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Construction Materials

Editorial

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We are delighted to present this themed issue of Construction Materials, featuring selected papers from the Sixth International Conference on Sustainable Construction Materials and Technology (SCMT6). The construction materials sector is among the largest global consumers of natural resources. While significant progress has been made in promoting sustainability, considerable opportunities remain for further innovation and impact. The SCMT conference series serves as a platform for showcasing case studies and research that demonstrate novel and effective strategies for enhancing sustainability in construction materials and technologies.

SCMT6 was held from 9 to 14 June 2024 at the University of Lyon (ENTPE), France, where approximately 85 papers were presented to an audience of over 100 delegates. This conference follows five successful prior editions held in Coventry, UK (2007); Ancona, Italy (2010); Kyoto, Japan (2013); Las Vegas, USA (2016); and London, UK (2019). These events have consistently attracted participation from government representatives, engineers across both public and private sectors, academics, students, material suppliers, and construction professionals. While previous conferences have highlighted contemporary practices and emerging research, they have also underscored the ongoing need for further investigation and practical implementation in this critical field. SCMT6 sustained this momentum as part of an ongoing effort to facilitate technological transfer.

The conference received support from several esteemed organizations, including the Institution of Civil Engineers (ICE), the American Concrete Institute (ACI), Engineers Australia, the Canadian Society of Civil Engineers, and the Masonry Society (USA), alongside the University of Lyon (ENTPE) and the University of Nevada, Las Vegas. Among the many high-quality submissions, the awards committee selected several papers for potential publication. The four papers included in this themed issue were among those chosen and underwent rigorous review in accordance with the journal's standard peer-review guidelines.

Looking ahead, the next installment of the conference series, SCMT7, is scheduled to take place in 2027, with the location to be announced. Further information will be available at https://www.scmt-conferences.com.

Collectively, these four papers represent a broad spectrum of topics contributing to the sustainability of the built environment. Sustainability has remained a central focus of research in construction materials over the past two decades, and it is anticipated to continue as a priority well into the future. Although challenges persist, sustainability is now firmly embedded within both research and practice, a trend that is strongly reflected in the content of this journal.

Granulated blast furnace slag (GBS), a by-product of the steel industry, has been the subject of extensive research aimed at its sustainable reutilization. Over the past several decades, scholars worldwide have explored various strategies for upcycling this material in different applications. Venkataramu and Reddy (2025) investigated the feasibility of employing processed granulated blast furnace slag (PGBS) as fine aggregate in structural concrete. Utilizing a vertical shaft impactor to enhance particle morphology, their study demonstrates that PGBS can serve as a complete replacement for natural river sand in normal-strength concrete with negligible effects on its mechanical properties. This finding underscores PGBS as a viable and environmentally sustainable alternative to conventional sand extraction practices.

Ojedokun and Mngat (2025) conducted an extensive investigation into corrosion thresholds in alkali-activated concrete (AAC). By systematically measuring hydroxyl (OH^-) and chloride (Cl^-) concentrations in pore solutions over a 1,750-day exposure period, their study revealed that AAC exhibits a significantly higher chloride threshold for corrosion initiation compared to Portland cement (PC) concrete. Furthermore, the presence of sulphur-containing compounds on the steel surface within AAC appears to inhibit corrosion progression, enabling reinforcement to endure higher Cl^-/OH^- ratios. These findings highlight the potential durability advantages of AAC in aggressive environments, reinforcing its viability as a sustainable alternative to conventional cement-based materials.

The protection of concrete is essential for preserving its mechanical properties and durability, thereby mitigating the risk of costly repairs and potential safety hazards. One effective approach is silane treatment, which forms a hydrophobic barrier that inhibits chloride ingress, alkali-silica reaction, and freeze-thaw damage. However, evaluating the long-term efficacy of such treatments remains a complex challenge. Nagaoka *et al*. (2025) investigated the use of electrochemical impedance spectroscopy (EIS) with a four-probe method to assess the durability of silane-treated concrete. Through a combination of experimental analysis and finite

element (FE) modelling, their study demonstrated that the impedance response is highly sensitive to both the non-uniform thickness of the silane layer and the electrode spacing. These findings underscore both the potential and the limitations of EIS as a non-destructive evaluation tool for assessing the protective performance of silane treatments.

The disposal of industrial waste presents a significant environmental challenge, necessitating its incorporation into construction materials as a viable and sustainable alternative. Martins *et al*. (2025) analysed the influence of zeta potential on the performance of ready-mix mortars containing waste-derived materials. Zeta potential governs particle interactions in the fresh state, subsequently influencing air-entrainment behaviour and, ultimately, the mechanical properties of the hardened material. The study demonstrates that zeta potential is a critical determinant of the interactions between additives and waste materials in mortar, impacting both its fresh-state workability and long-term durability.

We trust that this themed issue of *Construction Materials* offers valuable insights for researchers and industry professionals. Additionally, readers are encouraged to explore the journal's latest articles, available ahead of print on the ICE Virtual Library, for early access to emerging research.