 2017, 29(1), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001727](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001727).
7. Muthumani, A., **Shi, X.** Effectiveness of Liquid Agricultural By-Products and Solid Complex Chlorides for Snow and Ice Control. *ASCE Journal of Cold Regions Engineering*, 2017, 31(1), DOI: [10.1061/\(ASCE\)CR.1943-5495.0000112](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000112).
8. Jungwirth, S.** , **Shi, X.** Laboratory Investigation of Naturally Sourced Liquid Deicers and Subsequent Decision Support. *ASCE Journal of Cold Regions Engineering*, 2017, 31(3), DOI: [10.1061/\(ASCE\)CR.1943-5495.0000132](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000132). (**Editor's Choice, 2017**).

9. He, J.** , **Shi, X.** Developing an Abiotic Capsule-Based Self-Healing System for Cementitious Materials: The State of Knowledge. *Construction and Building Materials*, 2017, 156, 1096-1113. DOI: [10.1016/j.conbuildmat.2017.09.041](https://doi.org/10.1016/j.conbuildmat.2017.09.041).
10. Li, Z.** , **Gong, J.**, Du, S.** , Wu, J., Li, J., Hoffman, D., **Shi, X.** Nano-montmorillonite Modified Foamed Paste with High Volume Fly Ash Binder. *RSC Advances*, 2017, 7, 9803–9812. DOI: [10.1039/c6ra26968k](https://doi.org/10.1039/c6ra26968k).
11. Zhou, G.** , **Zhong, J.**, Zhang, H.** , Hu, X.** , Wu, J., Koratkar, N., **Shi, X.** Influence of Releasing Graphene Oxide into A Clayey Sand: Physical and Mechanical Properties. *RSC Advances*, 2017, 7, 18060–18067. DOI: [10.1039/c7ra01539a](https://doi.org/10.1039/c7ra01539a).
12. Zhang, H.** , Zhou, G.** , **Zhong, J.**, Shen, Z.** , **Shi, X.** Effect of Nanomaterials and Electrode Configuration on Soil Consolidation by Electroosmosis: Experimental and Modeling Studies. *RSC Advances*, 7, 12103-12112. DOI: [10.1039/C6RA26674F](https://doi.org/10.1039/C6RA26674F).
13. Zhang, H.** , Zhou, G.** , Wu, J.* , **Zhong, J.**, Wu, J., **Shi, X.** Mechanism for Soil Reinforcement by Electro-Osmosis in the Presence of Calcium Chloride. *Chemical Engineering Communications*, 2017, 204(4), 424-433. DOI: [10.1080/00986445.2016.1273833](https://doi.org/10.1080/00986445.2016.1273833).
14. **Shi, X.**, Quilty, S. M., Long, T., Jayakaran, A., Fay, L., Xu, G.** Managing Airport Stormwater Containing Deicers: Challenges and Opportunities. *Frontiers of Structural and Civil Engineering*, 2017, 11(1), 35-46. DOI: [10.1007/s11709-016-0366-6](https://doi.org/10.1007/s11709-016-0366-6).
15. Hao, H.** , Xu, C.** , **Li, Y.**, Jackson, E., **Shi, X.** Preparation of Au Nano-Tips for *In-Situ* Investigation of Early-Age Localized Corrosion of Three Metals by Scanning Electrochemical Microscope. *International Journal of Electrochemical Science*, 2017, 12, 3732-3740. DOI: [10.20964/2017.05.54](https://doi.org/10.20964/2017.05.54).
16. Du, S.** , Petrie, J., **Shi, X.** Use of Snow Fences to Reduce the Impacts of Snowdrifts on Highways: Renewed Perspective. *Transportation Research Record*, 2017, 2613, 45-51. DOI: [10.3141/2613-06](https://doi.org/10.3141/2613-06).
17. Xu, G.** , Sturges, L., Chapman, M., Albrecht, C.P., Bergner, D.L., **Shi, X.** Snow Removal Performance Metrics: Past, Present, and Future. *Transportation Research Record*, 2017, 2613, 61-70. DOI: [10.3141/2613-08](https://doi.org/10.3141/2613-08).
18. **Shi, X.**, Zhou, G.** , Muthumani, A. Corrosion of Metals Exposed to 25% Magnesium Chloride Solution and Tensile Stress: Field and Laboratory Studies. *Case Studies in Construction Materials*, 2017, 7, 1-14. DOI: [10.1016/j.cscm.2017.04.001](https://doi.org/10.1016/j.cscm.2017.04.001).
19. Nguyen, T.A., Nguyen, T.H., Pham, T.L., Dinh, T.M.T., Thai, H., **Shi, X.** Application of Nano-SiO₂ and Nano-Fe₂O₃ for Protection of Steel Rebar in Chloride Contaminated Concrete: Epoxy Nanocomposite Coatings and Nano-Modified Mortars. *Journal of Nanoscience and Nanotechnology*, 2017, 17, 427-436. DOI: [10.1166/jnn.2017.12396](https://doi.org/10.1166/jnn.2017.12396).

Year 2016

1. Dang, Y., **Shi, X.**, Xie, N., McVey, E.* , Kessel, A.* Accelerated Laboratory Test Suggests the Importance of Film Integrity of Sealers for the Protection of Concrete from Deicer Scaling. *ASCE Journal of Materials in Civil Engineering*, 2016, 28(9), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001579](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001579).
2. Xie, N., **Shi, X.**, Dang, Y., Pace, A.*. Upcycling of Waste Materials: Green Binder Prepared with Pure Fly Ash. *ASCE Journal of Materials in Civil Engineering*, 2016, 28(3), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001414](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001414).
3. Wu, J., Yu, H., **Shi, X.** Effectiveness of Products in Managing Metallic Corrosion Induced by Cyclic Deicer Exposure: Laboratory Study Using Multielectrode Array Sensors,

- Electrochemical Impedance, and Laser Profilometer. *ASCE Journal of Materials in Civil Engineering*, 2016, 28(5), 04015186. DOI: [10.1061/\(ASCE\)MT.1943-5533.0001449](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001449).
4. Jungwirth, S.** , **Shi, X.**, Seeley, N., Fang, Y. Proactive Approaches to Preserving Maintenance Equipment from Roadway Deicers. *ASCE Journal of Cold Regions Engineering*, 2016, 30(1), DOI: [10.1061/\(ASCE\)CR.1943-5495.0000085](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000085).
 5. **Shi, X.**, Hansen, G., Mills, M., Jungwirth, S.** , Zhang, Y. Preserving the Value of Highway Maintenance Equipment against Roadway Deicers: A Case Study and Preliminary Cost Benefit Analysis. *Anti-Corrosion Methods and Materials*, 2016, 63(1), 1-8. DOI: [10.1108/ACMM-07-2014-1410](https://doi.org/10.1108/ACMM-07-2014-1410).
 6. **Shi, X.** Experimental and Modeling Studies on Installation of Arc Sprayed Zn Anodes for Protection of Reinforced Concrete Structures. *Frontiers of Structural and Civil Engineering*, 2016, 10(1), 1-11. DOI: [10.1007/s11709-016-0312-7](https://doi.org/10.1007/s11709-016-0312-7).
 7. Zhang, H.** , **Zhong, J.**, Zhou, G.** , Wu, J.* , Yang, Z.** , **Shi, X.** Microwave-Assisted Solvent-Free Synthesis of Zeolitic Imidazolate Framework-67. *Journal of Nanomaterials*, 2016, DOI: [10.1155/2016/9648386](https://doi.org/10.1155/2016/9648386).
 8. Xiao, X.** , Wang, D.** , **Li, Y.**, Jackson, E.* , Fang, Y.* , Zhang, Y., Xie, N., **Shi, X.** Investigation into the Synergistic Effect of Nano-sized Materials on the Anti-corrosion Properties of a Waterborne Epoxy Coating. *International Journal of Electrochemical Science*, 2016, 11, 6023-6042. DOI: [10.20964/2016.07.66](https://doi.org/10.20964/2016.07.66).
 9. Nguyen, T.A., Nguyen, T.H., Nguyen, T.V., Thai, H., **Shi, X.** Effect of Nanoparticles on the Thermal and Mechanical Properties of Epoxy Coatings. *Journal of Nanoscience and Nanotechnology*, 2016, 16(9), 9874-9881. DOI: [10.1166/jnn.2016.12162](https://doi.org/10.1166/jnn.2016.12162).
 10. Nguyen, T. H., Nguyen, T. A., Le, V. K., Dinh, T.M.T., Thai, H., **Shi, X.**, Nguyen, T.H. (2016). Effect of Electrochemical Chloride Extraction Treatment on the Corrosion of Steel Rebar in Chloride Contaminated Mortar. *Anti-Corrosion Methods and Materials*, 63(5), 377-385. DOI: [10.1108/ACMM-12-2014-1473](https://doi.org/10.1108/ACMM-12-2014-1473).

Year 2015

1. Dang, Y., **Shi, X.**, Mery, S.* , Xie, N., Benson, A.* , Yang, Z. Influence of Surface Sealers on the Properties of Internally Cured Cement Mortars Containing Saturated Fine Lightweight Aggregate. *ASCE Journal of Materials in Civil Engineering*, 2015, 27(12), DOI: [10.1061/\(ASCE\)MT.1943-5533.0001306](https://doi.org/10.1061/(ASCE)MT.1943-5533.0001306).
2. Qian, Y.** , **Li, Y.**, Jungwirth, S.** , Seeley, N.* , Fang, Y.* , **Shi, X.** The Application of Anti-Corrosion Coating for Preserving the Value of Equipment Asset in Chloride-laden Environments: A Review. *International Journal of Electrochemical Science*, 2015, 10, 10756-10780. www.electrochemsci.org/papers/vol10/101210756.pdf.
3. Veneziano, D., Muthumani, A., **Shi, X.** Safety Effects of Fixed Automated Spray Technology Systems. *Transportation Research Record*, 2015, 2482, 102–109. DOI: [10.3141/2482-13](https://doi.org/10.3141/2482-13).
4. Wang, Z., Song, H., Watkins, D.W., Ong, K.G., Xue, P., Yang, Q., **Shi, X.** Cyber-Physical Systems for Water Sustainability: Challenges and Opportunities. *IEEE Communications*, 2015, 53(5), 216-222. DOI: [10.1109/MCOM.2015.7105668](https://doi.org/10.1109/MCOM.2015.7105668).
5. Nguyen, T.H., Nguyen, T.A., Nguyen, T.V., Le, V.K., Dinh, T.M.T., Thai, H., **Shi, X.** Effect of Electrical Injection of Corrosion Inhibitor on the Corrosion of Steel Rebar in Chloride-Contaminated Repair Mortar. *International Journal of Corrosion*, 2015, DOI: [10.1155/2015/862623](https://doi.org/10.1155/2015/862623).

Year 2014

1. Wang, X., Chen, J., Kong, Y., **Shi, X.** Sequestration of Phosphorus from Wastewater by Cement-Based or Alternative Cementitious Materials. *Water Research*, 2014, 62(1), 88-96. DOI: [10.1016/j.watres.2014.05.021](https://doi.org/10.1016/j.watres.2014.05.021).
2. **Shi, X.**, Jungwirth, S.**, Akin, M., Wright, R., Fay, L., Veneziano, D., Zhang, Y., Gong, J., Ye, Z. Evaluating Snow and Ice Control Chemicals for Environmentally Sustainable Highway Maintenance Operations. *ASCE Journal of Transportation Engineering*, 2014, 140(11), 05014005. DOI: [10.1061/\(ASCE\)TE.1943-5436.0000709](https://doi.org/10.1061/(ASCE)TE.1943-5436.0000709).
3. Dang, Y., Xie, N., Kessel, A.*, McVey, E.*, Pace, A.*, **Shi, X.** Accelerated Laboratory Evaluation of Surface Treatments for Protecting Concrete Bridge Decks from Salt Scaling. *Construction and Building Materials*, 2014, 55, 128-135. DOI: [10.1016/j.conbuildmat.2014.01.014](https://doi.org/10.1016/j.conbuildmat.2014.01.014).
4. **Li, Y.**, Zhang, Y.**, Jungwirth, S., Seeley, N.*, Fang, Y.*, **Shi, X.** Corrosion Inhibitors for Metals in Maintenance Equipment: Introduction and Recent Developments. *Corrosion Reviews*, 2014, 32(5-6), 163-236. DOI: [10.1515/corrrev-2014-0002](https://doi.org/10.1515/corrrev-2014-0002).
5. Muthumani, A., Fay, L., Akin, M., Wang, S., Gong, J., **Shi, X.** Correlating Lab and Field Tests for Evaluation of Deicing and Anti-icing Chemicals: A Review of Potential Approaches. *Cold Regions Science and Technology*, 2014, 97(1): 21-32. DOI: [10.1016/j.coldregions.2013.10.001](https://doi.org/10.1016/j.coldregions.2013.10.001).
6. Ye, Z., Yu, X.**, Veneziano, D., **Shi, X.** Evaluation of Winter Maintenance Chemicals and Crashes Using Artificial Neural Network. *Transportation Research Record*, 2014, 2440, 43-50. DOI: [10.3141/2440-06](https://doi.org/10.3141/2440-06).

Year 2013

1. Feng, D., **Xie, N.**, Gong, C.**, Leng, Z., Xiao, H., Li, H., **Shi, X.** Portland Cement Paste Modified by TiO₂ Nanoparticles: A Microscopic Perspective. *Industrial & Engineering Chemistry Research*, 2013, 52, 11575-11582. DOI: [10.1021/ie4011595](https://doi.org/10.1021/ie4011595).
2. **Li, Y.**, Lu, Q.**, Wu, S.**, Wang, L., **Shi, X.** Hydrogen Peroxide Sensing Using Ultrathin Platinum-Coated Gold Nanoparticles with Core@Shell Structure. *Biosensors and Bioelectronics*, 2013, 41, 576-581. DOI: [10.1016/j.bios.2012.09.027](https://doi.org/10.1016/j.bios.2012.09.027)
3. Han, B., Yang, Z., **Shi, X.**, **Yu, X.** Transport Properties of Carbon-Nanotube/Cement Composites. *Journal of Materials Engineering and Performance*, 2013, 22, 184-189. DOI: [10.1007/s11665-012-0228-x](https://doi.org/10.1007/s11665-012-0228-x).
4. Li, Y., Fang, Y.*, Seeley, N.*, Jungwirth, S.**, Jackson, E.*, **Shi, X.** Corrosion of Chloride Deicers on Highway Maintenance Equipment: Renewed Perspective and Laboratory Investigation. *Transportation Research Record*, 2013, 2361, 106-113. DOI: [10.3141/2361-13](https://doi.org/10.3141/2361-13).
5. Ye, Z., Wu, J., El Ferradi, N.**, **Shi, X.** Anti-icing for Key Highway Locations: Fixed Automated Spray Technology. *Canadian Journal of Civil Engineering*, 2013, 40: 11-18. DOI: [10.1139/cjce-2012-0226](https://doi.org/10.1139/cjce-2012-0226).
6. **Shi, X.**, Veneziano, D., Xie, N., Gong, J. Use of Chloride-Based Ice Control Products for Sustainable Winter Maintenance: A Balanced Perspective. *Cold Regions Science and Technology*, 2013, 86, 104-112. DOI: [10.1016/j.coldregions.2012.11.001](https://doi.org/10.1016/j.coldregions.2012.11.001). **(One of the most cited papers published since 2012, based on Scopus data; last updated in 2017).**
7. **Shi, X.**, Fortune, K., Smithlin, R.*, Akin, M., Fay, L. Exploring the Performance and Corrosivity of Chloride Deicer Solutions: Laboratory Investigation and Quantitative Modeling. *Cold Regions Science and Technology*, 2013, 86, 36-44. DOI: [10.1016/j.coldregions.2012.10.011](https://doi.org/10.1016/j.coldregions.2012.10.011).

8. **Shi, X.**, Soltesz S., Li, Y., Cross, J.D., Evan, L.* Electrochemically Aged Arc-Sprayed Zinc Coating to Concrete: Bond Strength Study. *Surface Engineering*, 2013, 29(1), 55-60. DOI: [10.1179/1743294412Y.0000000082](https://doi.org/10.1179/1743294412Y.0000000082).
9. Xu, C.**, Wu, Q., **Li, Y.**, Chen, Z.**, **Shi, X.** High-Performance Electrocatalytic Activity of Pt Nanoparticles/Chitosan 3-D Nanocomposites. *Nanoscience and Nanotechnology Letters*, 2013, 5(3), 334-340. DOI: [10.1166/nnl.2013.1540](https://doi.org/10.1166/nnl.2013.1540).
10. Yao, H.**, You, Z., Li, L., Lee, C.H., Wingard, D., Yap, Y.K., **Shi, X.**, Goh, S.W.** Rheological Properties and Chemical Bonding of Asphalt Modified with Nanosilica. *ASCE Journal of Materials in Civil Engineering*, 2013, 15(11), 1619-1630. DOI: [10.1061/\(ASCE\)MT.1943-5533.0000690](https://doi.org/10.1061/(ASCE)MT.1943-5533.0000690).
11. Yao, H.**, You, Z., Li, L., Goh, S.W.**, Mills-Beale, J., **Shi, X.**, Wingard, D. Evaluation of Asphalt Blended with Low Percentage of Carbon Micro-fiber and Nanoclay. *ASTM Journal of Testing and Evaluation*, 2013, 41(2), 278-288. DOI: [10.1520/JTE20120068](https://doi.org/10.1520/JTE20120068).
12. Yao, H.**, You, Z., Li, L., Goh, S.W., Lee, C.H., Yap, Y.K., **Shi, X.** Rheological Properties and Chemical Analysis of Nanoclay and Carbon Microfiber Modified Asphalt with Fourier Transform Infrared Spectroscopy. *Construction and Building Materials*, 2013, 38, 327-337. DOI: [10.1016/j.conbuildmat.2012.08.004](https://doi.org/10.1016/j.conbuildmat.2012.08.004).
13. Cao, L., **Shi, X.**, Liu, X., Wu, J. Laboratory Study on the Properties of Plastering Mortar Modified by Feather Fibers. *Science and Engineering of Composite Materials*, 2013, 20(3): 293-299.
14. Ye, Z., Veneziano, D., **Shi, X.** Estimating Statewide Benefits of Winter Maintenance Operations. *Transportation Research Record*, 2013, 2329, 17-23. DOI: [10.3141/2329-03](https://doi.org/10.3141/2329-03).

Year 2012

1. **Shi, X.**, Nguyen, T.A., Suo, Z., Wu, J., Gong, J., Avci, R. Electrochemical and Mechanical Properties of Super-hydrophobic Aluminum Substrates Modified with Nano-silica and Fluorosilane. *Surface and Coatings Technology*, 2012, 206, 3700–3713.
2. **Li, Y.**, Wu, S.**, Cui, X.**, Zhang, Y.**, Wang, L., **Shi, X.** Ultralow Platinum-Loading Bimetallic Nanoflowers: Fabrication and High-Performance Electrocatalytic Activity towards the Oxidation of Formic Acid. *Electrochemistry Communications*, 2012, 25, 19-22. DOI: [10.1016/j.elecom.2012.09.021](https://doi.org/10.1016/j.elecom.2012.09.021).
3. Liu, Y., **Shi, X.** Stochastic Modeling of Service Life of Concrete Structures in Chloride-laden Environments. *ASCE Journal of Materials in Civil Engineering*, 2012, 24(4), 381-390. DOI: [10.1061/\(ASCE\)MT.1943-5533.0000399](https://doi.org/10.1061/(ASCE)MT.1943-5533.0000399).
4. **Shi, X.**, Goh, S.W.**, Akin, M., Stevens, S.*, You, Z. Exploring the Interactions of Chloride Deicer Solutions with Nanomodified and Micro-modified Asphalt Mixtures Using Artificial Neural Networks. *ASCE Journal of Materials in Civil Engineering*, 2012, 24(7), 805–815. DOI: [10.1061/\(ASCE\)MT.1943-5533.0000452](https://doi.org/10.1061/(ASCE)MT.1943-5533.0000452).
5. **Shi, X.**, Akin, M. Holistic Approach to Decision Making in the Formulation and Selection of Anti-icing Products. *ASCE Journal of Cold Regions Engineering*, 2012, 26(3), 103-117. DOI: [10.1061/\(ASCE\)CR.1943-5495.0000039](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000039).
6. **Shi, X.**, Fay, L., Fortune, K., Smithlin, R., Johnson, M., Peterson, M.M., Creighton, A. Longevity of Corrosion Inhibitors and Performance of Liquid Deicer Products under Field Storage. *Canadian Journal of Civil Engineering*, 2012, 39: 117-127.
7. Akin, M., **Shi, X.** Development of Standard Laboratory Testing Procedures to Evaluate the Performance of Deicers. *ASTM Journal of Testing and Evaluation*, 2012, 40(6), 1015-1026.

DOI: [10.1520/JTE103615](https://doi.org/10.1520/JTE103615).

8. Fay, L., **Shi, X.** Environmental Impacts of Chemicals for Snow and Ice Control: State of the Knowledge. *Water, Air & Soil Pollution*, 2012, 223, 2751–2770. DOI: [10.1007/s11270-011-1064-6](https://doi.org/10.1007/s11270-011-1064-6).
9. **Shi, X.**, Fortune, K., Fay, L., Smithlin, R.*, Yang, Z., Cross D, and Wu, J. Longevity of Corrosion Inhibitors and Performance of Anti-icing Products after Pavement Application: A Case Study. *Cold Regions Science and Technology*, 2012, 83–84, 89–97.
10. Liu, Y., **Shi, X.** Modeling Cathodic Prevention for Unconventional Concrete in Salt-laden Environment. *Anti-Corrosion Methods and Materials*, 2012, 59(3), 121-131. DOI: [10.1108/00035591211224663](https://doi.org/10.1108/00035591211224663). ([Highly Commended Award, 2013](#)).
11. **Shi, X.**, Xie, N., Fortune, K., Gong, J. Durability of Steel Reinforced Concrete in Chloride Environments: An Overview. *Construction and Building Materials*, 2012, 30, 125-138. DOI: [10.1016/j.conbuildmat.2011.12.038](https://doi.org/10.1016/j.conbuildmat.2011.12.038). ([The most cited paper published since 2011, based on Scopus data; last updated in 2017](#)).
12. Li, Y., Kumar, P.*, **Shi, X.**, Nguyen, T.A., Xiao, Z., Wu, J. Electroless Synthesis of Ni-P and Ni-Zn-P Alloy Coatings for Protecting Steel Rebar from Chloride-Induced Corrosion. *International Journal of Electrochemical Science*, 2012, 7, 8151-8169. www.electrochemsci.org/papers/vol7/7098151.pdf.
13. Liu, Y., **Shi, X.** Ionic Transport in Cementitious Materials under an Externally Applied Electric Field: Experimental Characterization and Finite Element Modeling. *Construction and Building Materials*, 2012, 27, 450-460. DOI: [10.1016/j.conbuildmat.2011.07.019](https://doi.org/10.1016/j.conbuildmat.2011.07.019).
14. Yao, H.***, You, Z., Li, L., **Shi, X.**, Goh, S.W.***, Mills-Beale, J., Wingard, D. Performance of Asphalt Binder Blended with Non-modified and Polymer-modified Nanoclay. *Construction and Building Materials*, 2012, 35, 159-170. DOI: [10.1016/j.conbuildmat.2012.02.056](https://doi.org/10.1016/j.conbuildmat.2012.02.056).
15. Ye, Z., **Shi, X.**, Strong, C.K., Larson, R.E. Vehicle-Based Sensor Technologies for Winter Highway Operations. *IET Intelligent Transport Systems*, 2012, 6(3), 336-345. DOI: [10.1049/iet- its.2011.0129](https://doi.org/10.1049/iet-its.2011.0129).
15. Xie, N., **Shi, X.**, Feng, D., Kuang, B., Li, H. Percolation Backbone Structure Analysis in Electrically Conductive Carbon Fiber Reinforced Cement Composites. *Composites Part B: Engineering*, 2012, 43, 3270-3275. DOI: [10.1016/j.compositesb.2012.02.032](https://doi.org/10.1016/j.compositesb.2012.02.032).
16. Li, J., Zhao, Y.***, Hu, J., Shu, L., **Shi, X.** Anti-icing Performance of a Superhydrophobic PDMS/ Modified Nano-silica Hybrid Coating for Insulators. *Journal of Adhesion Science and Technology*, 2012, 26, 665-679. DOI: [10.1163/016942411X574826](https://doi.org/10.1163/016942411X574826).

Year 2011

1. Yang, Z., Hollar, J.*, He, X., **Shi, X.** A Self-healing Cementitious Composite Using Oil Core/Silica Gel Shell Microcapsules. *Cement and Concrete Composites*, 2011, 33, 506-512. DOI: [10.1016/j.cemconcomp.2011.01.010](https://doi.org/10.1016/j.cemconcomp.2011.01.010).
2. Fay, L., **Shi, X.** Laboratory Investigation of Performance and Impacts of Snow and Ice Control Chemicals for Winter Road Service. *ASCE Journal of Cold Regions Engineering*, 2011, 25(3), 89-114. DOI: [10.1061/\(ASCE\)CR.1943-5495.0000025](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000025) ([Best Paper, 2011-2012](#)).
3. **Shi, X.**, Fay, L., Peterson, M.M., Berry, M., Mooney, M.* A FESEM/EDX Investigation into How Continuous Deicer Exposure Affects the Chemistry of Portland Cement Concrete. *Construction and Building Materials*, 2011, 25(2), 957-966. DOI: [10.1016/j.conbuildmat.2010.06.086](https://doi.org/10.1016/j.conbuildmat.2010.06.086).
4. **Shi, X.**, Yang, Z., Liu, Y., Cross, D. Strength and Corrosion Properties of Portland Cement

- Mortar and Concrete with Mineral Admixtures. *Construction and Building Materials*, 2011, 25(8), 3245-3256. DOI: [10.1016/j.conbuildmat.2011.03.011](https://doi.org/10.1016/j.conbuildmat.2011.03.011).
5. Goh, S.W.**, Akin, M., You, Z., **Shi, X.** Effect of Deicing Solutions on the Tensile Strength of Micro- or Nano-modified Asphalt Mixture. *Construction and Building Materials*, 2011, 25(1), 195-200. DOI: [10.1016/j.conbuildmat.2010.06.038](https://doi.org/10.1016/j.conbuildmat.2010.06.038).
 6. **Shi, X.**, Nguyen, T.A., Kumar, P.*, Liu, Y. A Phenomenological Model for the Chloride Threshold of Pitting Corrosion of Steel in Simulated Concrete Pore Solutions. *Anti-Corrosion Methods and Materials*, 2011, 58(4), 179-189. DOI: [10.1108/00035591111148894](https://doi.org/10.1108/00035591111148894). ([Highly Commended Award, 2012](#)).
 7. **Shi, X.**, Fay, L., Mumma, S.* Laboratory Investigation into Interactions among Chemicals Used for Snow and Ice Control. *ASTM Journal of Testing and Evaluation*, 2011, 39(6), 1205-1212. DOI: [10.1520/JTE103609](https://doi.org/10.1520/JTE103609).
 8. Zhao, Y.**, Li, J., Hu, J., Shu, L., **Shi, X.** Fabrication of Super-Hydrophobic Surfaces with Long-Term Stability. *Journal of Dispersion Science and Technology*, 2011, 32(7), 969-974. DOI: [10.1080/01932691.2010.488513](https://doi.org/10.1080/01932691.2010.488513).

Year 2010

1. Yu, H., **Shi, X.**, Hartt, W. H., Lu, B. Laboratory Investigation of Reinforcement Corrosion Initiation and Chloride Threshold Content for Self-compacting Concrete. *Cement and Concrete Research*, 2010, 40(10), 1507-1516. DOI: [10.1016/j.cemconres.2010.06.004](https://doi.org/10.1016/j.cemconres.2010.06.004).
2. Yang, Z., Hollar, J.*, **Shi, X.** Surface-sulfonated Polystyrene Microspheres Improve Crack Resistance of Carbon Microfiber-reinforced Portland Cement Mortar. *Journal of Materials Science*, 2010, 45(13), 3497-3505. DOI: [10.1007/s10853-010-4386-7](https://doi.org/10.1007/s10853-010-4386-7).
3. **Shi, X.**, Fay, L., Peterson, M.M., Yang, Z. Freeze-thaw Damage and Chemical Change of a Portland Cement Concrete In the Presence of Diluted Deicers. *Materials and Structures*, 2010, 43(7): 933-946. DOI: [10.1617/s11527-009-9557-0](https://doi.org/10.1617/s11527-009-9557-0).
4. Yang, Z., **Shi, X.**, Hollar, J.*, He, X., Laboratory Assessment of A Self-healing Cementitious Composite. *Transportation Research Record*, 2010, 2142, 9-17. DOI: [10.3141/2142-02](https://doi.org/10.3141/2142-02).
5. Liu, Y., **Shi, X.** Molecular Dynamics Study of Interaction between Corrosion Inhibitors, Nanoparticles, and Other Minerals in Hydrated Cement. *Transportation Research Record*, 2010, 2142, 58–66.
6. **Shi, X.**, Liu, Y., Mooney, M.*, Berry, M., Hubbard, B.*, Nguyen, T.A. Laboratory Investigation and Neural Networks Modeling of Deicer Ingress into Portland Cement Concrete and Its Corrosion Implications. *Corrosion Reviews*, 2010, 28(3-4), 105-153. DOI: [10.1515/CORRREV.2010.28.3-4.105](https://doi.org/10.1515/CORRREV.2010.28.3-4.105).
7. Fay, L., Veneziano, D., Ye, Z., Williams, D., **Shi, X.** Costs and Benefits of Tools to Maintain Winter Roads: A Renewed Perspective Based on Recent Research. *Transportation Research Record*, 2010, 2169, 174–186. DOI: [10.3141/2169-19](https://doi.org/10.3141/2169-19).
8. Strong, C.K., Ye, Z., **Shi, X.** Safety Effects of Winter Weather: The State of Knowledge and Remaining Challenges. *Transport Reviews*, 2010, 30(6), 677-699. DOI: [10.1080/01441640903414470](https://doi.org/10.1080/01441640903414470).

Year 2009

1. **Shi, X.**, Nguyen, T.A., Suo, Z., Liu, Y., Avci, R. Effect of Nanoparticles on the Anticorrosion and Mechanical Properties of Epoxy Coating. *Surface and Coatings Technology*, 2009, 204(3), 237-245. DOI: [10.1016/j.surfcoat.2009.06.048](https://doi.org/10.1016/j.surfcoat.2009.06.048).

2. He, X., **Shi, X.** Self-repairing Coating for Corrosion Protection of Aluminum Alloys. *Progress in Organic Coatings*, 2009, 65, 37-43. DOI: [10.1016/j.porgcoat.2008.09.003](https://doi.org/10.1016/j.porgcoat.2008.09.003).
3. Yang, Z., **Shi, X.**, Creighton, A. T.*, Peterson, M. M. Effect of Styrene-Butadiene Rubber Latex on the Chloride Permeability and Microstructure of Portland Cement Mortars. *Construction and Building Materials*, 2009, 23(6), 2283-2290. DOI: [10.1016/j.conbuildmat.2008.11.011](https://doi.org/10.1016/j.conbuildmat.2008.11.011).
4. **Shi, X.**, Yang, Z., Nguyen, T.A., Suo, Z., Avci, R., Song, S. An Electrochemical and Microstructural Characterization of Steel-Mortar Admixed with Corrosion Inhibitors. *Science in China, Series E: Technological Sciences*, 2009, 52(1), 52-66. DOI: [10.1007/s11431-008-0276-5](https://doi.org/10.1007/s11431-008-0276-5).
5. Ye, Z., Strong, C.K., **Shi, X.**, Conger, S., Huft, D. Benefit-Cost Analysis of Maintenance Decision Support System. *Transportation Research Record*, 2009, 2107, 95-103. DOI: [10.3141/2107-10](https://doi.org/10.3141/2107-10).
6. Ye, Z., **Shi, X.**, Strong, C.K., Greenfield, T. H. Evaluation of the Effects of Weather Information on Winter Maintenance Costs. *Transportation Research Record*, 2009, 2107, 104-110. DOI: [10.3141/2107-11](https://doi.org/10.3141/2107-11).
7. Liu, Y., **Shi, X.** Cathodic Protection Technologies for Reinforced Concrete: Introduction and Recent Developments. *Reviews in Chemical Engineering*, 2009, 25(5-6), 339-388. DOI: [10.1515/REVCE.2009.25.5-6.339](https://doi.org/10.1515/REVCE.2009.25.5-6.339).
8. **Shi, X.**, Fay, L., Yang, Z., Nguyen, T.A., Liu, Y. Corrosion of Deicers to Metals in Transportation Infrastructure: Introduction and Recent Developments. *Corrosion Reviews*, 2009, 27(1-2), 23-52.
9. Liu, Y., **Shi, X.** Electrochemical Chloride Extraction and Electrochemical Injection of Corrosion Inhibitor in Concrete: State of the Knowledge. *Corrosion Reviews*, 2009, 27(1-2), 53-82. DOI: [10.1515/CORRREV.2009.27.1-2.53](https://doi.org/10.1515/CORRREV.2009.27.1-2.53).
10. Nguyen, T.A., **Shi, X.** A Mechanistic Study of Corrosion Inhibiting Admixtures. *Anti-Corrosion Methods and Materials*, 2009, 56(1), 3-12.
11. Veneziano, D., Wang, S., **Shi, X.** Precipitation Variation and the Identification of High-Risk Wet Accident Locations in California. *Transportation Research Record*, 2009, 2107, 123-133. DOI: [10.3141/2107-13](https://doi.org/10.3141/2107-13).

Year 2008

1. Pan, T., He, X., **Shi, X.** Laboratory Investigation of Acetate-based Deicing/Anti-icing Agents Deteriorating Airfield Asphalt Concrete. *Journal of the Association of Asphalt Paving Technologists (AAPT)*, 2008, 77, 773-793.
2. Pan, T., Nguyen, T.A., **Shi, X.** Assessment of Electrical Injection of Corrosion Inhibitor for Corrosion Protection of Reinforced Concrete. *Transportation Research Record*, 2008, 2044, 51-60. DOI: [10.3141/2044-06](https://doi.org/10.3141/2044-06).
3. He, X., **Shi, X.** Chloride Permeability and Microstructure of Portland Cement Mortars Incorporating Nanomaterials. *Transportation Research Record*, 2008, 2070, 13-21. DOI: [10.3141/2070-03](https://doi.org/10.3141/2070-03).
4. Strong, C., **Shi, X.** Benefit-Cost Analysis of Weather Information for Winter Maintenance: A Case Study. *Transportation Research Record*, 2008, 2055, 119-127. DOI: [10.3141/2055-14](https://doi.org/10.3141/2055-14).

Year 2007

1. Nguyen, T.A., Lu, Y.***, Yang, X., **Shi, X.** Carbon and Steel Surfaces Modified by *Leptothrix*

discophora SP-6: Characterization and Implications. *Environmental Science & Technology*, 2007, 41(23), 7987-7996. DOI: [10.1021/es071178p](https://doi.org/10.1021/es071178p).

Years 2002-2004

1. **Shi, X.**, Schillings, P., Boyd, D. Applying Artificial Neural Networks and Virtual Experimental Design to Quality Improvement of Two Industrial Processes. *International Journal of Production Research*, 2004, 42(1): 101-108. DOI: [10.1080/00207540310001602937](https://doi.org/10.1080/00207540310001602937).
2. **Shi, X.**, Avci, R., Lewandowski, Z. Comparative Study in Chemistry of Microbially and Electrochemically Initiated Pits of Type 316L Stainless Steel. *Corrosion Science*, 2003, 45(11): 2577-2595. DOI: [10.1016/S0010-938X\(03\)00079-9](https://doi.org/10.1016/S0010-938X(03)00079-9).
3. **Shi, X.**, Avci, R., Lewandowski, Z. Microbially Deposited Manganese and Iron Oxides on Passive Metals: Their Chemistry and Consequences for Material Performance. *Corrosion*, 2002, 58(9): 728-738. DOI: [10.5006/1.3277655](https://doi.org/10.5006/1.3277655).
4. **Shi, X.**, Avci, R., Lewandowski, Z. Electrochemistry of Passive Metals Modified by Manganese Oxides Deposited by *Leptothrix Discophora*: Two-step Model Verified by TOF-SIMS. *Corrosion Science*, 2002, 44(5): 1027-1045. DOI: [10.1016/S0010-938X\(01\)00104-4](https://doi.org/10.1016/S0010-938X(01)00104-4).
5. Yan, Y., **Shi, X.**, Liu, J., Zhao, T., Yu, Z. Thermosetting Resin System Based on Novolak and Bismaleimide for Resin-Transfer Molding, *Journal of Applied Polymer Science*, 2002, 83(8): 1651-1657. DOI: [10.1002/app.10073](https://doi.org/10.1002/app.10073).
6. Lewandowski, Z., Avci, R., Geiser, M., **Shi, X.**, Braughton, K., Yurt, N. Biofouling and Corrosion of Stainless Steels in Natural Waters. *Water Science and Technology: Water Supply*, 2002, 2(4): 65-72.

BOOKS

1. **Shi, X.**, Liu, Z., Liu, J. (2018). *Proceedings of GeoShanghai 2018 International Conference: Transportation Geotechnics and Pavement Engineering* (Eds.). ISBN 978-981-13-0011-0. Springer.
2. **Shi, X.**, Fu, L. (2018). *Sustainable Winter Road Operations* (Eds.). ISBN: 978-1-119-18506-2. Wiley-Blackwell.
3. Pacheco-Torgal, F., Melchers, R., **Shi, X.**, De Belie, N., Van Tittelboom, K., Pérez, A.S. (2017). *Eco-efficient Repair and Rehabilitation of Concrete Infrastructure* (Eds.). Elsevier.
4. Bruinsma, J., Smith, K., Peshkin, D., Ballou L., Eisenberg, B., Lurie, C., Costa, M., Ung, C., Nassiri, S., **Shi, X.**, Haselbach, L. (2017). *Guidance for Usage of Permeable Pavement at Airports*. ACRP Research Report 178. Washington, D.C.: National Academies Press. DOI: [10.17226/24852](https://doi.org/10.17226/24852).
5. Fay, L., **Shi, X.**, Huang, J. (2013). *Strategies to Mitigate the Impacts of Chloride Roadway Deicers on the Natural Environment*. Washington, D.C.: National Academies Press. DOI: [10.13140/2.1.1360.2249](https://doi.org/10.13140/2.1.1360.2249).
6. Fay, L., Akin, M., **Shi, X.** (2012). *Cost-effective and Sustainable Road Slope Stabilization and Erosion Control*. Washington, D.C.: National Academies Press. DOI: [10.13140/2.1.1229.1525](https://doi.org/10.13140/2.1.1229.1525).
7. **Shi, X.** (2008). *Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure*. Washington, D.C.: National Academies Press.

BOOK CHAPTERS

1. **Shi, X.**, Fu, L. (2018). Chapter 1: Introduction to Sustainable Winter Road Maintenance. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 1-6.

2. Cui, N., Xie, N., **Shi, X.** (2018). Chapter 2: A Framework for Life-Cycle Sustainability Assessment of Road Salt Used in Winter Maintenance Operations. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 7-22.
3. Veneziano, D., **Shi, X.**, Fay, L. (2018). Chapter 9: Economic Benefits of Winter Road Operations. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 156-179.
4. **Shi, X.**, Du, S., Fay, L. (2018). Chapter 10: Environmental Risks of Snow and Ice Control Materials. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 180-210.
5. Xu, G., **Shi, X.** (2018). Chapter 11: Impact of Chemical Deicers on Roadway Infrastructure: Risks and Best Management Practices. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 211-240.
6. Nazari, M.H., **Shi, X.** (2018). Chapter 12: Vehicle Risks of Winter Road Operations and Best Management Practices. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 241-272.
7. Muresan, M., Kwon, T.J., Fu, L., **Shi, X.** (2018). Chapter 13: Strategic Planning and Management for Sustainable Winter Road Maintenance. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 273-308.
8. **Shi, X.**, Fu, L. (2018). Chapter 14: Source Control Tactics for Sustainable Winter Road Maintenance. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 309-333.
9. **Shi, X.**, Strecker, E., Jungwirth, S. (2018). Chapter 15: Reactive Approaches for Environmentally Sustainable Winter Road Operations. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 334-357.
10. **Shi, X.**, Jungwirth, S. (2018). Chapter 17: The Search for “Greener” Materials for Winter Road Maintenance Operations. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 378-401.
11. **Shi, X.**, Huang, J., Yang, Z. (2018). Chapter 18: Pavement Treatments for Sustainable Winter Road Maintenance. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 402-422.
12. Fu, L., **Shi, X.** (2018). Chapter 22: A Look into the Future. In X. Shi, L. Fu (Eds.), *Sustainable Winter Road Operations*, Wiley-Blackwell, pp. 472-478.
13. **Shi, X.** (2017). Chapter 4: Monitoring of Reinforced Concrete Corrosion. In Pacheco-Torgal, F., et al. (Eds.), *Eco-efficient Repair and Rehabilitation of Concrete Infrastructure*, Elsevier, pp. 69-95. [Web link](#)
14. Xu, G., Navarro, L. G., Wong, K., **Shi, X.** Freeze-Thaw and Salt Resistance of a Fly Ash Based Pervious Concrete. ACI Fall Convention 2017. ACI Special Publication, SP-03-01.
15. Jiang, Y., Xu, G., **Shi, X.** Multifunction Green Corrosion Inhibiting Admixture for Mortar under Chloride Environment. ACI Fall Convention 2017. ACI Special Publication, SP-03-07.
16. Nazari, M.H., **Shi, X.** (2016). Polymer-based nanocomposite coatings for anticorrosion applications. In M. Hosseini & A. S. H. Makhlof (Eds.), *Industrial Applications for Intelligent Polymers and Coatings*. New York, Philadelphia: Springer Publishing, pp. 373-399. DOI: [10.1007/978-3-319-26893-4_18](https://doi.org/10.1007/978-3-319-26893-4_18).
17. Xie, N., Muthumani, A., Dang, Y., **Shi, X.** (2015). Deicer Impacts on Concrete Bridge Decks: A Comparative Study of Field Cores from Potassium Acetate and Sodium Chloride Environments. In S. Zhao, J. Liu & X. Zhang (Eds.), *Innovative Materials and Design for*

- Sustainable Transportation Infrastructure: pp. 42-57. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479278.005](https://doi.org/10.1061/9780784479278.005).
18. Xie, N., **Shi, X.** (2015). Life-Cycle Performance of Concrete Bridge Decks Exposed to Deicer Environments: A New Risk Rating Method. In J. Liu, S. Zhao & P. Li (Eds.), Environmental Sustainability in Transportation Infrastructure: pp.213-226. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.018](https://doi.org/10.1061/9780784479285.018).
 19. **Shi, X.**, Beutel, M., Long, T., Hellenthal, A., Bristoll-Groll, C. (2015) Green Stormwater Infrastructure Strategies for Airports: Challenges and Opportunities. In J. Liu, S. Zhao & P. Li (Eds.), Environmental Sustainability in Transportation Infrastructure: pp.1-13. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.001](https://doi.org/10.1061/9780784479285.001).
 20. Cui, N. and **Shi, X.** (2015) Improved User Experience and Scientific Understanding of Anti-Icing and Pre-Wetting for Winter Roadway Maintenance in North America. Environmental Sustainability in Transportation Infrastructure: pp. 104-119. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.010](https://doi.org/10.1061/9780784479285.010).
 21. Nazari, M.H., Fay, L., Jungwirth, S., and **Shi, X.** (2015) Water Quality Implications and the Toxicological Effects of Chloride-Based Deicers. Environmental Sustainability in Transportation Infrastructure: pp. 272-292. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.022](https://doi.org/10.1061/9780784479285.022).
 22. Cui, N., Fay, L., and **Shi, X.** (2015) Review on the Toxicological Effects of Chloride-Based Deicers: Impacted Environments and Assessment Methods. Environmental Sustainability in Transportation Infrastructure: pp. 256-271. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.021](https://doi.org/10.1061/9780784479285.021).
 23. Nazari, M.H., Bergner, D., and **Shi, X.** (2015) Managing Metallic Corrosion on Winter Maintenance Equipment Assets. Environmental Sustainability in Transportation Infrastructure: pp. 61-76. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.006](https://doi.org/10.1061/9780784479285.006).
 24. Muthumani, A. and **Shi, X.** (2015) Impacts of Specialized Hauling Vehicles on Highway Infrastructure, the Economy, and Safety: Renewed Perspective. Environmental Sustainability in Transportation Infrastructure: pp. 241-255. ASCE Construction Institute. Special Publication. DOI: [10.1061/9780784479285.020](https://doi.org/10.1061/9780784479285.020).
 25. Ye, Z., **Shi, X.**, Huang, J., and Wang, S. (2015) Quality Control of Precipitation Data for Wet Pavement Accident Analysis. Environmental Sustainability in Transportation Infrastructure: pp. 25-40. ASCE Construction Institute. Special Publication.
 26. **Shi, X.**, Huang, J., Williams, D., Akin, M., Veneziano, D. (2014). Highway Winter Maintenance Operations at Extremely Cold Temperatures. Climatic Effects on Pavement and Geotechnical Infrastructure: pp. 52-65. ASCE Construction Institute. DOI: [10.1061/9780784413326.006](https://doi.org/10.1061/9780784413326.006).
 27. Veneziano, D., **Shi, X.**, Ballard, L., Ye, Z., Fay, L. (2014). A Benefit-Cost Analysis Toolkit for Road Weather Management Technologies. Climatic Effects on Pavement and Geotechnical Infrastructure: pp. 217-230. ASCE Construction Institute. DOI: [10.1061/9780784413326.022](https://doi.org/10.1061/9780784413326.022).
 28. Gong, J., Huang, J., Wang, S., Soltesz, S., **Shi, X.** (2014). Potential Deicer Effects on Concrete Bridge Decks: Developing Exposure Maps. Climatic Effects on Pavement and Geotechnical Infrastructure: pp. 66-77. ASCE Construction Institute. DOI: [10.1061/9780784413326.007](https://doi.org/10.1061/9780784413326.007).
 29. **Shi, X.**, Xiao, Z., Wu, J. (2013). Chapter 5: The use of nanotechnology to improve the bulk and surface properties of steel for structural applications. In F. Pacheco Torgal, M.V. Diamanti, A. Nazari, C.G. Granqvist (Eds.), Nanotechnology in Eco-efficient Construction: Materials,

OUTREACH PUBLICATIONS AND TECHNICAL REPORTS

1. Xu, G., Shi, X. Graphene Oxide Enables the Clinker-Free Concrete Based on Coal Fly Ash. *Science Trends*, May 21, 2018.
2. Fay, L., Akin, M., Muthumani, A., **Shi, X.** *Quantifying Salt Concentration on Pavement – Phase II*. Final report for the Aurora Pooled Fund and Iowa Department of Transportation, Jan., 2018.
3. Jiang, Y., Dang, Y., Qian, J., Li, X., **Shi, X.**, Yang, Z. Influence of Surface Status of Hardened Cement Paste on Its Microhardness and Statistical Distribution (in Chinese). *Journal of the Chinese Ceramic Society*, 2017, 45(2), 212-219. DOI:[10.14062/j.issn.0454-5648.2017.02.06](https://doi.org/10.14062/j.issn.0454-5648.2017.02.06).
4. Xu, G., **Shi, X.**, Sturges, L., Chapman, M., Albrecht, C., Bergner, D. *Snow Removal Performance Metrics*. Final report for the Clear Roads Pooled Fund and Minnesota Department of Transportation, May 2017.
5. Cui, N., Xie, N., **Shi, X.** *A Framework for Life Cycle Sustainability Assessment of Road Salt Used in Winter Maintenance Operations*. Final report for the Center for Environmentally Sustainable Transportation in Cold Climates. Fairbanks, Alaska. December 2016.
6. Xu, G., **Shi, X.**, Muthumani, A. *Environmentally Friendly Pervious Concrete for Treating Deicer-Laden Stormwater (Phase I)*. Final report for the Center for Environmentally Sustainable Transportation in Cold Climates. Fairbanks, Alaska. May 2016.
7. Nazari, M.H., **Shi, X.**, Muthumani, A. *Bio-based Renewable Additives for Anti-icing Applications (Phase I)*. Final report for the Center for Environmentally Sustainable Transportation in Cold Climates. Fairbanks, Alaska. May 2016.
8. Muthumani, A., Fay, L., Bergner, D., **Shi, X.** *Understanding the Effectiveness of Non-Chloride Liquid Agricultural By-Products and Solid Complex Chloride/Mineral Products*. Final report for the Clear Roads Pooled Fund and Minnesota Department of Transportation, November 2015.
9. Fay, L., Veneziano, D., Muthumani, A., **Shi, X.**, Kroon, A., Falero, C., Janson, M., Petersen, S. *Benefit-Cost of Various Winter Maintenance Strategies*. Prepared for the Minnesota Department of Transportation and the Clear Roads Program, St. Paul, MN. Sept. 2015.
10. Yang, Q., Gao, H., **Shi, X.** *A Remote, Self-Sustained System for Monitoring Water Quality near Highways*. Prepared for the FHWA EAR Project DTFH61-13-H-00003. Washington, D.C., August 2015.
11. Fay, L., Nazari, M.H., Jungwirth, S., Muthumani, A., Cui, N., **Shi, X.**, Bergner, D., Venner, M. *Snow and Ice Control Environmental Best Management Practices Manual*. Prepared for the Minnesota Department of Transportation and the Clear Roads Program, St. Paul, MN. June 2015.
12. **Shi, X.**, Ye, Z., Muthumani, A., Zhang, Y., Dante, J. F., Yu, H. *A Corrosion Monitoring System for Existing Reinforced Concrete Structures*. Final report for the Oregon Department of Transportation, Salem, OR. May 2015.
13. Nazari, M.H., Bergner, D., **Shi, X.** *Manual of Best Practices for the Prevention of Corrosion on Vehicles and Equipment Used by Transportation Agencies for Snow and Ice Control*. Prepared for the Minnesota Department of Transportation and the Clear Roads Program, St. Paul, MN. April 2015.
14. Ye, Z., **Shi, X.**, Veneziano, D., Fay, L. *Evaluating the Effectiveness of Winter Chemicals on*

- Reducing Crashes in Idaho*. Final report for the Idaho Transportation Department, Boise, ID. December 2014.
15. Xie, N., Mery, S., Dang, Y., Akin, M., **Shi, X.** *Evaluation of Pervious Concrete Mixes in Areas Subject to Snow Plow Operations and Abrasive and Salt Application*. Final report for the Nevada Department of Transportation, Carson City, NV. November 2014.
 16. Muthumani, A., Veneziano, D., Huang, J., **Shi, X.** *Benefit-Cost Analysis of CDOT Fixed Automated Spray Technology (FAST) Systems*. Final report for the Colorado Department of Transportation, Denver, CO. October 2014.
 17. **Shi, X.**, Xie, N., Dang, Y., Muthumani, A., Huang, J., Hagel, A., Forsythe, S., Selig, E., Falk, D., McVey, E., Kessel, A., Martins, C., Zhang, Y., Fang, Y. *Understanding and Mitigating Effects of Chloride Deicer Exposure on Concrete*. Final report for the Oregon Department of Transportation, Salem, OR. September 2014.
 18. Jungwirth, S., Cao, L., **Shi, X.** *Developing Locally Sourced Brine Additive for Anti-icing*. Final report for the Alaska University Transportation Center and the Alaska Department of Transportation, Fairbanks, AK. FHWA-AK-RD-14-05. August 2014.
 19. **Shi, X.**, Muthumani, A., Veneziano, D. *Winter Maintenance: Target Tracking. Roads & Bridges*, September 2014, S16-S19.
 20. Veneziano, D., Fay, L., **Shi, X.**, Foltz, B., Reyna, M. *Highway User Expectations for ITD Winter Maintenance*. Final report for the Idaho Transportation Department, Boise, ID. July 2014.
 21. Xie, N., **Shi, X.** *Evaluation of Plus Grade of Performance Graded (PG) Asphalt Binder*. Final report for the New Mexico Department of Transportation, Albuquerque, NM. June 2014.
 22. Muthumani, A., **Shi, X.** *Impacts of Increasing Maximum Weights of Specialized Hauling Vehicles (SHVs)*. Final report for the New Mexico Department of Transportation, Albuquerque, NM. June 2014.
 23. Fay, L., **Shi, X.**, Venner, M., Strecker, E. *Toxicological Effects of Chloride-Based Deicers in the Natural Environment*. Final Report for the Association of American State Highway and Transportation Officials (AASHTO) Standing Committee on the Environment and National Research Council, Washington, D.C. Feb. 2014.
 24. **Shi, X.**, Akin, M., Huang, J., Zhang, Y., Jungwirth, S., Fang, Y., Muthumani, A., Yi, P. *Evaluation and Analysis of Liquid Deicers for Winter Highway Maintenance Operations*. Final report for the Western Transportation Institute. Bozeman, MT. December 2013.
 25. Veneziano, D., Fay, L., **Shi, X.**, Ballard, L. *Development of a Toolkit for Cost-Benefit Analysis of Specific Winter Maintenance Practices, Equipment and Operations Phase 2*. Final report for the Minnesota DOT and the Clear Roads Program, St. Paul, MN. June 2013.
 26. **Shi, X.**, Li, Y., Jungwirth, S., Fang, Y., Seeley, N., Jackson, E. *Identification and Laboratory Assessment of Best Practices to Protect DOT Equipment from the Corrosive Effect of Chemical Deicers*. Final report for the Washington State DOT, Olympia, WA. March 2013.
 27. Fay, L., Akin, M., **Shi, X.**, Veneziano, D. *Revised Chapter 8, Winter Operations and Salt, Sand, and Chemical Management*. Final report for the National Cooperative Highway Research Program, Washington, D.C. NCHRP 20-07/Task 318. March 2013.
 28. Akin, M., Huang, J., **Shi, X.**, Veneziano, D., Williams, D. *Snow Removal at Extreme Temperatures*. Final report for the Minnesota DOT and the Clear Roads Program, St. Paul, MN. February 2013.
 29. Ye, Z., Veneziano, D., **Shi, X.**, Fay, L. *Methods for Estimating the Benefits of Winter Maintenance Operations*. Final report for the National Cooperative Highway Research

- Program, Washington, D.C. NCHRP 20-07/Task 300. September 2012.
30. **Shi, X.**, Xie, N., Gong, J. Recent Progress in the Research on Microbially Influenced Corrosion: A Bird's Eye View through the Engineering Lens. *Recent Patents on Corrosion Science*, 2011, 1(2), 118-131.
 31. **Shi, X.**, Cross, J.D., Ewan, L., Liu, Y., Fortune, K. *Replacing Thermal Sprayed Zinc Anodes on Cathodically Protected Steel Reinforced Concrete Bridges*. Final report for the Oregon DOT, Salem, OR. September 2011.
 32. **Shi, X.**, Fay, L., Fortune, K., Smithlin, R., Johnson, M., Peterson, M.M., Creighton, A., Yang, Z., Cross, D. Investigating Longevity of Corrosion Inhibitors and Performance of Deicer Products under Storage or after Pavement Application. Final report for the Washington State DOT and the Transportation Pooled Fund led by the Pacific Northwest Snowfighters Association, Olympia, WA. June 2011.
 33. **Shi, X.**, Liu, Y., Yang, Z., Berry, M., Rajaraman P.K. Validating the Durability of Corrosion Resistant Mineral Admixture Concrete. Final report for the California Department of Transportation, Sacramento, CA. December 2010.
 34. **Shi, X.** On the Use of Nanotechnology to Manage Steel Corrosion. *Recent Patents on Engineering* 2010, 4(1), 44-50.
 35. **Shi, X.** Winter Road Maintenance: Best Practices, Emerging Challenges, and Research Needs. *Journal of Public Works & Infrastructure* 2010, 2(4), 318-326.
 36. **Shi, X.**, Liu, Y., Yang, Z., Berry, M., Rajaraman P.K. *Validating the Durability of Corrosion Resistant Mineral Admixture Concrete*. Final report for the California Department of Transportation, Sacramento, CA. December 2010.
 37. Veneziano, D., Fay, L., Ye, Z., Williams, D., **Shi, X.** *Development of a Toolkit for Cost-Benefit Analysis of Specific Winter Maintenance Practices, Equipment and Operations*. Final report for the Wisconsin DOT and the Clear Roads Program, Madison, WI. September 2010.
 38. **Shi, X.**, Liu, Y., Mooney, M., Berry, M., Hubbard, B., Fay, L., Leonard, A.B. *Effect of Chloride-based Deicers on Reinforced Concrete Structures*. Final report for the Washington State DOT, Olympia, WA. July 2010.
 39. Fay, L., Akin, M., Wang, S., **Shi, X.**, Williams, D. *Developing a Test Methodology that Correlates Laboratory Testing and Field Performance in Measuring Performance Characteristics and the Friction Coefficient of Deicing and Anti-icing Chemicals (Phase 1)*. Final report for the Wisconsin DOT and the Clear Roads Program, Madison, WI. July 2010.
 40. **Shi, X.**, Nguyen, T.A., Gao, H., Catania, D., Guillen, G., Courtney, C., Schuette, D. *An Autonomous and Self-Sustained Sensing System to Monitor Water Quality near Highways*. Final report of the Project NCHRP-125. Report for the IDEA Program, Transportation Research Board, National Research Council, Washington, D.C. April 2010.
 41. Akin, M., **Shi, X.** *Development of Standardized Test Procedures for Evaluating Deicing Chemicals*. Final report for the Wisconsin DOT and the Clear Roads Program, Madison, WI. March 2010.
 42. Friedman, P.L., **Shi, X.** Assessing the Impact of Pavement Deicing Products on Aircraft and Airfield Infrastructure. *Journal of Airport Management* 2009, 3(3), 223 - 237.
 43. **Shi, X.**, Akin, M., Pan, T., Fay, L., Liu, Y., Yang, Z. Deicer Impacts on Pavement Materials: Introduction and Recent Developments. *The Open Civil Engineering Journal* 2009, 3, 16-27.
 44. Ye, Z., Strong, C., **Shi, X.**, Conger, S. *Analysis of Maintenance Decision Support System (MDSS) Benefits and Costs*. Final Report for the MDSS Pooled Fund led by the South Dakota DOT, Pierre, SD. May 2009.

45. Ye, Z., Strong, C., Fay, L., **Shi, X.** *Cost Benefits of Weather Information for Winter Road Maintenance*. Final Report for the Aurora Consortium led by the Iowa DOT, Des Moines, IA. April 2009.
46. **Shi, X.**, Fay, L., Gallaway, C., Volkening, K., Peterson, M.M., Pan, T., Creighton, A., Lawlor, C., Mumma, S., Liu, Y., Nguyen, T.A. *Evaluation of Alternate Anti-icing and Deicing Compounds Using Sodium Chloride and Magnesium Chloride as Baseline Deicers*. Final Report for the Colorado DOT, Denver, CO. Report No. CDOT-2009-01. February 2009.
47. Dollhopf, D., Pokorny, M., Dougher, T.A.O., Stott, L., Rew, L.J., Stark, J., Peterson, M., Fay, L., **Shi, X.** *Using Reinforced Native Grass Sod for Biostrrips, Bioswales, and Sediment Control*. Final report for the California Department of Transportation, Sacramento, CA, December 2008.
48. Wang, S., Veneziano, D., Huang, J., **Shi, X.** *Estimating the Wet Pavement Exposure with Precipitation Data*. Final report for the California Department of Transportation, Sacramento, CA, March 2008.
49. **Shi, X.**, O’Keefe, K., Wang, S., Strong, C. *Evaluation of Utah DOT’s Weather Operations/RWIS Program: Phase I*. Final report for the Utah DOT, Salt Lake, UT, February 2007.
50. Transportation Research Board, Basic Research and Emerging Technologies Related to Concrete Committee. *Control of Cracking in Concrete: State of the Art*. Transportation Research Circular E-C107. Washington, DC, October 2006.
51. **Shi, X.**, Strong, C., Larson, R., Kack, D.W., Cuelho, E.V., El Ferradi, N., Seshadri, A., O’Keefe, K., Fay, L.E. *Vehicle-Based Technologies for Winter Maintenance: The State of the Practice*. National Cooperative Highway Research Program (NCHRP), Washington D.C., September 2006.
52. O’Keefe, K., **Shi, X.** *Synthesis of Information on Anti-icing and Pre-wetting for Winter Highway Maintenance Practices in North America*. Final report for the Pacific Northwest Snowfighters Association in Collaboration with the Washington State DOT, Olympia, WA. August 2005.
53. **Shi, X.** WeatherShare Concept of Operations. Version 2.0 - Baseline. Report for the California Department of Transportation. Sacramento, CA, April 2005. [PDF](#)
54. Staples, J.M., Gamradt, L., Stein, O., **Shi, X.** *Recommendations for Winter Traction Materials Management on Roadways Adjacent to Bodies of Water*. Final report for the Montana Department of Transportation, Helena, MT, December 2004. FHWA/MT-04-008/8117-19.
55. Albert, S., Wright, P.M., Taylor, J.E., **Shi, X.**, Lee, S. *CANAMEX Smart Tourist Corridor*. Final report for the CANAMEX Corridor Coalition in Collaboration with the U.S. Federal Highway Administration. March 2004.
56. Kelly, S., Kack, D., **Shi, X.**, Ballard, L. *Montana Coordinated Transportation Handbook*. Final report for the Montana Council on Developmental Disabilities, Helena, MT, 2003.

CONFERENCE PROCEEDINGS

1. He, J., Du, S., Yang, Z., **Shi, X.** Influence of Graphene Oxide as a Surface Sealer on Microstructure of Cementitious Mortars. Proceedings of the Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017. Washington, D.C. Paper No. 17-5127.
2. Jiang, Y., **Shi, X.**, Yang, Z., Sun, W. Improved Transport Properties of Mortar by Graphene Oxide Modified Mortar Surface Sealer. Proceedings of the Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017. Washington, D.C. Paper No. 17-5311.

3. Du, S., Petrie, J., **Shi, X.** Snow Fences for Reducing the Impacts of Snow Drifts on Highways: Renewed Perspective. Proceedings of the Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017. Washington, D.C. Paper No. 17-5215.
4. Xu, G., Sturges, L., Albrecht, C.P., Bergner, D.L., **Shi, X.** Snow Removal Performance Metrics: Past, Present, and Future. Proceedings of the Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017. Washington, D.C. Paper No. 17-5301.
5. Muthumani, A., Fay, L.E., **Shi, X.** Agricultural By-Products Weaken the Snow/Ice Bond to Pavement and Improve Sunlight Absorbance and Longevity on Road. Proceedings of the Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017. Washington, D.C. Paper No. 17-5584.
6. Xu, G., **Shi, X.** Graphene Oxide Modified Pervious Concrete with Fly Ash as Sole Binder. Proceedings of the First International Conference on Transportation Infrastructure and Materials (ICTIM 2016), DOI: 10.12783/dtetr/ictim2016/5478.
7. Du, S., **Shi, X.**, Ge, Y. Laboratory Investigation into the Mix Design of High-Volume Fly Ash Mortars. Proceedings of the Transportation Research Board 95th Annual Meeting. Jan. 10-14, 2016. Washington, D.C. Paper No. 16-6139.
3. Xu, G., **Shi, X.** Exploratory Investigation into Upcycling of Coal Fly Ash as Sole Binder for Mortars. Proceedings of the Transportation Research Board 95th Annual Meeting. Jan. 10-14, 2016. Washington, D.C. Paper No. 16-5292.
4. Nazari, M.H., **Shi, X.**, Jackson, E., Zhang, Y., Li, Y. Effectiveness of Salt Removers and Sugarbeet Byproduct in Protecting Metals from Corrosion by Magnesium Chloride Deicer. Proceedings of the Transportation Research Board 95th Annual Meeting. Jan. 10-14, 2016. Washington, D.C. Paper No. 16-6157.
5. Muthumani, A., Huang, J., **Shi, X.** Fixed Automated Spray Technology: Current Practices and Case Study. Proceedings of the Transportation Research Board 94th Annual Meeting. Jan. 11-15, 2015. Washington, D.C. Paper No. 15-1577.
6. Veneziano, D., Muthumani, A., **Shi, X.** Safety Effects of Fixed Automated Spray Technology Systems. Proceedings of the Transportation Research Board 94th Annual Meeting. Jan. 11-15, 2015. Washington, D.C. Paper No. 15-0756.
7. Muthumani, A., **Shi, X.** Effectiveness of Liquid Agricultural Products and Solid Complex Chlorides for Snow and Ice Control. Proceedings of the Transportation Research Board 94th Annual Meeting. Jan. 11-15, 2015. Washington, D.C. Paper No. 15-5815.
8. Cui, N., **Shi, X.** Improved User Experience and Scientific Understanding of Anti-icing and Prewetting for Winter Maintenance in North America. Proceedings of the Transportation Research Board 94th Annual Meeting. Jan. 11-15, 2015. Washington, D.C. Paper No. 15-5823.
9. Ye, Z., Xu, Y., Veneziano, D.A., **Shi, X.** Evaluation of Winter Maintenance Chemicals and Crashes Using Artificial Neural Network. Proceedings of the Transportation Research Board 93rd Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
10. **Shi, X.**, Jungwirth, S., Akin, M., Wright, R., Fay, L., Veneziano, D.A., Zhang, Y., Huang, J., Ye, Z. Evaluation of Snow and Ice Control Materials for Highway Maintenance Operations: A Renewed, Data-Driven Perspective. Proceedings of the Transportation Research Board 93rd Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
11. Jungwirth, S., **Shi, X.**, Seeley, N., Fang, Y. Protecting Maintenance Equipment Against Chloride Roadway Deicers: Corrosion Mechanisms, Test Methods, and Proactive Approaches. Proceedings of the Transportation Research Board 93rd Annual Meeting. Jan. 12-16, 2014. Washington, D.C.

12. Li, Y., **Shi, X.**, Jungwirth, S., Seeley, N., Fang, Y. Corrosion Inhibitors Available for Preserving the Value of Equipment Assets in Chloride-Laden Environments: State of the Knowledge. Proceedings of the Transportation Research Board 93th Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
13. Muthumani, A., Akin, M., Veneziano, D.A., **Shi, X.** Strategies for Snow and Ice Control at Extreme Temperatures: Review of Current Practice. Proceedings of the Transportation Research Board 93th Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
14. Fay, L., Jungwirth, S., Li, Y., **Shi, X.** Toxicological Effects of Chloride-Based Deicers in the Natural Environment: Synthesis of Existing Research. Proceedings of the Transportation Research Board 93th Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
15. Li, Y., Xu, C., Jackson, E., **Shi, X.** In situ investigation of early-age localized corrosion of three metals by scanning electrochemical microscope. Proceedings of the 2013 Department of Defense Corrosion Virtual Conference, Sept. 16-17, 2013, USA.
16. Li, Y., Fang, Y., Seeley, N., Jungwirth, S., Jackson, E., Mills, M., Hansen, G., **Shi, X.** Corrosion of Chloride Deicers to Highway Maintenance Equipment: A Renewed Perspective and Preliminary Laboratory Investigation. Proceedings of the Transportation Research Board 92nd Annual Meeting. Jan. 13-17, 2013. Washington, D.C.
17. Muthumani, A., Fay, L., Akin, M., Wang, S., **Shi, X.** Correlating Lab and Field Tests for Evaluation of Deicing and Anti-icing Chemicals: A Renewed Perspective. Proceedings of the Transportation Research Board 92nd Annual Meeting. Jan. 13-17, 2013. Washington, D.C.
18. Huang, J., Wang, S., Chaudhari, J., Soltesz, S., **Shi, X.** Deicer Effect on Concrete Bridge Decks: Practitioners' Perspective and a Method of Developing Exposure Maps. Proceedings of the Transportation Research Board 92nd Annual Meeting. Jan. 13-17, 2013. Washington, D.C.
19. Ye, Z., Veneziano, D., **Shi, X.** Estimating Statewide Benefits of Winter Maintenance Operations. Proceedings of the Transportation Research Board 92nd Annual Meeting. Jan. 13-17, 2013. Washington, D.C.
20. **Shi, X.**, Li, Y., Cross, D., Evan, L., Fortune, K., Soltesz, S.M., Jungwirth, S. Replacing Thermal Sprayed Zinc Anodes on Cathodically Protected Steel Reinforced Concrete Bridges: Experimental and Modeling Studies. Proceedings of the Transportation Research Board 92nd Annual Meeting. Jan. 13-17, 2013. Washington, D.C.
21. Li, Y., Jackson, E., Fang, Y, Zhang, Y, Xie, N., **Shi, X.**, Synergistic Effect of Nanomaterials on the Anticorrosion Properties of Environmentally Friendly Waterborne Epoxy Coating. 1st International Workshop on Corrosion and Protection of Materials, Dec. 4-7, 2012, Hanoi, Vietnam.
22. Ye, Z., **Shi, X.**, Wang, S., Ballard, L., Huang, E. A Regional Pilot Weather Information System for Surface Transportation and Incident Management: Concept of Operations. 12th COTA International Conference of Transportation Professionals (CICTP 2012), Beijing, China. August 3-6, 2012.
23. **Shi, X.**, Akin, M. Multi-Criteria Decision Making Approach to the Formulation and Selection of Anti-icing Liquids. *TRB 90th Annual Meeting Compendium of Papers Online*, Transportation Research Board, Washington D.C., January 23-27, 2011.
24. Fay, L., Veneziano, D., Ye, Z., Williams, D., **Shi, X.** Cost–Benefits of Winter Maintenance Tools: A Renewed Perspective Based on Recent Research. *TRB 89th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2010.
25. Ye, Z., **Shi, X.**, Strong, C.K., Use and Cost–Benefit of Weather Information in Winter Maintenance. Paper # MMC09-019. TRB Transportation Research Circular E-C135:

Maintenance Management 2009 - *Presentations from the 12th AASHTO-TRB Maintenance Management Conference*. Annapolis, Maryland. July 19–23, 2009.
<http://onlinepubs.trb.org/onlinepubs/circulars/ec135.pdf>.

26. Ye, Z., **Shi, X.**, Strong, C.K. Cost–Benefit Analysis of the Pooled-Fund Maintenance Decision Support System - Case Studies. Paper # MMC09-020. TRB Transportation Research Circular E-C135: Maintenance Management 2009 - *Presentations from the 12th AASHTO-TRB Maintenance Management Conference*. Annapolis, Maryland. July 19–23, 2009.
27. Fay, L., **Shi, X.**, Volkening, K., Peterson, M.M. Laboratory Evaluation of Alternative Deicers: The Path to Decision-Making Based on Science and Agency Priorities. *TRB 88th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2009.
28. Ye, Z., Strong, C.K., **Shi, X.**, Conger, S., and Huft, D. Benefit-Cost Analysis of Maintenance Decision Support System. *TRB 88th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2009.
29. Ye, Z., **Shi, X.**, Strong, C.K., Greenfield, T. H. Evaluation of the Effects of Weather Information on Winter Maintenance Costs. *TRB 88th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2009.
30. Strong, C., **Shi, X.**, Ye, Z. Safety Effects of Winter Weather: State of Knowledge and Remaining Challenges. *TRB 88th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2009.
30. Veneziano, D., Wang, S., **Shi, X.** Relationship between Precipitation Variation and High-Risk Wet Accident Locations in the State of California. *TRB 88th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2009.
31. Strong, C.K., **Shi, X.** Integrating Weather into Transportation Operations: A Utah Department of Transportation Case Study. Paper # Weather08-005. TRB Transportation Research Circular E-C126: Surface Transportation Weather and Snow Removal and Ice Control Technology. *Proceedings of the 4th National Conference on Surface Transportation Weather*, Indianapolis, Indiana, June 16-17, 2008. <http://onlinepubs.trb.org/onlinepubs/circulars/ec126.pdf>.
32. Pan, T., He, X., **Shi, X.** Laboratory Investigation of Acetate-based Deicing/Anti-icing Agents Deteriorating Airfield Asphalt Concrete. 83rd AAPT Annual Meeting. Philadelphia, Pennsylvania, January 2008.
33. Fay, L., Volkening, K., Gallaway, C., **Shi, X.** Performance and Impacts of Current Deicing and Anti-icing Products: User Perspective versus Experimental Data. *TRB 87th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2008.
34. Huang, J., Wang, S., **Shi, X.** Estimating the Wet-Pavement Exposure with Historical Precipitation Data in the State of California. *TRB 87th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2008.
35. Strong, C., **Shi, X.** Benefit-Cost Analysis of Weather Information for Winter Maintenance: A Case Study. *TRB 87th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2008.
36. **Shi, X.**, El Ferradi, N., Strong, C. Fixed Automated Spray Technology for Winter Maintenance: The State of the Practice in North America. *TRB 86th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2007.
37. **Shi, X.**, Larson, R., Strong, C., Kack, D.W., Cuelho, E.V., Fay, L., El Ferradi, N., Seshadri, A., O’Keefe, K. Vehicle-Based Sensor Technologies for Winter Maintenance: A Critical Review. *TRB 86th Annual Meeting Compendium of Papers DVD*, Transportation Research Board,

Washington D.C., January 2007.

38. Strong, C., El Ferradi, N., **Shi, X.** State-of-The-Practice of Automatic Vehicle Location for Winter Maintenance Operations. *TRB 86th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, Washington D.C., January 2007.
39. **Shi, X.**, Wang, S., Turnbull, I., Chu, M., Albert, S. A Regional Pilot Weather Information System for Surface Transportation and Incident Management. *TRB 85th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, January 22-26, 2006, Washington, D.C.
40. O'Keefe, K., **Shi, X.** Anti-icing and Pre-wetting: Improved Methods for Winter Highway Maintenance in North America. *TRB 85th Annual Meeting Compendium of Papers DVD*, Transportation Research Board, January 22-26, 2006, Washington, D.C.
41. **Shi, X.**, Wang, S., Turnbull, I., Chu, M., Albert, S. WeatherShare: An Integrated, User-friendly Surface Transportation Weather System for Northern California. *Proceedings of the 12th World Congress on Intelligent Transportation Systems*. San Francisco, California. November 6-10, 2005. 2009, 2: pp 1115-1126.
42. **Shi, X.**, Staples, J.M., Stein, O. Managing Winter Traction Materials on Roadways Adjacent to Bodies of Water: Challenges and Opportunities. *Environmental Stewardship in Transportation through Waste Management, Materials Reuse and EMS: 2005 Summer TRB Committee ADC60 Conference*. Charlotte, North Carolina. July 17-19, 2005.
43. **Shi, X.** The Use of Road Salts for Highway Winter Maintenance: An Asset Management Perspective. *2005 ITE District 6 Annual Meeting*. Kalispell, Montana. July 10-13, 2005.
44. Lewandowski, Z., Avci, R., Geiser, M., **Shi, X.**, Braughton, K., Yurt, N. Biofouling and Corrosion of Stainless Steels in Natural Waters. *2nd World Water Congress: Water Distribution and Water Services Management*, Oct. 15-19, 2001, Berlin, Germany. Wilderer, P., et al. (Eds.).

INVITED PRESENTATIONS – SELECTED

Year 2018

1. **Shi, X.** Graphene Oxide Enables Ambiently Cured Fly Ash Geopolymer. Presentation invited by the School of Naval Architecture, Ocean & Civil Engineering, Shanghai Jiaotong University, June 14, 2018, Shanghai, China.
2. **Shi, X.** Application of Graphene Oxide in Asphalt Materials: Exploratory Studies. Presentation invited by the School of Civil Engineering & Architecture, Wuhan Polytechnic University, June 11, 2018, Wuhan, China.
3. **Shi, X.** Application of Graphene Oxide in Civil Engineering Materials: Exploratory Studies. Presentation invited by the State Key Laboratory of Silicate Materials for Architectures, June 8, 2018, Wuhan, China.
4. **Shi, X.**, Liu, K. Mechanical performance and modification mechanism of asphalt modified with graphene oxide and warm mix additives. Presentation invited by the GeoShanghai 2018 Conference, May 30, 2018, Shanghai, China.
5. **Shi, X.**, Xu, G. Cementless Cementitious Binder and Pervious Concrete based on Ambiently Activated Fly Ash. May 1, 2018, Presentation invited by the Department of Civil, Architectural, and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO.
6. **Shi, X.**, Nazari, M.H. Best Practices in Preventing & Mitigating the Corrosion Risk of Roadway Deicers to Winter Maintenance Equipment. April 5, 2018, Presentation invited by the Corrosion Protection Technology (CPT) for Winter Maintenance: A Peer Exchange Workshop, by the University of California, Davis, and California Department of Transportation. Davis,

CA.

7. **Shi, X.** Application of Materials Science in Civil Engineering. March 19, 2018, Presentation invited by the College of Civil Engineering, Central South University of Forestry & Technology, Changsha, Hunan, China.

Year 2017

1. **Shi, X.** Graphene Oxide Endowing Civil Engineering Materials with New Opportunities. December 19, 2017, Presentation invited by the School of Civil Engineering and Architecture, Wuhan Polytechnic University, Wuhan, China.
2. **Shi, X.** Application of Materials Science in Civil Engineering. December 15, 2017, Presentation invited by the School of Civil Engineering, Hunan City University, Yiyang, Hunan, China.
3. **Shi, X.** Sustainable Transportation Infrastructure Enabled by Innovative Materials. November 3, 2017, Presentation invited by the School of Engineering and Applied Sciences, Washington State University, Tri-Cities, WA.
4. **Shi, X.** Multiple Dimensions in Sustainable Winter Road Operations. September 11, 2017, Presentation invited by the ASCE Construction Institute, for the ASCE Congress on Technical Advancement, Duluth, MN.
5. **Shi, X.** Innovations in Sustainable Transportation Infrastructure. July 6, 2017, School of Civil Engineering, Harbin Institute of Technology, Harbin, China.
6. **Shi, X.** Sustainable Transportation Infrastructure: Innovative Materials and Practices. July 4, 2017, School of Transportation Engineering, Southeast University, Nanjing, China.
7. **Shi, X.** Pervious Concrete Pavement and Application of Nanotechnology: Case Studies. Keynote presentation, June 5, 2017, 1st World Transport Convention, Beijing, China.
8. **Shi, X.** Exploratory Study into the Use of Nanotechnology for Reinforcement of Weak Soils. May 31, 2017, Wuhan Polytechnic University, Wuhan, China.
9. **Shi, X.** EPMA and NMR Studies into the Influence of Graphene Oxide on the Hydration of Fly Ash. Keynote presentation, May 25, 2017, Materials Genome Session, 2nd Transportation Research Congress, Beijing, China.
10. Xu, G., **Shi, X.** Graphene Oxide Modified Fly Ash Pervious Concrete. Poster for the World of Coal Ash Conference (WOCA), May 8-11, 2017, Lexington, Kentucky.
11. **Shi, X.** Graphene Oxide Enables the Expanded Use of Coal Fly Ash as a Sustainable Cementitious Binder. Invited by the 1st International Workshop on Sustainability Innovation in Transportation Infrastructure, March 30-31, 2017, Knoxville, Tennessee.
12. **Shi, X.** Emerging Use-Phase Considerations of Asphalt Pavement. Invited by the ASCE Construction Institute for CI Summit 2017, March 3, 2017, Anaheim, California.
13. **Shi, X.**, Nazari, M.H. Turning Waste Leaves into Green Chemicals: An Exploratory Study. January 27, 2017. An invited talk for the Annual Alaska Peony Growers Association (APGA) Winter Conference, Fairbanks, Alaska and a webinar by CESTiCC.

Year 2016

1. **Shi, X.** Exploratory Study into Bio-based Renewable Additives for Anti-icing Applications. 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
2. **Shi, X.** Durable and Sustainable Concrete Infrastructure. June 9, 2016. Invited by the University of Jinan, Jinan, Shandong, China.
3. **Shi, X.** Opportunities of Using Connected Transportation Infrastructure for Enhanced Winter

Operations. June 7, 2016. Invited by the China Communications Construction Co. Ltd., Beijing, China.

4. **Shi, X.** Emerging Challenges and Recent Advances in Sustainable Highway Winter Operations. June 5, 2016. Invited by the 1st Transportation Research Congress, Beijing, China.
5. **Shi, X.** Sustainability Practices in Highway Winter Operations: A Renewed Perspective. February 17, 2016. Invited by the Center for Environmentally Sustainable Transportation in Cold Climates.
6. **Shi, X.,** Nazari, M.H., Bergner, D., Fay, L. Best Practices for the Prevention of Corrosion on Vehicles and Equipment Used by Transportation Agencies for Snow and Ice Control. Invited by the TRB Maintenance Equipment Committee. Transportation Research Board 95th Annual Meeting. Jan. 13, 2016, Washington, D.C.

Year 2015

1. **Shi, X.** Research Trends in Sustainable Concrete Pavements and Materials. Harbin Institute of Technology, China, August 14, 2015.
2. **Shi, X.** Materials research related to sustainable concrete pavements. IACIP workshop for the 9th International Conference on Road and Airfield Pavement Technology (ICPT), Dalian, Liaoning, China, August 11, 2015.
3. **Shi, X.** *Pre-Symposium Workshop: Emerging Challenges, Best Practices, and Research Needs in Sustainable Winter Road Operations.* International Symposium on Systematic Approaches to Environmental Sustainability in Transportation, Fairbanks, Alaska, August 2-5, 2015.
4. **Shi, X.** Sustainability Practices in Highway Winter Operations: A Renewed Perspective. February 3, 2015. Invited by the Louisiana Transportation Research Center and Center for Environmentally Sustainable Transportation in Cold Climates.

Year 2014

1. Fay, L., **Shi, X.,** Strecker, E. Strategies to Mitigate the Impacts of Chloride Roadway Deicers on the Natural Environment. *2014 Webinar for Transportation Research Board*, December 17, 2014, Washington, DC.
2. **Shi, X.** Effect of Potassium Acetate, Sodium Chloride and Magnesium Chloride Deicers on Concrete. Oct. 6, 2014. Invited by the Washington State Department of Transportation Bridge and Structures Office.
3. **Shi, X.** Effect of Potassium Acetate, Sodium Chloride and Magnesium Chloride Deicers on Concrete. *2014 APWA Western Snow & Ice Conference*, September 23-25, 2014, Loveland, CO. Invited by the American Public Works Association.
4. **Shi, X.** Environmental sustainability in winter roadway operations. *2014 APWA Western Snow & Ice Conference*, September 23-25, 2014, Loveland, CO. Invited by the American Public Works Association.
5. **Shi, X.** Seven Best Practices in Sustainable Winter Highway Maintenance Operations. *2nd International Symposium on Winter Road Maintenance*, August 19-22, 2014. Invited by the China Highway and Transportation Society (CHTS) and the Canadian Society of Civil Engineering (CSCE).

Prior to August 2014 (Montana State University)

1. **Shi, X.** Best Practices for Preventing and Mitigating Corrosion of Metals in Maintenance Equipment: A Cold-Climate Perspective. *2014 National Equipment Fleet Management*

- Conference*, Lake Buena Vista, Florida, June 8-12, 2014.
2. **Shi, X.** Research Enabling Durable and Sustainable Concrete Infrastructure. Virginia Polytechnic Institute and State University, Blacksburg, VT, Feb. 14, 2014.
 3. **Shi, X.** Technical Writing and Experiences for High-Quality Journal Papers. Harbin Institute of Technology, Harbin, China, May 30, 2013.
 4. **Shi, X.** Winter Maintenance of Pavements and Bridges in North America. Harbin Institute of Technology, Harbin, China, May 30, 2013.
 5. **Shi, X.** Understanding the Effects of Chloride Deicer Exposure on Concrete Bridge Decks: A Renewed Perspective. *Midwest Bridge Working Group Spring 2013 Meeting*, Huntington, WV, May 22, 2013.
 6. **Shi, X.** A Corrosion Monitoring System for Existing Reinforced Concrete Structures. *Midwest Bridge Working Group Spring 2013 Meeting*, Huntington, WV, May 22, 2013.
 7. **Shi, X.** Exploring the Unknown World: How to Knock on the Door of Research. Wuhan Polytechnic University. Dec. 13, 2012.
 8. **Shi, X.** Synergistic Effect of Nanomaterials on the Anticorrosion Properties of Environmentally Friendly Waterborne Epoxy Coating. *1st International Workshop on Corrosion and Protection of Materials*, 4-7th Dec. 2012, Hanoi, Vietnam.
 9. **Shi, X.** A Holistic Approach to Sustainable Winter Road Maintenance Service. *Annual BIA/Tribal Transportation Symposium*, Bozeman, MT, April 3, 2012.
 10. **Shi, X.** Environmental Effects of Deicing and Anti-icing Chemicals. *2011 Michigan Winter Operations Conference*, Midland, MI, November 10, 2011.
 11. **Shi, X.** Longevity of Corrosion Inhibitors and Performance of Deicer Products under Storage or after Pavement Application. *2011 APWA North American Snow & Pacific Northwest Snowfighters Conference*, Spokane, WA, April 12, 2011.
 12. **Shi, X.***, Liu, Y., Mooney, M., Berry, M., Hubbard, B., Nguyen, T.A. Laboratory Investigation and Neural Network Modeling of Deicer Ingress into Portland Cement Concrete and Its Corrosion Implications. *TRB 90th Annual Meeting*, Presentation invited by the Corrosion Committee, Washington, D.C., Jan. 25, 2011.
 13. **Shi, X.***, Nguyen, T.A., Gao, H., Catania, D., Guillen, G., Courtney, C., Schuette, D. An Autonomous and Self-Sustained Sensing System to Monitor Water Quality near Highways. Invited poster for the *TRB 89th Annual Meeting*, Transportation Research Board, Washington D.C., January 2010.
 14. **Shi, X.** Winter Road Maintenance: Emerging Challenges and Best Practices. Invited Presentation. Beijing University of Technology and Beijing Society of Highways, August 4, 2009, Beijing, China.
 15. **Shi, X.** Winter Road Maintenance: Emerging Challenges and Best Practices. Invited Presentation. Center for Transportation Safety and Environment, Chinese Academy of Transportation Sciences, Ministry of Transport, July 29, 2009, Beijing, China.
 16. **Shi, X.** Influence of Deicers on Pavement Materials: State of the Knowledge. Invited Presentation. Chongqing University, July 20, 2009, Chongqing, China.
 17. **Shi, X.** Influence of Deicers on Pavement Materials: State of the Knowledge. Invited Presentation. China University of Petroleum, July 9, 2009, Dongying, China.
 18. **Shi, X.** Looking to the Future of Winter Maintenance: FAST, Vehicle-based Sensor Technologies, and MDSS. Invited Presentation. *13th Eastern Snow Expo*. King of Prussia, PA, August 28, 2008.
 19. **Shi, X.** FAST and Vehicle-based Winter Maintenance Technologies: The State of the Practice.

- Invited Presentation. *12th Eastern Snow Expo*. Columbus, OH, August 30, 2007.
20. **Shi, X.** Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure. Invited Presentation. *16th Annual Aircraft and Airfield Deicing and Stormwater Conference*. Baltimore, MD, August 5-7, 2007.
 21. **Shi, X.** Anti-icing and Pre-wetting: Improved Methods for Winter Highway Maintenance in North America. Session: Fact or Fiction: Winter Reality on the Road. *Pacific Northwest Snowfighters Conference*, Spokane, WA, June 14-16, 2006.
 22. **Shi, X.** The Use of Road Salts for Highway Winter Maintenance: An Asset Management Perspective. Invited presentation. *Salt Strategy Meeting*. Washington DOT, Olympia, WA. July 29, 2004.

OTHER PRESENTATIONS – SELECTED

1. **Shi, X.**, Nazari, M.H. Deicer Corrosion to DOT Equipment and Vehicles: Best Practices in Prevention and Mitigation. May 21, 2018. A webinar for the Center for Environmentally Sustainable Transportation in Cold Climates (CESTiCC).
2. **Shi, X.** Six Key Elements of High-Quality Technical Writing. Webinar for the International Association of Chinese Infrastructure Professionals (IACIP), Jan. 14, 2018.
3. Xu, G., Navarro, L.G., Wong, K., **Shi, X.** Freeze-Thaw and Salt Resistance of A Fly Ash Based Pervious Concrete. ACI Fall Convention, Oct. 15-19, 2017, Anaheim, CA.
4. He, J., Jiang, Y., Xu, G., **Shi, X.** Multifunction Green Corrosion Inhibiting Admixture for Mortar under Chloride Environment. ACI Fall Convention, Oct. 15-19, 2017, Anaheim, CA.
5. Xu, G., **Shi, X.** Influence of Graphene Oxide in a Chemically Activated Fly Ash Binder. The 10th International Conference on Road and Airfield Pavement Technology (ICPT), August 8-10, 2017, Hong Kong, China.
6. **Shi, X.**, Xu, G. Fly Ash Binder Based Pervious Concrete. Webinar for the City of Spokane, WA. July 25, 2017.
7. **Shi, X.** Exploratory Study into the Use of Nanotechnology for Reinforcement of Weak Soils. June 5, 2017, 1st World Transport Convention, Beijing, China.
8. Du, S., Jiang, Y., Ge, Y., **Shi, X.** Abrasion Resistance of High Volume Fly Ash Concrete as Influenced by the Admixed Graphene Oxide. June 5, 2017, 1st World Transport Convention, Beijing, China.
9. Nazari, M.H., Havens, E.A., **Shi, X.** Corrosion Behavior of Carbon Steel in the Presence of an Apple Pomace Derived Green Inhibitor. May 25, 2017, 2nd Transportation Research Congress, Beijing, China.
10. Nazari, M.H., Havens, E.A., **Shi, X.** Corrosion Behavior of C1010 Carbon Steel in the Presence of an Apple Pomace Derived Green Inhibitor. Poster for the Symposium of Pioneering Ideas in Agriculture, March 17, 2017, Pullman, Washington.
11. He, J., Du, S., Yang, Z., **Shi, X.** Influence of Graphene Oxide as a Surface Sealer on Microstructure of Cementitious Mortars. Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017, Washington, D.C.
12. Jiang, Y., **Shi, X.**, Yang, Z., Sun, W. Improved Transport Properties of Mortar by Graphene Oxide Modified Mortar Surface Sealer. Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017, Washington, D.C.
13. Du, S., Petrie, J., **Shi, X.** Snow Fences for Reducing the Impacts of Snow Drifts on Highways: Renewed Perspective. Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017, Washington, D.C.

14. Xu, G., Sturges, L., Albrecht, C.P., Bergner, D.L., **Shi, X.** Snow Removal Performance Metrics: Past, Present, and Future. Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017, Washington, D.C.
15. Muthumani, A., Fay, L.E., **Shi, X.** Agricultural By-Products Weaken the Snow/Ice Bond to Pavement and Improve Sunlight Absorbance and Longevity on Road. Transportation Research Board 96th Annual Meeting. Jan. 8-12, 2017, Washington, D.C.
16. Nazari, M.H., **Shi, X.** Bioenergy Harvesting and Wastewater Treatment Using Microbial Fuel Cell. Poster for the 2016 PacTrans Region 10 Transportation Conference, October 14, 2016, Seattle, Washington.
17. Xu, G., **Shi, X.** Graphene Oxide Modified Pervious Concrete. Poster for the 2016 PacTrans Region 10 Transportation Conference, October 15, 2016, Seattle, Washington.
18. Xu, G., **Shi, X.** Graphene Oxide Modified Fly Ash Pervious Concrete and Its Deicer Salt Scaling Resistance. 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
19. Du, S., **Shi, X.** An Electron Probe Micro-Analysis Investigation into High-Volume Fly Ash Mortars. Poster for the 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
20. Hoffman, D., Yang, Z., **Shi, X.** Surficial Treatment of Recycled Concrete Aggregate to Yield Structural Grade Concrete. Poster for the 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
21. Nazari, M.H., **Shi, X.** A Green Inhibitor Derived from Apple Pomace for Protecting C1010 Steel in NaCl Media. Poster for the 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
22. Xie, N., **Shi, X.** Durable Green Coal Fly Ash Concrete. 2016 CESTiCC Summer Workshop, August 12, 2016, Bozeman, Montana.
23. Yang, Z., Zhang, Y., **Shi, X.** Impact of Nanoclay and Carbon Microfiber in Combating the Deterioration of Asphalt Concrete by Non-chloride Deicers. 4th Sustainable Construction Materials and Technologies, August 7-11, 2016, Las Vegas, Nevada.
24. Xu, G., **Shi, X.** Environmentally Friendly Pervious Concrete with Fly ash as Sole Binder. Poster for the Transportation Research Board Committees on Resource Conservation & Recovery and Geo-Environmental Processes 2016 Summer Workshop, July 26-29, 2016, Asheville, North Carolina.
25. Nazari, M.H., **Shi, X.** Bio-based Renewable Additives for Anti-icing Applications. Poster for the Transportation Research Board Committees on Resource Conservation & Recovery and Geo-Environmental Processes 2016 Summer Workshop, July 26-29, 2016, Asheville, North Carolina.
26. Du, S., **Shi, X.**, Ge, Y. Water Absorptivity and Permeability of High Volume Fly Ash Mortars with Various Chemical Admixtures. Poster for the Transportation Research Board Committees on Resource Conservation & Recovery and Geo-Environmental Processes 2016 Summer Workshop, July 26-29, 2016, Asheville, North Carolina.
27. He, J., Du, S., Yang, Z., **Shi, X.** Influence of Graphene Oxide as a Surface Sealer on Microstructure of Cementitious Mortar. Poster for the 1st Transportation Research Congress, June 6, 2016, Beijing, China.
28. **Shi, X.**, Nazari, M.H., Wu, J., Jackson, E., Zhang, Y., Li, Y. Laboratory Investigation into the Effectiveness of Salt Removers and Sugar Beet By-Products in Protecting Metals from Corrosion by Magnesium Chloride Deicer. Transportation Research Board 95th Annual Meeting. Jan. 10-14, 2016, Washington, D.C.

29. **Shi, X.**, Beutel, M., Long, T., Hellenthal, A., Bristoll-Groll, C. Green Stormwater Infrastructure Strategies for Airports: Challenges and Opportunities. International Symposium on Systematic Approaches to Environmental Sustainability in Transportation, Fairbanks, Alaska, August 2-5, 2015.
30. Nazari, M.H., **Shi, X.** Managing the Corrosion and Toxicological Effects of Roadway Deicers. *Sustainability in a Time of Resource Scarcity*, Transportation Research Board ADC60 Summer Workshop, Los Angeles, CA, June 6-9, 2015.
31. **Shi, X.** Minimizing the Environmental Footprint of Winter Highway Operations. 2014 TRB ADC60 Sustainable & Resilient Infrastructure Workshop, New York City, June 16-19, 2014.
32. **Shi, X.**, Xie, N. Environmentally friendly cementitious binders made from coal fly ash. 2014 TRB ADC60 Sustainable & Resilient Infrastructure Workshop, New York City, June 16-19, 2014.
33. Nazari, M.H., **Shi, X.** A Green Inhibitor Derived from Peony Leaves and Its Performance for Protecting Carbon Steel from Aqueous Corrosion. *Gordon Research Conference, Corrosion – Aqueous session*, New Hampshire, July 13-18, 2014.
34. **Shi, X.**, Jungwirth, S., Akin, M., Wright, R., Fay, L., Veneziano, D.A., Zhang, Y., Huang, J., Ye, Z. Evaluation of Snow and Ice Control Materials for Highway Maintenance Operations: A Renewed, Data-Driven Perspective. Transportation Research Board 93th Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
35. **Shi, X.**, Jungwirth, S., Seeley, N., Fang, Y. Protecting Maintenance Equipment Against Chloride Roadway Deicers: Corrosion Mechanisms, Test Methods, and Proactive Approaches. Transportation Research Board 93rd Annual Meeting. Jan. 12-16, 2014. Washington, D.C.
36. Wu, J., **Shi, X.**, Yu, H., Zhang, Y. Assessing the Effectiveness of Two Inhibitors and One Coating Against Metallic Corrosion Induced by Cyclic Deicer Exposure. 2013 Department of Defense Corrosion Virtual Conference, Sept. 16-17, 2013, USA.
37. **Shi, X.**, Xie, N., Huang, J. Enabling Sustainability in Highway Winter Maintenance Operations: Seven Best Practices and a Look to the Future. International Symposium of Climatic Effects on Pavement and Geotechnical Infrastructure, August 5-7, 2013, Fairbanks, AK.
38. **Shi, X.** Understanding the Effects of Chloride Deicer Exposure on Concrete Bridge Decks: Some New Insights. International Symposium of Climatic Effects on Pavement and Geotechnical Infrastructure, August 5-7, 2013, Fairbanks, AK.
39. **Shi, X.**, Lundstrom, A., Akin, M., Pan, T., Albert, S. Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure. The Partners in Environmental Technology Technical Symposium & Workshop. Sponsored by SERDP and ESTCP under the U.S. Department of Defense. Poster #97. Washington, D.C., December 2-4, 2008.
40. **Shi, X.**, Strong, C., Ye, Z., Conger, S., Huft, D.L. Benefits and Costs Associated with Maintenance Decision Support Systems (MDSS). *MDSS Pooled Fund Technical Panel Meeting*. Sioux Falls, SD. Oct. 1, 2008.
41. **Shi, X.**, Pokorny, M., Dougher, T., Rew, L., Dollhopf, D., Brown, D., and Broadbent, J. Reinforced Native Sod Grass for Biostrrips, Bioswales, and Sediment Control. *The International Erosion Control Association (IECA) Conference*, Orlando, FL, February 19-22, 2008.
42. **Shi, X.**, Larson, R., Strong, C., Kack, D.W., Cuelho, E.V. Vehicle-Based Sensor Technologies for Smart Snowplows. Poster Session 2. *2007 ITS America Annual Meeting & Expo*, Palm Springs, CA, June 4-6, 2007.
43. **Shi, X.**, Strong, C., O'Keefe, K., Wang, S., Little, C., Patterson, R. The Next Stage in Improving Road Weather Forecasting: UDOT's Weather Operations/RWIS Program. Poster

- Session 2. 2007 ITS America Annual Meeting & Expo, Palm Springs, CA, June 4-6, 2007.
44. **Shi, X.**, El Ferradi, N., Strong, C. Fixed Automated Spray Technology for Winter Maintenance: The State of the Practice in North America. *The 86th Annual Meeting of Transportation Research Board*, Washington D.C., 2007.
 45. **Shi, X.**, Larson, R., Strong, C., Kack, D.W., Cuelho, E.V., Fay, L., El Ferradi, N., Seshadri, A., O’Keefe, K. Vehicle-Based Sensor Technologies for Winter Maintenance: A Critical Review. *The 86th Annual Meeting of Transportation Research Board*, Washington D.C., 2007.
 46. **Shi, X.**, Strong, C., Larson, R.E., Kack, D.W., Cuelho, E.V. Synthesis of Vehicle-Based Winter Maintenance Technologies. *National Rural ITS Conference 2006*, Big Sky, MT, August 13-16, 2006.
 47. **Shi, X.**, Staples, J.M., Stein, O. Highway Runoff Best Management Practices and Winter Traction Materials Management: Cold Regions Perspective. *Transportation Research Board Annual Meeting*, Washington, D.C., January 22-26, 2006.
 48. **Shi, X.**, Wang, S., Turnbull, I., Chu, M., Albert, S. A Regional Pilot Weather Information System for Surface Transportation and Incident Management. *Transportation Research Board Annual Meeting*, Washington, D.C., January 22-26, 2006.
 49. **Shi, X.**, Wang, S., Turnbull, I., Chu, M., Albert, S. WeatherShare: An Integrated, User-friendly Surface Transportation Weather System for Northern California. *12th World Congress on Intelligent Transportation Systems*. San Francisco, CA. November 6-10, 2005.
 50. **Shi, X.**, Staples, J.M., Stein, O. Managing Winter Traction Materials on Roadways Adjacent to Bodies of Water: Challenges and Opportunities. *Environmental Stewardship in Transportation through Waste Management, Materials Reuse and EMS: 2005 Summer TRB Committee ADC60 Conference*. Charlotte, NC. July 17-19, 2005.
 51. **Shi, X.** The Use of Road Salts for Highway Winter Maintenance: An Asset Management Perspective. *2005 ITE District 6 Annual Meeting*. Kalispell, MT. July 10-13, 2005.

RESEARCH GRANTS AND CONTRACTS RECEIVED

Research Activities at Washington State University (Aug. 2014 - Present)

Total Funding Awarded as Principal Investigator:	\$2,595,587
Total Funding Awarded as Co-Principal Investigator:	\$1,348,052
<i>Not including the match funds from WSU</i>	

Evaluation of On-Site and In-Situ Treatment Alternatives for Contaminated Soils. Funded by the Illinois Center for Transportation. Jan. 2018 – Dec. 2020. \$374,772. Co-PI: 18% credit. PI: Dr. Amanda Hohner (WSU).

Pavement Surface Treatments for Ice-Prone Locations in the Illinois Highway System. Funded by the Illinois Center for Transportation. Jan. 2018 – Dec. 2019. \$187,490. Principal Investigator: 70% credit. Co-PIs: Dr. Kun Zhang (Washington State University), Dr. Yan Qi (Southern Illinois University, Edwardsville), and Dr. Shenghua Wu (University of South Alabama).

Inspiring Transportation Careers with K-12 Curriculum Activities. Funded by the PacTrans (Region 10 University Transportation Center). Aug. 2018 – Nov. 2019. \$43,043. Co-PI: 50% credit. PI: Michelle Akin (WSU).

Exploring Weather-related Connected Vehicle Applications for Improved Winter Travel in Pacific Northwest. Funded by the PacTrans (Region 10 University Transportation Center). Oct. 2017 – Dec. 2019. \$180,000 (plus \$180,000 match by WSDOT and WSU). Principal Investigator: X.

Shi: 33.3% credit. Co-PIs: Dr. Haizhong Wang (Oregon State University, \$60,000); Dr. Yin Hai Wang (University of Washington, \$60,000).

Developing Friction Data to Support the Optimal Use of Pre-Wet Deicing Salt for Enhanced Winter Mobility. Funded by the CAMMSE through the University of North Carolina, Charlotte. Oct. 2017 – Sept. 2018. \$60,000. Principal Investigator.

Modeling the Macroscopic Effects of Winter Maintenance Operations on Traffic Mobility on Washington Highways. Funded by the CAMMSE through the University of North Carolina, Charlotte. Oct. 2017 – Sept. 2018. \$75,000. Principal Investigator.

The Use of Connected Vehicle Technology to Facilitate Multimodal Winter Travel (Phase I). Funded by the CAMMSE through the University of North Carolina, Charlotte. Jan. 2017 – Sept. 2018. \$106,733. Principal Investigator.

Center for Advanced Multimodal Mobility Solutions and Education (CAMMSE). Funded by the *USDOT* as a Tier 1 University Transportation Center, a subaward through University of North Carolina, Charlotte. Nov. 2016 – Oct. 2022. \$839,036. Principal Investigator and WSU Site Director: 78% credit. Co-PI: Dr. Jia Yan (WSU).

Center for Environmentally Sustainable Transportation in Cold Climates. Funded by the *USDOT* as a Tier 1 University Transportation Center, a subaward through University of Alaska, Fairbanks. Year 2 (Oct. 2014 - Sept. 2015): \$480,239, Assistant Director and Co-PI; Years 3 & 4 (Oct. 2015 – December 2018): \$458,968, Site Director and Principal Investigator since March 2017.

CESTiCC Years 2 & 3 Operations and Outreach at WSU. \$74,999. Funded by the CESTiCC through the University of Alaska, Fairbanks. Dec. 2015 – Dec. 2018. Principal Investigator: 33.3% credit.

Field Demonstration of a Cement-Free Binder Using Fly Ash as the Sole Binder. FY2017 Commercialization Gap Fund award. Sponsored by the WSU Office of Commercialization. \$44,623. Dec. 2016 – August 2018. Principal Investigator.

NSF CRISP Type 2/Collaborative Research: Multi-Agent Sustainable Water Decision Theory (MUST): Nexus of Water, Road, and Hierarchic Social Contractual Systems. Sponsored by the National Science Foundation (Award No. 1638384). \$365,771. Oct. 2016 – Sept. 2020. Principal Investigator. Prof. Shi collaborates with Prof. Bill Yu et al. of Case Western Reserve University on this \$2.5 million NSF grant.

Environmentally Friendly Pervious Concrete for Treating Deicer-Laden Stormwater (Phase II). Funded by the CESTiCC through the University of Alaska, Fairbanks. Dec. 2016 – July 2018. \$50,000. Principal Investigator.

A Novel Systematic Strategy towards Air-Purifying, Corrosion Resistant and Self-Healing Concrete Infrastructure. Funded by the CESTiCC through the University of Alaska, Fairbanks. Dec. 2016 – July 2018. \$50,000. Co-PI: 10% credit. PI: 88, Dr. Zhengxian Yang (WSU).

Locally Sourced Renewable Additives for Infrastructure-Friendly Snow/Ice Control Operations Funded by the CESTiCC through the University of Alaska, Fairbanks. Dec. 2016 – July 2018. \$50,000 (plus \$25,000 match by the Washington State DOT). Principal Investigator.

A New Sustainable Additive for Self-Deicing Asphalt Mixture. Funded by the CESTiCC through the University of Alaska, Fairbanks. Dec. 2016 – July 2018. \$50,000. Principal Investigator.

Anti-corrosion coatings and Concrete repair technologies. Sponsored by the WSU Excellence Fund provided by the Simpson-Strong Tie, Inc. \$85,000. July 2016 – December 2018. Principal Investigator.

A Targeted Nanotechnology Approach to High-Volume Fly Ash Concrete Pavement (Phase I).

Funded by the CESTiCC through the University of Alaska, Fairbanks. Nov. 2015 – July 2018. \$50,000. Principal Investigator.

Cost-Effective Use of Sustainable Cementitious Materials as Reactive Filter Media (Phase I).
Funded by the CESTiCC through the University of Alaska, Fairbanks. Nov. 2015 – July 2018. \$88,669. Principal Investigator.

Synthesis of Material Application Methodologies for Winter Operations. Funded by the Clear Roads Pooled Fund through Minnesota Department of Transportation. April 2016 – May 2018. \$117,658. Principal Investigator.

Design of Living Barriers to Reduce the Impacts of Snow Drifts on Illinois Freeways. Funded by the Illinois Center for Transportation. Nov. 2015 – Oct. 2018. \$235,609. Principal Investigator: 60% credit. Co-PIs: Dr. John Petrie (WSU) and Dr. Yan Qi (Southern Illinois University, Edwardsville).

Snow Removal Performance Metrics. Funded by the Clear Roads Pooled Fund through Minnesota Department of Transportation. April 2015 – June 2017. \$74,640. Principal Investigator.

Guidance for Usage of Pervious Pavement at Airports (ACRP 02-64). Funded by the Airport Cooperative Research Program, National Research Council through Applied Pavement Technology, Inc. June 2015 – December 2016. \$38,095. Principal Investigator: 48% credit. Co-PIs: Dr. Somayeh Nassiri and Dr. Liv Haselbach (WSU).

Guide for Utilization Measurement and Management of Fleet Equipment. Funded by the National Research Council. National Cooperative Highway Research Program (NCHRP) Project 13-05. June 2015 – December 2017. \$399,998. Co-PI: 16% credit. PI: Dr. Ali Hajbabaie (WSU).

Quantifying Salt Concentration on Pavement. Funded by the Aurora Program through Montana State University. Jan. 2015 – June 2017. \$11,058. Principal Investigator.

Environmentally Friendly Pervious Concrete for Treating Deicer-Laden Stormwater (Phase I).
Funded by the CESTiCC through the University of Alaska, Fairbanks. Oct. 2014 – Dec. 2015. \$50,311. Principal Investigator.

Bio-based Renewable Additives for Anti-icing Applications (Phase I). Funded by the CESTiCC through the University of Alaska, Fairbanks. Sept. 2014 – Dec. 2015. \$39,827. Principal Investigator.

Recent Advances in Sustainable Winter Road Operations. Funded by the CESTiCC through the University of Alaska, Fairbanks. Sept. 2014 – March 2017. \$48,843. Principal Investigator.

Collaborative Research: Life-Cycle Sustainability Assessment of Highway Winter Maintenance Operations (Phase I). Funded by the CESTiCC through the University of Alaska, Fairbanks. Sept. 2014 – Mar. 2016. \$8,958. Principal Investigator.

Research Activities at Montana State University – Selected (Feb. 2003-Aug. 2014)

Total Funding Awarded as Principal Investigator:	\$7,317,518
Total Funding Awarded as Co-Principal Investigator:	\$819,212
Total Funding Awarded as Co-Investigator:	\$829,785

Not including the match funds from MSU

Center for Environmentally Sustainable Transportation in Cold Climates. Funded by the USDOT as a Tier 1 University Transportation Center, a subaward through University of Alaska, Fairbanks. Years 1 & 2 (Oct. 2013 – Sept. 2015): \$777,618. Principal Investigator and MSU Site Director until July 2014.

Nano-Electrochemical Techniques for Consolidating Weak Soils: Mechanistic Studies. Funded by

the National Natural Science Foundation of China, through a visiting professorship at Wuhan Polytechnic University. ¥800,000 (~\$128,000). Jan. 2012 – December 2016. Principal Investigator. Project No. 51278390.

Iraq Science Fellowship Program of the U.S. Department of State. Funded by CRDF Global. \$7,500. July 2014- August 2014. Principal Investigator to host a visiting professor from Iraq to work on the evaluation of corrosion inhibitors.

Understanding the Effectiveness of Non-Chloride Liquid Agricultural By-Products and Solid Complex Chloride/Mineral Products Used in Snow and Ice Control Operations. Funded by the Clear Roads Pooled Fund led by the *Minnesota Department of Transportation (DOT)*. Dec. 2013 – Sept. 2015. \$188,718. Principal Investigator (until July 2014).

Comparing the Direct Costs and Infrastructure Implications of Anti-icing Strategies. Funded by the *Nevada DOT*. \$181,926. Dec. 2013 – Dec. 2015. Principal Investigator (until July 2014).

Best Practices for the Prevention of Corrosion to Department of Transportation Equipment: A User’s Manual. Funded by the Clear Roads Pooled Fund led by the *Minnesota DOT*. Dec. 2013 – Nov. 2014. \$49,500. Principal Investigator (until July 2014).

Developing a Snow and Ice Control Environmental Best Management Practices Manual. Funded by the Clear Roads Pooled Fund led by the *Minnesota DOT*. Dec. 2013 – Mar. 2015. \$180,117. Co-PI (until July 2014). PI: Laura Fay (Montana State University).

A Remote, Self-Sustained System for Monitoring Water Quality near Highways. Funded by the USDOT *Federal Highway Administration (FHWA)*. \$249,325. Mar. 2013 – Mar. 2015. Co-PI. PI: Dr. Qing Yang (Montana State University).

Benefit-Cost Analysis of CDOT FAST Systems. Funded by the *Colorado DOT*. \$100,000. Nov. 2012 – Oct. 2015. Principal Investigator.

Cost-Benefit of Various Winter Maintenance Strategies. Funded by the Clear Roads Pooled Fund led by the *Minnesota DOT*. \$121,730. Dec. 2013 – Nov. 2014. Co-PI (until July 2014). PI: Laura Fay (Montana State University).

A Corrosion Monitoring System for Existing Reinforced Concrete Structures. Funded by the *Oregon DOT* and USDOT Research & Innovative Technology Administration (RITA). \$380,000. Mar. 2011 – Sept. 2014. Principal Investigator.

Understanding the Chemical and Mechanical Performance of Snow and Ice Control Agents on Porous or Permeable Pavements. Funded by the Clear Roads Pooled Fund led by the *Minnesota DOT*. \$185,000. Feb. 2013 – Aug. 2014. Co-Investigator.

Evaluation of Pervious Concrete Mixes in Areas Subject to Snow Plow Operations and Abrasive and Salt Application. Funded by the *Nevada DOT*. \$92,499. Dec. 2012 – July 2014. Principal Investigator.

Evaluation of Plus Grades of Performance Graded (PG) Asphalt Binder. Funded by the *New Mexico DOT*. Jan. 2014 – June 2014. \$15,000. Co-PI. PI: Dr. Ning Xie (Montana State University).

Impacts of Increasing Maximum Weights of Specialized Hauling Vehicles (SHVs). Funded by the *New Mexico DOT*. Jan. 2014 – June 2014. \$19,158. Principal Investigator.

Optimization of Salt Storage for County Garage Facilities. Funded by the Ohio DOT. Serve as the subcontractor to the *Ohio University*. \$15,712. Oct. 2013 – June 2014. Co-Investigator.

Understanding and Mitigating Effects of Chloride Deicer Exposure on Concrete. Funded by the *Oregon DOT* and USDOT RITA. \$474,000. Aug. 2011 – June 2014. Principal Investigator.

NCHRP 25-25/Task 86: Toxicological Effects of Chloride Based Deicers in the Natural Environment. Funded by the *National Research Council*. \$75,000. May 2013 – Jan. 2014.

Principal Investigator.

Highway User Expectations for ITD Winter Maintenance. Funded by the Idaho Transportation Department. \$75,000. May 2013 – Sept. 2014. Co-Investigator.

Evaluating the Effectiveness of Winter Chemicals on Reducing Crashes in Idaho. Funded by the Idaho Transportation Department. \$127,000. Mar. 2011 – Jul. 2013. Co-Investigator.

Cost-Benefit Analysis Toolkit – Phase II. Funded by Clear Roads, a pooled-fund study led by the *Minnesota DOT*. \$109,999. Feb. 2012 – Apr. 2013. Principal Investigator.

Winter Operations and Salt, Sand, and Chemical Management. Funded by the *National Cooperative Highway Research Program (NCHRP)*. \$69,980. June 2012 – Feb. 2013. Co-Investigator.

Evaluation and Analysis of Liquid Deicers for Winter Highway Maintenance Operations. Funded by an Ohio transportation agency and a private company. \$160,000. July 2011 – Oct. 2013. Principal Investigator.

Develop Locally Sourced Salt Brine Additive for Anti-Icing. Funded by the *Alaska Department of Transportation and Public Facilities (AKDOT&PF)* and USDOT RITA (via Alaska UTC). \$192,750. Oct. 2011 – Dec. 2012. Principal Investigator.

Best Practices and Guidelines for Protecting Department of Transportation Equipment from the Corrosive Effect of Chemical Deicers. Phase I. Funded by the *Washington State DOT* and USDOT RITA, \$210,000. Jan. 2011 – Dec. 2012. Principal Investigator.

Snow Removal at Extreme Temperatures. Funded by Clear Roads, a pooled-fund study led by the *Minnesota DOT*. \$32,500. Mar. 2012 – Dec. 2012. Principal Investigator.

Reducing the Effects of Roadway Deicers on the Natural Environment - NCHRP Synthesis 20-05/Topic 43-12. Funded by the National Research Council. \$42,000. Oct. 2011 – Sept. 2012. Co-PI. PI: Laura Fay (Montana State University).

Testing and Evaluation of Recovered Traction Sanding Materials. Funded by the Montana DOT. \$39,962. July 2011 – August 2012. Co-Investigator. PI: Dr. Robert Mokwa (Montana State University).

Development and Demonstration of a Corrosion Test-bed at TRANSCEND. Funded by the USDOT Research and Innovative Technology Administration (RITA). \$49,899. Apr. 2012 – Aug. 2012. Principal Investigator.

NCHRP 20-07/Task 300: Methods for Estimating the Benefits for Winter Maintenance Operations. Funded by the National Research Council. \$50,000. Sept. 2011 – June 2012. Co-PI. PI: Dr. David Veneziano (Montana State University).

Replacing Thermal Sprayed Zinc Anodes on Cathodically Protected Steel Reinforced Concrete Bridges. Funded by the *Oregon DOT*. \$210,000. With another \$50,000 cost-shared by the USDOT RITA. Aug. 2008 – June 2011. Principal Investigator.

Inhibitor Longevity and Deicer Performance: A Pooled Fund Study. Funded by *eleven state DOTs* (WA, ID, OR, MT, CO, IN, IO, MN, ND, UT, and VA), USDOT RITA, Redmond Minerals, America West, and Tetra Technologies. \$719,337. Nov. 2007 – Dec. 2010. Principal Investigator.

Development of a Toolkit for Cost-Benefit Analysis of Specific Winter Maintenance Practices, Equipment and Operations. Funded by Clear Roads, a pooled-fund study led by the *Wisconsin DOT*. \$149,500. Nov. 2008 – Aug. 2010. Principal Investigator.

Establishing Best Practices of Removing Snow and Ice from California Roadways. Funded by the *California DOT* and USDOT RITA. \$317,131. Jan. 2008 – June 2010. Co-Investigator.

Validating the Durability of Corrosion Resistant Mineral Admixture Concrete. Funded by the

California DOT. \$390,121. June 2006 - June 2010. With another \$118,000 cost-shared by the USDOT RITA. Principal Investigator.

Laboratory Testing of Mixed Liquid Deicers and Use of Multiple Performance Characteristics for Deicer Selection. Funded by the USDOT RITA. \$50,000. Feb. 2009 – June 2010. Principal Investigator.

An Autonomous and Self-Sustained Sensing System to Monitor Water Quality near Highways. Funded by the *National Research Council*, NCHRP-IDEA. \$120,000. May 2007 – April 2010. Principal Investigator.

Effect of Chloride-Based Deicers on Reinforced Concrete Structures. Funded by the *Washington State DOT*. \$203,001. With another \$20,000 cost-shared by the USDOT RITA. Dec. 2005 – Dec. 2009. Principal Investigator.

Fate and Transport Behavior of Anti-icers and Deicers in Roadside Soils. Funded by the USDOT RITA. \$35,000. Dec. 2007 – June 2008. Co-PI. PI: Dr. Tongyan Pan (Montana State University).

Development of Standardized Test Procedures for Evaluating Deicing Chemicals. Funded by Clear Roads, a pooled-fund study led by the *Wisconsin DOT*. \$100,000. Nov. 2007 – Sept. 2009. Principal Investigator.

Analysis of Maintenance Decision Support System (MDSS) Benefits and Costs. Funded by the Federal Highway Administration and the *South Dakota DOT*. \$155,000. Oct. 2006 – Sept. 2009. Principal Investigator.

Cost Benefit for Weather Information in Winter Maintenance. Funded by the Aurora pooled-fund led by the *Iowa DOT*. \$125,000. March 2007 - March 2009. Principal Investigator.

Laboratory Investigation of Deicer Impact on Concrete Microstructure and Pavement Friction Coefficient. Funded by the USDOT RITA. \$35,000. Jan. 2008 – Jan. 2009. Principal Investigator.

Evaluation of Alternate Anti -icing and Deicing Compounds Using Sodium Chloride and Magnesium Chloride as Baseline Deicers. Funded by the *Colorado DOT*. \$100,000. June 2006 - Dec. 2008. Principal Investigator.

Using Reinforced Native Grass Sod for Biostrips, Bioswales, and Sediment Control. Funded by the *California DOT*. \$276,519. Dec. 2004 – June 2008. Principal Investigator.

Corrosion, Electrochemistry & Analysis Laboratory. Funded by the USDOT RITA. \$116,001. March 2007 - September 2008. Principal Investigator.

An Innovative Coating System for the Corrosion Prevention of Galvanized Steel. Funded by the USDOT RITA. \$48,827. Jan. 2007 - May 2008. Principal Investigator.

Electrochemical Rehabilitation of Salt-Contaminated Concrete: A Laboratory Study. Funded by the USDOT RITA. \$34,403. Nov. 2006 – Mar. 2008. Principal Investigator.

Validating Percent Wet Time Statewide. Funded by the *California Department of Transportation*. \$197,584. June 2006 – Mar. 2008. Principal Investigator.

Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure. Funded by the Airport Cooperative Research Program under *National Research Council*. \$30,000. Mar. 2007– Nov. 2007. Principal Investigator.

Investigating Innovative Research Opportunities Related to the Application of Electrochemistry in Transportation. Funded by the USDOT RITA. \$159,371. November 2005 – April 2007. Principal Investigator.

Evaluation of the UDOT Weather Operations / RWIS Program: Phase I. Funded by the *Utah DOT* and USDOT RITA. \$53,500. Aug. 2005 - Feb. 2007. Principal Investigator. Winner of the *ITS*

America 2007 Award for Best “Return on Investment”.

Corrosion Inhibition Mechanisms at the Steel/Concrete Interface. Funded by the USDOT RITA. \$61,176. May 2005 - Dec. 2006. Principal Investigator.

UTC Materials Corrosion Lab, Phase 1 – Funded by the USODT RITA. \$124,092. September 2005 – September 2006. Principal Investigator.

Synthesis of Vehicle-Based Winter Maintenance Technologies. Funded by the *National Research Council*. \$75,000. Nov. 2005 - Sept. 2006. Principal Investigator.

WeatherShare (Phase I). Funded by the *California DOT*. \$200,000. July 2003 – Dec. 2005. Final Principal Investigator.

Synthesis of Information on Anti-icing and Pre-wetting for Winter Maintenance for the Pacific Northwest Snowfighters Association. Funded by the Pacific Northwest Snowfighters Association through the *Washington State DOT*. \$30,000. Jan. 2005 – Aug. 2005. Principal Investigator.

Materials Corrosion Laboratory: Evaluating Common Corrosion-inhibited Deicers. Funded by the USDOT RITA. \$40,289. December 2003 – March 2005. Principal Investigator.

Recommendations for Winter Traction Materials Management on Roadways Adjacent to Bodies of Water. Funded by the *Montana DOT*. \$25,000. June 2003 - July 2004. Principal Investigator.

Research Activities at Montana State University – Prior to 2003

A Novel Type of Microbial Fuel Cell Utilizing Manganese-Oxidizing Bacteria. Funded by the U.S. Department of Defense Office of Naval Research. 2002-2005. Graduate Research Assistant, NSF Center for Biofilm Engineering, Montana State University. Dr. Shi conducted the preliminary experiments and a comprehensive literature review that contributed to the success of this research proposal.

Biomaterialized Manganese Oxides Deposited on Passive Metals. Funded by the U.S. Department of Defense Office of Naval Research. August 1999 – December 2001. Graduate Research Assistant, NSF Center for Biofilm Engineering, Montana State University. Tools included continuous flow bioreactors, advanced electrochemical systems, UV-Vis, ToF-SIMS, XPS, AFM, and SEM/EDX.

TECHNICAL CONSULTING

- Simpson Strong-Tie, Inc. (2016-Present)

UNIVERSITY SERVICES

- Group Coordinator, Geotechnical & Transportation Engineering, Department of Civil & Environmental Engineering, Washington State University, August 2016 – Present
- Member of the Graduate Studies Committee, Department of Civil & Environmental Engineering, Washington State University, August 2016 – Present
- Member of the Undergraduate Committee, Department of Civil & Environmental Engineering, Washington State University, 2014-2015
- Sustainable, Smart and Resilient Infrastructure Faculty Search Committee, Washington State University, 2017
- Geotechnical Engineering Faculty Search Committee, Washington State University, 2016-2017
- Structural Engineering Faculty Search Committee, Washington State University, 2014-2015

LEADERSHIP EXPERIENCE

- Chair, Session for Pavement Materials: Recent Advances, GeoShanghai 2018 Conference, May 30, 2018, Shanghai, China.
- Chair, Organizing Committee, TRB ADC 60 (*Committee on Resource Conservation and Recovery*) Summer 2018 Workshop, July 15-17, 2018, Spokane, WA.
- Session Chair and Co-Chair of Subcommittee, *1st World Transport Convention*, June 3-6, 2017, Beijing, China.
- Organizing Committee and Co-Chair of Subcommittee, *2nd Transportation Research Congress (TRC)*, May 23-25, 2017, Beijing, China.
- Co-Chair, Organizing Committee, International Workshop on Research Frontier and Reviews, University of Science and Technology, Beijing, China, May 23, 2017.
- Chair, Organizing Committee for 2017 Annual Workshop of IACIP, *Advances in Smart, Sustainable and Resilient Transportation Infrastructure*, held during Transportation Research Board Annual Meeting in January 2017, Washington, D.C.
- Chair of Technical Program Subcommittee and Member of Planning committee, TRB ADC 60 (*Committee on Resource Conservation and Recovery*) Summer 2016 Workshop, July 26-29, 2016, Asheville, North Carolina.
- Organizing committee, 2016 *International Conference on Transportation Infrastructure and Materials*, July 16-18, 2016, Xi'an, China.
- Organizing committee, *International Symposium on Systematic Approaches to Environmental Sustainability in Transportation*, August 2-5, 2015, Fairbanks, Alaska.
- Associate Editor, *Innovations in Corrosion and Materials Science*, 2013-2015.
- Chair, NACE TG 334 - *Corrosion-Related Organizations and Societies*, NACE International, 2010-2012.
- Chair and Special Session Organizer, *Nanotechnology in Civil Engineering*, 3rd International Conference on Smart Materials and Nanotechnology in Engineering (SMN2011), December 5-8, 2011, Shenzhen, China.
- Invited Expert, NCHRP Project 20-7(287), *A Roadmap for Winter Maintenance Research*, Special Meeting, August 2-3, 2010. National Academies' Arnold and Mabel Beckman Center, Irvine, CA.
- Invited Expert, *Nanoscale Research Workshop*. March 5-6, 2009. FHWA Turner-Fairbank Highway Research Center, McLean, VA.
- Chair, *Smart Materials Applications* sessions, 2nd International Conference on Smart Materials and Nanotechnology in Engineering (SMN2009), July 8-11, 2009, Weihai, China.
- [International Association of Chinese Infrastructure Professionals](#) (IACIP), Member since 2011; Chair of Fundraising Committee 2014-2017; Board of Directors, 2014-Present
- Chair, Transportation Research Board AHD65 (*Winter Maintenance*) Subcommittee on Cost/Benefit Analysis of Winter Operations and New Technology, 2011-2015.
- Planning Committee Member, 1st National Winter Maintenance Peer Exchange, 2007.
- Co-organizer, Corrosion Forum by the Pacific Northwest Snowfighters Association, Western Transportation Institute, Montana State University, Bozeman, MT, December 2005.

SELECTED PROFESSIONAL LICENSES, TRAINING, AND SERVICES

- *Registered Professional Engineer*, State of Montana, License #16066, 2007-Present.
- Editorial Board Member, *International Journal of Transportation Science and Technology*, 2018-Present

- Short course: *Online Teaching Orientation*, Washington State University, Spring 2018
- Member of the Dissertation Committee and 1st Opponent, Norwegian University of Science and Technology, Dissertation of Kine Nielsen entitled “*Ice Melting Capacity of Deicing Chemicals in Cold Temperatures*”, 2017.
- Invited Peer Reviewer, Natural Sciences and Engineering Research Council of Canada, 2017
- Invited Peer Reviewer, U.S.-Israel Binational Science Foundation, 2017.
- Academic Committee, 10th *International Conference on Road and Airfield Pavement Technology (ICPT)*, August 8-10, 2017, Hong Kong, China.
- Technical committee, 2017 *International Conference on Transportation Infrastructure and Materials*, June 9-12, 2017, Qingdao, China.
- Scientific committee, 1st *Transportation Research Congress (TRC)*, June 6-8, 2016, Beijing, China.
- Organizing committee, The 6th *IACIP Annual Workshop: Asia-US Infrastructure Technology Exchange Forum*, Jan. 10, 2016, Washington, D.C.
- *ORAP Grant Proposal Development/Writing Course*, Washington State University, Fall 2016.
- Invited Peer Reviewer, Swiss National Science Foundation, 2015.
- Research in sustainable winter roadway operations widely covered in national media, including NPR, Times, USA Today, Washington Times, and Scientific American, during the 2014-2015 winter season.
- Member of the Examining Committee, Faculty of Engineering, University of Waterloo, Dissertation of Kamal Hossain entitled “*Optimum Deicing and Anti-icing for Snow and Ice Control of Parking Lots and Sidewalks*”, 2014
- Invited Speaker, 2nd *International Symposium and Exhibition on Winter Road Maintenance. Safer, Smarter and More Sustainable Winter Transportation*, August 20-22, 2014, Harbin, China.
- Editorial Board Member, *International Journal of Metals*, 2012-2017.
- Invited Panelist, National Science Foundation, 2012.
- Member of the International Advisory Board, 1st *International Workshop on Corrosion and Protection of Materials*, 4-7th Dec. 2012, Hanoi, Vietnam.
- Invited Panel Member, *TCRP Project D-16: Improving the Safety and Sustainability of Stray Current Control of DC-Powered Rail Transit Systems*, 2011-2017.
- Member, Science Committee for the 1st *International Conference in North America on Nanotechnology in Cement and Concrete*, 2010, Irvine, CA.
- Associate Editor, *Pavement and Materials Engineering, and Highway Maintenance*, 10th *International Chinese Conference of Transportation Professionals (ICCTP 2010)*, August 4-8, 2010, Beijing, China.
- Invited Panel Member, *ACRP Synthesis 11-03/Topic S09-02: Common Airport Pavement Maintenance Practices*, 2009. p
- Communications Coordinator, *Committee on Corrosion (AHD45)*, June 2009 – Jan. 2014.
- Short course “*In Situ Bioremediation of Perchlorate in Groundwater*”, Strategic Environmental Research & Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP), Partners in Environmental Technology, Washington, D.C., Dec. 2008.
- Journal referee: profile at: <https://publons.com/author/1238088/>
 - *ACI Structural and Materials Journals*
 - *Advances in Materials Science and Engineering*

- *Advances in Polymer Technology*
- *Anti-Corrosion Methods and Materials*
- *Applied Clay Science*
- *Applied Sciences*
- *ASCE Journal of Cold Regions Engineering*
- *ASCE Journal of Materials in Civil Engineering*
- *ASCE Journal of Transportation Engineering*
- *Bioresources*
- *Carbohydrate Polymers*
- *Chemical Papers*
- *Coatings*
- *Cold Regions Science and Technology*
- *Colloids and Surfaces A: Physicochemical and Engineering Aspects*
- *Composite Interfaces*
- *Computational Science & Discovery*
- *Computer-Aided Civil and Infrastructure Engineering*
- *Computers and Concrete*
- *Construction and Building Materials*
- *Corrosion Science*
- *Ecological Engineering*
- *Energy and Buildings*
- *European Journal of Environmental and Civil Engineering*
- *IEEE Sensors Journal*
- *Industrial & Engineering Chemistry Research (ACS)*
- *International Journal of Concrete Structures and Materials*
- *International Journal of Damage Mechanics*
- *International Journal of Molecular Sciences*
- *International Journal of Pavement Engineering*
- *International Journal of Pavement Research and Technology*
- *International Journal of Smart and Nano Materials*
- *International Journal of Sustainable Transportation*
- *Journal of Cleaner Production*
- *Journal of Composite Materials*
- *Journal of Infrastructure Systems*
- *Journal of Intelligent Material Systems and Structures*
- *Journal of Materials: Design and Applications*
- *Journal of Materials Engineering and Performance*
- *Journal of Policy Analysis and Management*
- *Journal of Solid State Electrochemistry*
- *Journal of Structural Integrity and Maintenance*
- *Journal of Sustainable Cement-Based Materials*
- *Journal of Testing and Evaluation (ASTM)*
- *Journal of the Taiwan Institute of Chemical Engineers*
- *Journal of Zhejiang University-Science A*
- *Materials Chemistry and Physics*
- *Materials and Structures (RILEM)*

- *Materials*
- *Molecules*
- *Nanomaterials*
- *Nanoscale*
- *Neural Computing and Applications*
- *Proceedings of the Royal Society A*
- *Progress in Organic Coatings*
- *Resources, Conservation & Recycling*
- *Road Materials and Pavement Design*
- *Scanning: The Journal of Scanning Microscopies*
- *Sensors & Actuators: B. Chemical*
- *Smart Materials and Structures (IOP)*
- *Structures and Buildings (ICE)*
- *Surface and Coatings Technology*
- *Sustainability*
- *The Journal of Physical Chemistry (ACS)*
- *Transactions in GIS*
- *Transportation Research Record (TRB)*
- *Transportation Research Part D: Transport and Environment*
- *Transportmetrica A: Transport Science*
- *Waste Management*
- *Water Research*
- Proposal Reviewer for Funding Agencies: *U.S. Department of Energy's Office of Technology Transitions*, 2018; *Transportation Consortium of South-Central States (Tran-SET) UTC*, 2017; *Center for the Advancement of Science in Space (CASIS)* , 2015; *Minnesota Sea Grant*, 2015; *Region II University Transportation Center*, 2015; *TransNow* at the University of Washington and the Washington State University, 2009, 2010, & 2011; *Ohio Transportation Consortium*, 2008; *Midwest Regional University Transportation Center*, 2004.
- *ITS Systems Certificate*, Consortium for ITS Training and Education, University of Maryland, Spring 2004.
- One-day course “*ITS Telecommunications*”, National Highway Institute, Denver, CO, 2003.
- Environmental Engineering Ph.D. Program at Montana State University, including coursework: ENVE540 (*Environmental Engineering Processes*), ENVE541 (*Environmental Engineering Reactors*), ENVE546 (*Fundamentals of Biofilm Engineering*), ENVE 545 (*Chemical Sensors and Environmental Biotechnology*), ENVE547 (*Biofilm Process Engineering*), and STAT401 (*Applied Statistical Methods*), 1999-2000.

PROFESSIONAL MEMBERSHIPS – SELECTED

- Academic Member, The Graphene Council, 2016-2017
- TRB *Standing Committee on Durability of Concrete (AFN30)*, Member, 2016-2019.
- TRB *Standing Committee on Resource Conservation and Recovery (ADC60)*, Member, 2016-2021.
- TRB *Standing Committee on Geo-Environmental Processes in Soils (AFP40)*, Member, 2015-2018.
- ASCE Construction Institute (CI) Bituminous Materials Committee, Member since 2014; Control Member since 2016

- Affiliated Faculty, WSU Center for Environmental Research, Education, and Outreach, 2014-Present.
- Affiliated Faculty, WSU Composite Materials & Engineering Center, 2014-Present.
- Member, ASCE Environmental & Water Resources Institute, 2013-Present.
- American Society of Civil Engineers (ASCE), Member since 2007 (No. 482177).
- Montana Institute on Ecosystems, Associate Faculty, 2011-2014.
- [American Nano Society](#), Invited member since 2011.
- National Association of Corrosion Engineers (NACE), Member since 2002.
- AASHTO Technical Committee for Bridge Preservation (T-9), Friend 2010-2013.
- Transportation Research Board (TRB), National Academies, Individual Affiliate 2005-2013.
- TRB AHD65 (Winter Maintenance) Subcommittee on Sustainability, Member, 2015-Present
- TRB *Standing Committee on Basic Research and Emerging Technologies Related to Concrete (AFN10)*, Member, 2005-2014.
- TRB *Standing Committee on Polymer Concretes, Adhesives, and Sealers (AHD40)*, Member, 2006-2015.
- TRB *Standing Committee on Corrosion (AHD45)*, Member, 2005-2014.
- TRB *Standing Committee on Winter Maintenance (AHD65)*, Member, 2006-2014.
- American Concrete Institute (ACI), Member since 2007.
- ACI Committee 236, Material Science of Concrete, Associate Member since 2009.
- ACI Committee 222, Corrosion of Metals in Concrete, Associate Member since 2009.
- ACI Committee 201, Durability of Concrete, Associate Member since 2009.
- Association of Chinese Corrosion Engineers (ACCE) International, Member since 2004; Member of the Board of Directors 2006-2007.
- American Chemical Society (ACS), Member, 2006.
- Materials Research Society (MRS), Member, 2006-2008.
- Society of Automotive Engineers (SAE), Member, 2006-2008.
- American Society of Quality (ASQ), Member 2002-2004.
- Chinese Society for Corrosion and Protection (CSCP), Member 1996-1999.

COLLABORATORS & OTHER AFFILIATIONS

(i) Collaborators (47)

Dr. Idil Akin (Washington State University);
 Dr. Marc Beutel (University of California, Merced);
 Dr. Indranil Chowdhury (Washington State University);
 Dr. Yudong Dang (Yunnan Key Laboratory of Building Structure and New Materials);
 Dr. Nele de Belie (Ghent University, Belgium);
 Dr. Wei Fan (University of North Carolina – Charlotte);
 Dr. Decheng Feng (Harbin Institute of Technology);
 Dr. Liping Fu (University of Waterloo);
 Dr. Hongwei Gao (Montana State University);
 Dr. Yong Ge (Harbin Institute of Technology);
 Dr. Ali Hajbabaie (Washington State University);
 Dr. Leila Hajjibabai (Stony Brook University, New York);
 Dr. Liv Haselbach (Lamar University, Texas);
 Dr. Zbigniew Lewandowski (Montana State University);

Dr. Yongxin Li (Anhui Normal University);
Dr. Juanyu Liu (University of Alaska);
Dr. Kefei Liu (Central South University of Forestry and Technology, China);
Dr. Yajun Liu (Guangdong University of Technology);
Dr. Thomas Long (Kent State University);
Dr. Robert Melchers (The University of Newcastle, Australia);
Dr. Julian Mills-Beale (California Baptist University);
Dr. Balasingam Muhunthan (Washington State University);
Dr. Tuan Anh Nguyen (Vietnam Academy of Science and Technology);
Dr. Keat Ghee Ong (Michigan Tech);
Dr. Fernando Pacheco-Torgal (University of Minho, Portugal);
Dr. John Petrie (California State University, Los Angeles);
Dr. Yan Qi (Southern Illinois University);
Dr. Pizhong Qiao (Washington State University);
Dr. Andres Saez Perez (Universidad de Sevilla, Spain);
Dr. Surendra Shah (Northwestern University);
Dr. Houbing Song (West Virginia University);
Dr. Kim Van Tittelboom (Ghent University, Belgium);
Dr. David Veneziano (Iowa State University);
Dr. Xinjun Wang (Chinese Academy of Transportation Sciences);
Dr. Zhaohui Wang (Michigan Tech);
Dr. David W. Watkins (Michigan Tech);
Dr. Richard Watts (Washington State University);
Dr. David Wingard (Clemson University);
Dr. Shenghua Wu (University of South Alabama);
Dr. Ning Xie (University of Jinan);
Dr. Pengfei Xue (Michigan Tech);
Dr. Qing Yang (University of North Texas);
Dr. Zhirui Ye (Southeast University);
Dr. Zhanping You (Michigan Tech);
Dr. Xiong (Bill) Yu (Case Western Reserve University);
Dr. Xun Yu (New York Institute of Technology);
Dr. Kun Zhang (California State University, Chico);
Dr. Jing Zhong (Harbin Institute of Technology).

(ii) Graduate and Postdoctoral Advisors (3)

Ph.D. Advisor: Dr. Yunzhao Yu, Research Professor Emeritus of Polymer Chemistry, Institute of Chemistry, Chinese Academy of Sciences; M.S. Advisors: Professor Emeritus Shizhe Song, School of Materials Science and Engineering, Tianjin University, China. The late Prof. Dr. Donald Boyd, Department of Industrial & Management Engineering, Montana State University, Bozeman.

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