

CIVIL AND ENVIRONMENTAL ENGINEERING

DEPARTMENT SEMINAR



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Date: Friday June 16th, 2023

Time: 12:30pm – 1:30pm EST

Location: Bingham Bldg., Room #240

Zoom Link: [Here](#)

Nanotechnology is Key to More Sustainable and Durable Concrete Infrastructure

Abstract: Over the last decade, nanotechnology has demonstrated great potential in contributing to durable and environmentally friendly concrete. This talk starts from a few recent innovations published by the WSU Smart and Green Infrastructure Group, where the value of coal fly ash was unlocked using a novel nano-sized material, graphene oxide (GO). For instance, a patented geopolymer technology hinges on the use of GO in the waterglass activated fly ash to produce a "greener" cementitious binder. GO selectively altered the distribution of different hydration precursors, promoted the formation of certain hydrates, and improved the polymerization degree of fly ash geopolymer. The 28-d compressive strength of geopolymer pastes (w/c 0.35) was increased by 23% by the admixed GO at 0.02% by mass of fly ash. Subsequently, this talk reports other nanotechnology enabled innovations, including the beneficial use of fly ash, silica fume and waste medical masks in concrete, as well as the use of GO and/or nanoclay to enhance the utilization of fine aggregate, penetrating sealer, and externally bonded FRP for more durable concrete infrastructure. This talk concludes with a discussion of ongoing initiatives at WSU related to diversion of waste streams to value-added application in concrete.

Bio: Dr. Shi is the Chair and a Professor at the Department of Civil & Environmental Engineering, Washington State University, Pullman. He also serves as the Founding Director of the National Center for Transportation Infrastructure Durability and Life-Extension (TriDurLE) and the Editor-in-Chief for the Journal of Infrastructure Preservation & Resilience. A Fellow of the American Society of Civil Engineers (ASCE), he has more than 20 years of experience in conducting engineering and science research, with a demonstrated publication record (H index of 52). Two of his projects won the AASHTO Sweet Sixteen Award and Supplementary Award, respectively. Three graduate students he mentored won a nationwide competitive scholarship by the American Coal Ash Association Educational Foundation in 2017, 2018, and 2020, respectively. One of his papers was the Best Paper 2011-2012 by the ASCE Journal of Cold Regions Engineering, and another won the 2020 Most Cited Paper Award by the Resources, Conservation & Recycling journal.