

# Role of Nanomaterials in Improving Pozzolanic Properties of Blended Cement: A Review



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**Abstract** Nanoscience and nanotechnology are the most commonly used keywords in today's academic and professional circles. Nanomaterials have emerged as a significant technological advancement, showcasing exceptional properties in various fields such as mechanical, electrical, and thermal applications. The cement industry has also witnessed the integration of nanomaterials due to their remarkable characteristics. This review article investigates the potential of utilizing nanoparticles as substitutes for cement, benefiting from their advantageous characteristics such as small particle size, high reactivity, and large surface area. Furthermore, this paper provides a summary of prior research studies that have analyzed the impact of nanoparticles on various concrete properties, including workability, mechanical strength, and durability. The insights gained from this review will significantly enhance our understanding of the potential applications and advantages of nanomaterials in the cement industry, thus paving the path for future advancements in cement technology.

**Keywords** Nano · Durability · Pozzolanic · Hydration · Mortar · Environment

## 1 Introduction

Nanotechnology has a significant influence in the construction field and has developed long-lasting, high-performance building materials. The fundamental qualities of conventional building materials have been improved mainly due to the unique scientific advances in the field of nanotechnology, which have made it possible to utilize a variety of nanoscale materials with diverse features [1].

Nanotechnology has several applications in various industries, and the concrete industry is no exception. However, most nanotechnology applications in the concrete industry are still limited to laboratory research [2].

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