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Editorial

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The Institution of Civil Engineers' *Construction Materials* journal continues to disseminate and publish the latest international research on construction materials related to all aspects of a material's life, including embodied energy, environmental impact, service life, refurbishment, recycling and reuse. Development of materials solutions, processes and technologies to enhance the sustainability of infrastructure and structures remains an open and an urgent challenge for the construction sector. Research streams in this field can be broadly divided into efforts on the development of innovative low carbon dioxide or high-performance materials and those on the development of strategies to extend the service life, durability and performance of traditional materials and structures. As well as being the subject of the current issue, these are, naturally, ongoing themes of the papers published herein.

It is my privilege and pleasure to write this issue's editorial introducing four interesting and timely papers covering both research streams mentioned above and on materials applicable to a range of infrastructure including roads, bridges, buildings and geotechnical structures. The issue, in this sense, presents an interesting and diverse combination of innovative approaches in addressing sustainability of construction materials. It is also worth mentioning that the journal publishes its most recent articles Ahead of Print on its Virtual Library homepage (https://www.icevirtuallibrary.com/toc/jcoma/0/0).

Incorporation of industrial wastes in production of construction materials with improved performance, properties or sustainability indicators is one of the common strategies adapted in the current research streams. This strategy has a twofold benefit. On the one hand, it allows the use of excessive industrial waste commonly discarded into landfill with extreme environmental consequences and, on the other hand, it enables development of innovative low carbon dioxide construction materials or improving the performance and sustainability of traditional ones. The first paper in this issue, from Malaysia and presented by Yadav (2023), addresses this by interrogating the feasibility of using tyre rubber waste in stabilisation and enhancement of the performance of clay. The annual growth of tyre waste is about 1.0 billion tonnes globally, most of which are discarded into landfill. Application of tyre waste to clays for stabilisation or performance enhancement improvements is, therefore, of extreme interest. The paper, building upon the existing literature, demonstrates that incorporation of waste tyre rubber leads to improvement of the ductility of clay while decreasing its strength. These results highlight the advantages of this technique and the need for achieving a balance between strength and ductility in these novel composites.

Another research stream is on the development of strategies to increase the service life performance of traditional infrastructure materials. The second paper, from Iran and presented by Vamegh *et al*. (2023), is aligned with this stream, and investigates the effect of adding Lucobite (a new polymer) or styrene butadiene styrene (SBS; a conventional polymer) in asphalt mixtures on improving their performance. The paper shows that, although the asphalt mixtures prepared with Lucobite did not achieve the performance of asphalt mixtures prepared with SBS, their fatigue resistance increased by 40%.

The third paper, from India and presented by Reddy and Reddy (2023), is also aligned with this research stream. This paper is focused on rutting as one of the most common deterioration mechanisms of thick bituminous pavements in hot climatic conditions. Building on the previous literature, the authors show grouting the bituminous mixes can be an effective strategy in improving their resistance to rutting. Further investigations in this field, combined with a detailed life-cycle analysis, can be beneficial in better understanding the benefits of this technique.

Efforts on the development of infrastructure materials with extreme mechanical properties are the subject of another research stream aligned with the theme of this issue. Ultra-high-performance concrete (UHPC) with a minimum compressive strength of 150 MPa is one of these materials. There is already a vast body of literature on the assessment or improvement of the performance of these materials. UHPCs are also currently being used in several infrastructure development projects. Aiming at enhancing our capabilities in modelling and design of these materials, the fourth paper, from the USA and presented by Carey *et al*. (2023), presents an experimental

study on the role of curing conditions on the stress–strain and macro-mechanical properties of these materials.

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