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應用物理及材料工程研究院
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INSTITUTE OF APPLIED PHYSICS AND MATERIALS ENGINEERING



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IAPME Seminar

Celebrating the 45th Anniversary of the University of Macau: Insights into early hydration of Alite in diluted suspension: onset of accelerated period as a kinetic window for in-situ polymerization toughening



17 April 2026

Prof. Jinhui TANG
Southeast University

Venue: N23-3022

Time: 14:00 - 15:00

Hosted by: Prof. Bimmeng CHEN

Abstract

The intrinsic brittleness of cement-based materials arises from the formation and evolution of hydration product microstructures. A deep understanding of early-stage hydration mechanisms is fundamental for achieving directed microstructure regulation and optimizing macroscopic toughness. This study reveals that the onset of the accelerated hydration period of Alite is governed by the synergistic control of a critical calcium ion concentration and surface nucleation site density. Then, we envision the interplay between early-stage hydration kinetics and in-situ polymerization kinetics, which holds great potential to fundamentally alter the brittle nature of cement-based materials, proposing their synergistic matching to explore a new regulatory pathway from "passive crack resistance" to "active crack prevention," providing scientific support for developing high-toughness, high-crack-resistance cement-based materials.

Biography

Prof. Jinhui TANG, National high-level young talent program, is now an Associate Professor and doctor's supervisor at the School of Materials Science and Engineering at Southeast University, and a scholar of "Zhishan". His main research areas include: organic-inorganic composite novel functional materials, green low-carbon engineering materials, mineral dissolution and microstructure evolution, and the design and development of new polymer admixtures. He has published over 70 high-quality papers in top journals such as "Cement and Concrete Research", "Cement and Concrete Composites", and "Research". His achievements have won the Second Prize for Basic Theory of the China Building Materials Federation Science and Technology Award (ranked 1st) and the First Prize for Science and Technology Progress (ranked 5th). He is currently leading and undertaking over 10 scientific research projects including National Natural Science Foundation of China and Key Research Program of National Key Development Plan.