

CIVIL & ENVIRONMENTAL ENGINEERING GRAD STUDENT SEMINAR ANNOUNCEMENT

Leveraging emerging technologies to address the crisis of aging concrete infrastructure

Dr. Xianming Shi
Department Chair
Civil & Architectural Engineering
University of Miami

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Aging concrete infrastructure faces accelerating deterioration from deferred maintenance, environmental exposure, and climate change, creating urgent demand for cost-effective, durable solutions. Meeting this challenge requires an integrated rehabilitation framework that unites electrochemical treatments, advanced repair materials and methods, and digital technologies. Electrochemical methods such as chloride extraction and cathodic protection can halt active corrosion of reinforcement, while advanced materials enable resilient, minimally disruptive repairs. Emerging approaches in additive manufacturing and robotics further expand options for rapid, customized interventions. At the systems level, nondestructive evaluation, artificial intelligence, structural health monitoring, and digital twin platforms support data-driven diagnosis and proactive, life-cycle management. This talk contends that only through interdisciplinary collaboration can we achieve the necessary paradigm shift, from reactive fixes to predictive, holistic rehabilitation, ultimately extending service life and enhancing the safety, sustainability, and resilience of our concrete infrastructure. The presenter will share some case studies of the emerging technologies from his recent studies, including ultra-high-performance concrete, strain-hardening cementitious composites, fiber-reinforced polymers, and self-healing concrete.



Dr. Xianming Shi
Chairman and Professor
Civil & Architectural Engineering
University of Miami

Dr. Xianming Shi, P.E. is the Chairman and a Professor at the Department of Civil & Architectural Engineering, University of Miami. He is the Founding Director of the National Center for Transportation Infrastructure Durability and Life-Extension and Editor-in-Chief for the Journal of Infrastructure Preservation & Resilience. He is a Fellow of ASCE and a Senior Member of the National Academy of Inventors, with more than 20 years of experience in R&D. Two of his projects won the AASHTO Sweet Sixteen Award and Supplementary Award, respectively. He obtained his Ph.D. in Chemistry from the Chinese Academy of Sciences in 1999.