

Editorial

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Modern society depends on cement-based products to provide most of the built environment. In order to provide, within a reasonable timeframe, the developing world with a built environment sufficient to offer a decent life to all citizens and maintain what is already there, it is necessary to keep increasing the global production of cement-based materials.

Without substantial innovation, this expansion of production will generate an environmental impact far greater than that of today, which is already considered too high to be sustained in the long term. The long service life and the high investment of a typical cement plant introduces a large technological inertia to the system. To be effective in preventing the growth of the undesirable environmental impact, the innovation has to come in a short period of time. The problem is that the cement industry, like any other capital-intensive industry, has little experience with innovation.

As acknowledged a long time ago, innovation depends on a constant flow of new knowledge. And since not all environmentally sound and scientifically proved new idea will become an innovation by succeeding in a market, we need to find and test lots of new ideas. Therefore, we need to scale up and speed up research in all aspects of cementitious materials. This is no time for safe 'business as usual' research: we need to test new ideas. We also need to communicate these new ideas – the good ones but also the bad ones – in a faster way. For this reason journals such as *Advances in Cement Research* are important and the voluntary work carried out by reviewers is crucial.

To be more effective, innovation must be based on scientific knowledge. There is a tremendous amount of knowledge that can be applied in the study of cementitious systems that has not been extensively used. In this issue of *Advances in Cement Research*, Demirer and Yilmaz (2015), and Hou *et al.* (2015) present successful applications of classical scientific tools to the study of cement-based systems.

Since our traditional raw materials are not available in all regions of the world, an eco-efficient cement industry will have to use local materials. In many cases this will need change, including the nature of the binder. Shoude *et al.* (2015) discusses one of these new cements of the family of sulfoaluminates.

Processing of cement-based materials has been neglected for too long. Most of the research is concentrated in concrete produced using conventional tools and temperature. There is a need to

better understand the influence of processing. Arabi *et al.* (2015) discusses the effect of autoclaving in the microstructure of calcium–silicate–hydrate.

Since the binder fraction tend to be the more scarce, more expensive and the phase with highest environmental impact, innovation must search for low-binder technologies. One condition for low binder is the dispersion of small particles. The modern chemical industry created a revolution by developing superplasticisers. However, the robustness of the solution needs to be increased. Lesage *et al.* (2015) discusses the plasticising effect of sodium gluconate, a chemical that might be able to help in this matter.

Research can be accelerated by the development of new experimental tools, as has been the case of other science, including DNA mapping. In this issue of *Advances in Cement Research*, Zuo and Wei (2015) discuss the use of electrical resistivity as a tool for controlling the degree of hydration.

REFERENCES

- Arabi N, Jauberthie R, Chelghoum N and Molez L (2015) Formation of C-S-H in calcium hydroxide–blast furnace slag–quartz–water system in autoclaving conditions. *Advances in Cement Research* **27(3)**: 153–162, <http://dx.doi.org/10.1680/adcr.13.00069>.
- Demirer A and Yilmaz B (2015) Wettability of cement and pozzolan particle surfaces. *Advances in Cement Research* **27(3)**: 124–134, <http://dx.doi.org/10.1680/adcr.13.00073>.
- Hou D, Ma H and Li Z (2015) Morphology of calcium silicate hydrate (C-S-H) gel: a molecular dynamic study. *Advances in Cement Research* **27(3)**: 135–146, <http://dx.doi.org/10.1680/adcr.13.00079>.
- Lesage K, Cizer Ö, Desmet B, Vantomme J, De Schutter G and Vandewalle L (2015) Plasticising mechanism of sodium gluconate combined with PCE. *Advances in Cement Research* **27(3)**: 163–174, <http://dx.doi.org/10.1680/adcr.13.00087>.
- Shoude W, Cheng C, Chenchen G, Yaming C, Lingchao L and Xin C (2015) Setting and hardening properties of alite-barium calcium sulfoaluminate cement with SCMs. *Advances in Cement Research* **27(3)**: 147–152, <http://dx.doi.org/10.1680/adcr.13.00077>.
- Zuo Y and Wei X (2015) Relations among electrical resistivity, chemical and autogenous shrinkage of cement pastes. *Advances in Cement Research* **27(3)**: 175–183, <http://dx.doi.org/10.1680/adcr.13.00089>.