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Construction Materials

Editorial

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Greetings to all our readers. As always, *Construction Materials* seeks to publish original research and practice papers of the highest quality on procurement, specification, application, development, performance, and evaluation of materials used in construction and civil engineering. The journal is as relevant as ever and is at the forefront of dissemination of cutting-edge knowledge and is committed to publishing excellent articles. Our peer review system is completely online, processing of manuscripts is getting faster and the best of research in construction materials gets published – thanks to a fantastic editorial team at Emerald Publishing.

The March 2024 issue of *Construction Materials* is a blend of five papers encompassing a wide range of construction materials from the nano to the macro such as graphene, carbon nanotubes, plastering sand, electromagnetic interference (EMI) shielding concrete and stainless steel. Except for the paper dealing with stainless steel, the rest rely on rigorous well planned experimental work.

The leading paper explores the use of graphene in civil engineering applications by a cross collaborative effort with industry (Cunningham *et al.*, 2024). A nanometre thick material, graphene shows immense potential for use in all the laboratory studies conducted to date. Given that known field applications in civil engineering is scarce, a sizable field application *via* a ground bearing slab constructed in 2021 using C28/35 grade concrete with CEM I cement type demonstrates the potential waiting to be tapped (Figure 1). By using graphene, a significant improvement in strength is noticeable compared to control concrete cast in an adjacent slab portion. However, the key challenge is in ensuring adequate dispersion within fresh concrete before placement in position. This paper demonstrates the viability of graphene in practice by demonstrating repeatability of test results which is aided by appropriate selection of graphene at the right particle size. Since, the flexural strength of graphene infused concrete is enhanced, a 15% reduction in the section size of the ground bearing slab is possible, which bodes well for a sustainable future as the carbon footprint is significantly reduced.

Figure 1. Solstice Park development: slab pour with graphene infused concrete underway

An interesting paper (Das *et al.*, 2024) deals with development of a low-cost electromagnetic interference (EMI) shielding cement-based concrete using locally available materials. Having used a combination of heavy weight aggregate such as magnetite and light weight aggregate graphite, a significant step up in shielding effectiveness is seen with 2% steel fibres. Since, 20% of the cementitious content consists of ground granulated blast furnace slag, it is not surprising to note the excellent durability properties.

Unlike graphene, carbon nanotubes (CNT) are made of sheets of graphene rolled up to form single and multi-walled nanotubes (MWCNTs) (Barbhuiya and Das, 2024). Using MWCNTs, the fundamental behaviour of cement at the nanoscale level was studied. The localised Young's modulus and

hardness of cement paste with short MWCNTs were certainly higher, as was the durability with respect to control specimens.

The use of stainless steel in reinforced concrete can lower the risk of corrosion and hence, minimise the associated repair and rehabilitation costs as well (Rabi, 2024). However, this advantage is often swept aside as its upfront cost is expensive relative to the carbon steel reinforcement. One of the key aspects of performance by which any metal reinforcement is measured is its bond to the surrounding concrete. This paper reports on a bond prediction equation using the artificial neural network and finds the existing provisions in Eurocode 2 and fib Model Code far too conservative. The last paper (Owoyemi and Afolagboye, 2024) examines suitability of the sand from four quarry pits and four sources from nearby stream channels for plastering purpose chiefly from the point of prolonged water retention.

I hope you will enjoy reading this issue and would be encouraged to discuss all the papers further. Stay safe and healthy.

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