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Special Issue Reprint

Reaction Mechanism and Properties of Cement-Based Materials (2nd Edition)

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Cement is a fundamental building material whose performance is governed by its complex, multi-scale microstructure. A thorough understanding of the relationship between the characteristics of hydration products, pore features, and the resulting macroscopic properties is crucial for designing more efficient, durable, and sustainable construction materials. This reprint brings together cutting-edge research across several key domains, including the modification of grouting materials using graphene oxide/nano-silica hybrids, the sustainable use of industrial by-products and agricultural wastes, and advanced material design enabled by the synergistic application of limestone powder and rice husk ash. It further addresses topics such as the incorporation of plant fibers in geopolymer concrete, performance optimization of fiber-reinforced lightweight aggregate concrete, and the influence of raw material fineness on clinker burnability and rheological behavior. It also covers critical advances in deformation control and strength enhancement through the combined use of MgO expansive agents and internal curing technology. By exploring diverse mechanisms from alkali migration in raw materials to the synthesis of high-belite cement from solid waste, the reprint provides a holistic perspective on emerging innovations that advances the construction materials field toward greater sustainability and resilience.

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