Editorial

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We should never forget that research is about solving society's problems, improving our understanding of nature and materials, and creating knowledge that allows scientists and engineers to solve problems. Therefore, the ultimate goal of research is not to publish papers; however, papers published by peer-review journals, such as *Advances in Cement Research* (ACR), are the best proven way to disseminate the, hopefully, relevant findings, allowing peers to build on top of what has already been discovered. This is how science and, to some extent technology, is increasingly progressing.

It must be the top priority for our small research community to search for economically valid, technical solutions to mitigate the emission of anthropogenic greenhouse gases on a large scale (billions of tonnes of cement and CO₂ every year). Improving binder and filler fine particles allows the amount of water that is necessary to be reduced for good rheological behaviour, and, indirectly, the amount of clinker that is about 90% of the source of CO₂ emissions of conventional cementitious materials. There are two relevant papers on dispersants or superplasticisers (Li *et al.* and Wang *et al.*). The passivation of steel and improved matrix resistance to chloride penetration are shown by Li *et al.* (2016) to be improved by the addition of iron mill scale, itself hitherto regarded as a waste product. The use of superplasticisers is well established but a paper by Wang *et al.* (2016) explains the action of new types of polycarboxylate formulations on improving the properties of fresh cements, while the rheological properties of fresh mixes leads to important modifications to mix rheology.

In the last few years, clinker substitution rates have stagnated due to the limited availability of the best supplementary cementitious materials (SCMs); blast furnace slag and fly ash. The possibility of transforming high-magnesium (Mg) calcium carbonates, including dolomite, in reactive SCMs, was presented in the paper by Jauffret and Glasser (2016). Dolomite is used to save cement, and hence lower CO₂ emissions, while at the same time, not have much of an impact on the high pH buffering reserves necessary to protect and passivate embedded steel. The suggestion of the low expansion risk associated with the hydration of magnesium oxide may be also good news for the use of high-magnesium carbonates as cement fillers.

The cement industry uses the same cements to produce a wide variety of solutions, this approach rarely results in optimised solutions. So, searching for optimal cements requires market

segmentation. Two of the papers are examples of that, looking for new solutions for grouting (Dai *et al.*, 2016) and corrosion protection (Chousidis *et al.*, 2016). The properties of formulations intended for rock anchor bolts are shown by Dai *et al.* (2016) to benefit from controlled additions of alunite and gypsum.

Another strategy to reduce the environmental impacts of cementitious materials is dematerialisation. Fibre-reinforced cementitious materials are an effective way of doing so. Two of the papers make interesting contributions to testing and improving the knowledge of fracture of such materials. They describe modifications to the properties of fresh and hardened cement matrices; the strain hardening of cement and concrete compositions and of reinforced composites is described by Zhang *et al.* (2016a) as well as by Zhang *et al.* (2016b).

They are also a very interesting example of another very important tool in the search for advance of knowledge and innovation, the multidisciplinary approach (real problems are very rarely limited to the rather artificial constraints of our knowledge areas). This is discussed in all of the papers in this issue.

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