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IAPME Seminar

Research on the Mechanism of Mineral Additives in Magnesium Phosphate Cement System

03 December 2025

Prof. Bing CHEN
Shanghai Jiao Tong University

Venue: N23-1004b
Time: 10:00 - 11:00
Hosted by: Prof. Guoxing SUN

Abstract

Magnesium phosphate cement (MPC) is a special type of cement with chemical bonding properties similar to those of ceramic materials. Compared with ordinary Portland cement (OPC), MPC has the advantages of rapid setting, early high strength, high bonding strength, small shrinkage upon drying, and good wear resistance. Due to the significant differences in raw material composition, reaction process, and hydration products between MPC and OPC, the explanation of the mineral admixture action mechanism for OPC does not apply to the MPC system. This study proposes a method for testing the activity of mineral admixtures in the MPC system, investigates the effects of mineral admixtures on the working performance, mechanical properties, and water resistance of MPC, analyzes the influence of mineral admixtures on the hydration products and microstructure, clarifies the mechanism of mineral admixtures (such as fly ash, slag, and microsilica powder) in the MPC system, and provides technical guidance for the low-cost production of magnesium phosphate cement.

Biography

Prof. Bing CHEN, PhD, is a Tenured Professor and Doctoral Supervisor at Shanghai Jiao Tong University. He has long focused on the development and engineering application of new building materials, with outstanding achievements in low-carbon green cementitious materials, air-conditioning wall materials, and the synthesis and characterization of smart cement-based composites. His core innovations include: developing thermal insulation and humidity-regulating wall materials based on the micro-nano pore structure of natural materials; proposing the alkali-free activation theory for aluminum-silicon-iron phases in industrial wastes in magnesium phosphate cement (MPC); revealing the seepage conductivity law and resistance-Kaiser memory effect of carbon fiber-reinforced cement-based composites; and establishing the corresponding relationship between concrete damage and acoustic emission signals. He has presided over and completed more than 30 scientific research projects of various types, including the National Natural Science Foundation and key R&D projects of the Ministry of Railways. He has published over 250 academic papers (including 200 indexed by SCI, with more than 17,000 non-self citations), obtained 27 authorized domestic and foreign invention patents, and won 8 awards such as the Shanghai Science and Technology Progress Award and the Huaxia Construction Science and Technology Award. Since 2019, he has been continuously selected as a Highly Cited Researcher in Civil and Structural Engineering in Mainland China by Elsevier. He also serves as a Senior Editorial Board Member of Construction and Building Materials and an Editorial Board Member of several domestic and foreign journals including Journal of Building Materials.

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