

Special Issue

Recent Applications of Low-Carbon Cementitious Materials and Coatings

Message from the Guest Editors

The production of ordinary Portland cement (OPC) is responsible for nearly 8% of global CO₂ emissions, driven by limestone calcination and high-temperature combustion. In response, low-carbon cementitious materials (LCCMs)—including alkali-activated materials (geopolymers), limestone calcined clay cements (LC3), CO₂-solidified carbonate materials (CSCMs), calcium sulfoaluminate cement (CSA), and supersulfated cements (SSCs)—have emerged as promising alternatives. These systems reduce or eliminate clinker by leveraging industrial by-products (e.g., fly ash, slag, metakaolin) or CO₂-curing reactions. From a materials science perspective, LCCMs exhibit different phase assemblages, pore structures, surface chemistries, and ion transport mechanisms compared to OPC, influencing durability and interfacial properties critical to coating performance. While extensive research has focused on mechanical and durability characteristics, surface and near-surface behavior remains underexplored. This Special Issue aims to bridge cement chemistry, surface science, and coating technology, sustainable solutions. The scope includes alkali-activated materials, LC3, CSCMs, CSA, SSCs, and other LCCMs.

Guest Editors

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About the Journal

Message from the Editor-in-Chief

Now more than ever, research is asked to deliver knowledge and technologies to solve the major challenges faced by our society. The development of new materials and devices for (without the ambition to be exhaustive) energy, health and food technology, together with the need for establishing processes that reduce the impact on critical resources and the environment, is indeed in the spotlight of most contemporary research. Surface science and engineering play a key role in this regard, with an incredible potential in delivering new and deep scientific understanding and technical solutions essential to solve most of the major societal challenges.

Coatings is a well-established, peerreviewed, online journal dedicated to the vibrant field of surface science and engineering. Coatings publishes original research articles that report cutting-edge results and review papers that make the point on the hottest research topics.

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