Editorial

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Advances in Cement Research (ACR) deals with a wide range of topics in the field of cement science, from the production of cements to their hydration and engineering in the construction industry; moreover, sustainability has become a key part in the progress of research.

Chemical additives play a major role in the engineering of the properties of concrete. This issue of ACR presents various papers on the use of plasticisers on Portland cement-related phases. Shui *et al.* (2016) present a brief overview of the current literature on the dispersion mechanism of polycarboxylate-type superplasticisers (PCEs) in Portland cement. They report an interesting tendency, in that the rate of fluidity increases with decreasing water/cement ratio when the dosage of the plasticiser gradually increases, which could not be explained by the steric effect. The authors present a possible dispersion mechanism in the PCE–cement system based on the repulsion originating from the exclusion of free polymers (non-adsorbed PCE, ‘Aft–PCE’ structure and some other fine matters coated with PCE) from the gap between cement particles.

The rate of hydration of the clinker phases influences the early properties of Portland cement, C_3A is a minor phase but with a large influence in the rheology and durability of concrete. In this regard, Zhang *et al.* (2016) report on the effects of three superplasticisers – sulfonated naphthalene formaldehyde, sulfonated acetone formaldehyde and polycarboxylates – on the hydration and microstructure of C_3A pastes in the presence of gypsum by isothermal calorimetry, X-ray diffraction, environmental scanning electron microscopy, Fourier transformed infrared spectroscopy and nuclear magnetic resonance. They found that the rate of hydration reaction was promoted in the presence of the superplasticisers during the initial 2 h, then slowed down for the 2–12 h period, then accelerated in later periods for various systems. Changes in the crystal morphology, the position or shape of the characteristic bands of aluminates, and coordination of the AIO are discussed. Ettringite is an important reaction product from the calcium aluminates, with implications in the short- and long-term properties of cements, a paper from Meier *et al.* (2016) report on the effects of three polycarboxylate superplasticisers on the crystallisation of ettringite from $Ca(OH)_2$ and $Al_2(SO_4)_3$. The authors noted that the addition of the polycarboxylates reduced the size of the hexagonal, prismatic ettringite crystals; this suggests that polymers exhibiting a higher affinity to the

crystal surfaces of ettringite inhibited its growth more strongly and produced smaller crystals, and that the specific chemistry (basemonomers) of the polycarboxylate also has an impact on the size of ettringite crystals.

The use of supplementary cementitious materials such as industrial byproducts is one route to promote the sustainability of the industry and a subject of interest in ACR since the decade of the 1980s; recent publications include alternative cements (Bernal *et al.*, 2016) and blended Portland cements (Hu *et al.*, 2014). In this issue, Qiang *et al.* (2016) contributed with an investigation on the effect of fly ash and blast furnace slag on the water content and reaction degree of Portland cements cured at various temperatures. They report that the slag induces larger heat of hydration than the ash, also that the higher temperature promoted greater heat of hydration and bound water for the slag composites cements. Their study highlights the higher hydraulic activity of the slag over the ash.

Regarding aspects related to the production of Portland cement and handling of emissions and byproducts, a paper from Lanzerstorfer (2016) deals with the physical and flow properties as well as handling and storage of five kiln dusts and three dusts from other sources dust from cement plants. He concludes that the results of indicators of angle of repose, Hausner ratio and Carr’s compressibility produced inconsistent results, resulting in overestimation of the dust flowability; also that the shear tests are better suited for a reliable categorisation of the flowability. In a matter related to the Portland cement production, Li *et al.* (2016a) investigated the solid solubility of magnesium oxide in aluminoferrite; they underline the problematic effect of free MgO in Portland cement clinkers, which is mostly considered to stabilise on the calcium silicates. The paper deals with the solubility of MgO in the aluminoferrite by replacing CaO for MgO on a molar basis. The presence of MgO resulted in the formation of new phases. The maximum solubility is reported at 4–5%, mostly dissolved in a glass phase instead of the C_4AF . The final paper, by Li *et al.* (2016b) is on the synthesis of an amphiphilic polycarboxylate copolymer.

The more recent papers are published ahead of print in the journals Virtual Library homepage (<http://www.icevirtuallibrary.com/journal/jadcr>), where the readership can learn more about other publications and how to submit contributions.

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