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Editorial
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Editorial

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The six papers in this issue of *Advances in Cement Research* again reflect the breadth and diversity of research in the field, while continuing the journal's approach to publishing work that sometimes falls outside of the mainstream.

The first two papers, by El-Didamony *et al.* (2014) and Salman *et al.* (2014), consider the valorisation of waste materials in cementitious binders. El-Didamony *et al.* have looked at blending heated drinking water treatment sludge (DWTS) with Portland cement and the impact of this on performance. It has previously been reported that DWTS alone has a detrimental effect on performance (Rodrıguez *et al.*, 2010), but El-Didamony *et al.* (2014) have found that the addition of sulfates to the blends countered this, thus opening up a potential avenue for the re-use of this increasingly common waste material. Meanwhile, Salman *et al.* have looked at another material for which there is no current use, continuous casting stainless steel slag. This slag is a crystalline powdered material, which, as an industrial by-product, would help to reduce the environmental burden of cement and concrete if it could be incorporated into a cementitious material. Salman *et al.* (2014) have taken a different approach to El-Didamony *et al.* Using mild heat and alkali activation they observed considerable strength gain and the formation of calcium-silicate-hydrate (C-S-H) type reaction products.

The next paper, by Guerrero *et al.* (2014) also looks at the impact of additives on Portland cement hydration, in this instance nanosilica. The aim of the study was to try and improve the performance of cementitious composites by understanding the impact of such additions on the hydrated phase assemblages. Using a suite of characterisation techniques, they have observed that the addition of nanosilica increases the C-S-H content, with the concurrent consumption of portlandite and a modification of the pore structure. Most surprisingly, however, they observed that the addition of nanosilica led to incorporation of aluminium into the C-S-H, together with a reduction in the levels of sulfoaluminate phases seen in the pastes.

Continuing on the topic of improving performance by modifying the microstructure and phase assemblages of cementitious materials, Achal *et al.* (2014) present a fascinating review of the potential for using biogenic calcium carbonate in cementitious composites, a term they call biocements. They have focused on the precipitation of calcium carbonate within cement pastes by use of urease, but review this burgeoning field on a country-by-country basis.

In the second of this issue's review papers, Wu (2014) takes a fresh look at the hydration of Portland cements and alkali-activated systems, including geopolymers. He states that 'it is possible to consider cement hydration a chemical process that can be described by a generalised framework of inorganic polymerisation and sol–gel processes'. This approach, in turn, offers new avenues for research, devising cements with unique structures and properties.

Finally, Xu *et al.* (2014) present results exemplify the variety of work published in *Advances in Cement Research*. They have used a range of different cementitious binders (Portland cement, high alumina cement and sulfoaluminate cement) to produce novel 1–3–2 piezoelectric composites. They hope that their work will help in the development of new piezoelectrics, which will overcome some of the limitations of convention PZT materials for structural monitoring.

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