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Influence of supplementary cementitious materials on hydration and microstructure development of concrete

A.I. Nicoara [1, 2, *], R. Trusca [2], O. Oprea [1, 2], B.S. Vasile [1, 2]

[1] Faculty of Applied Chemistry and Materials Science, Politehnica University of Bucharest, Bucharest, 060042, Romania
[2] National Centre for Micro and Nanomaterials, Politehnica University of Bucharest, Bucharest, 060042, Romania
* Correspondence: adi.nicoara18@gmail.com; Scopus ID: 57189267841

Several supplementary cementitious materials (SCM) were blended with Portland cement clinker in order to produce more sustainable binders. The use of such materials, where no additional clinkering process is involved, leads to a significant reduction in CO_2 emissions per ton of cementitious materials (grinding, mixing and transport of concrete and use very little energy compared to the clinkering process) and is a means to (re)utilize by-products of industrial manufacturing processes. Fly ash, for example, is the most commonly used supplementary cementitious material.

The blending of Portland cement with fly ash results in the reduction of the total amount of portlandite in the hydrated mixture [1-4], somewhat less pronounced than for silica fume as: the reactivity of fly ash is very limited and as the CaO in the fly ash is an additional source of calcium [5].

Since fly ash particles are more spherical in shape than cement particles, workability and pumpability can be improved, by adding fly ash, also, fly ashes can cause low early strengthening. In this paper, the effects of Fly-ash as SCM's on microstructure and hydration kinetics are studied.

Keywords: *concrete, fly ash, hydration kinetics.*

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Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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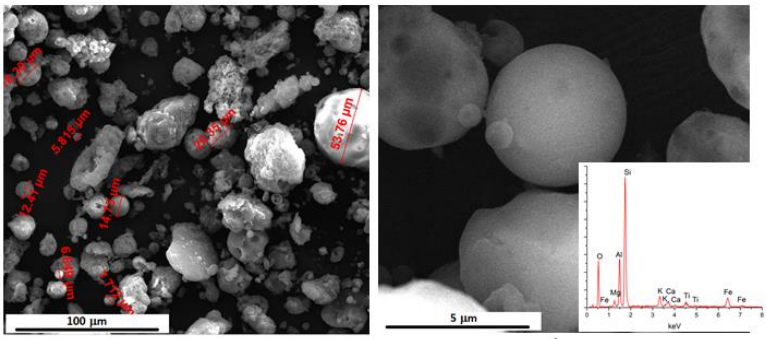

Figure 1. Scanning electron microscopy (SEM) images and EDS spectra on fly-ash (a and b).

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