香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

土木及環境工程學系
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

SEMINAR

LOW-CARBON AND CARBON-NEGATIVE INITIATIVES IN CEMENT AND CONCRETE

Speaker

Prof. Hongyan Ma

Missouri University of Science and Technology (S&T)

Abstract

Climate change is a global challenge. Reducing anthropogenic emissions and atmospheric CO_2 concentrations is critical to curb climate change, which requires a large-scale shift to low-carbon and carbon-negative paradigms. Concrete could play an important role in this shift, as the carbon-intensive cement can be substituted with carbon-neutral solid wastes, and, further, all concrete components can potentially store CO_2 through mineralization. This talk will briefly introduce advances in low-carbon cementitious materials, and then focus on new and emerging carbon-negative initiatives in cement and concrete, including opportunities and pathways for carbon-negative supplementary cementitious materials (SCMs), carbon-negative alternative binders, and carbon-negative aggregate. Raw materials, processing, production, and performance of these materials will be presented, and their implementation perspectives will also be discussed.

Biography

Dr. Hongyan Ma is a professor holding the Kummer Impact Professorship and Francisco Benavides Scholarship, affiliated with Civil Engineering, Chemical Engineering, and Energy Economics at the Missouri University of Science and Technology (S&T). He joined Missouri S&T as an assistant professor in 2015, following a 7-year journey as a PhD student and a Postdoctoral Fellow at the Hong Kong University of Science and Technology; he was promoted to Associate Professor with tenure in 2021 and to Full Professor in 2025. Dr. Ma has been directing the Laboratory of Future Cements and Carbon-negative Initiatives to conduct research regarding innovative cement-related concepts, smart systems for testing and evaluation, multi-scale characterization and modeling, concrete deterioration and mitigation, gigaton-scale CO_2 mineralization, thermal energy storage, and critical mineral recovery. Dr. Ma's research has received funding from the National Science Foundation, the Department of Transportation, the Department of Energy, the Department of Defense, private foundations, and industry, totaling >$17M. He has published more than 150 papers in prestigious journals and received over 11,000 citations with an h-index of 58. He has also co-founded two startup companies in the field of low-carbon cement.

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