
Role of aluminum in nanostructure and strength of cement hydration phases

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This research work is about the influence of various aluminum species on the nanomolecular structure and strength relationship of cement hydration phases.

The aluminum species and their corresponding amounts were studied by ²⁷Al MAS NMR technique. The technique has found out three Al species in cementitious samples: four-coordinate Al(IV), five-coordinate Al(V), and six-coordinate Al(VI) species [1, 2, 3]. The results show that an even more pronounced increase in the sample's polymerization degree of C-(A) S-H (C-S-H containing Al) phase is observed through the addition of alumina-based pyrogenic oxide. Based on this technique we have been able to know the amount and location of Al which is of major importance for the electrostatic cohesion and durability of the cement paste.

Keywords: ²⁷Al MAS NMR, Aluminum sites, C-(A) S-H phase, Cement hydration.

References

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Figures

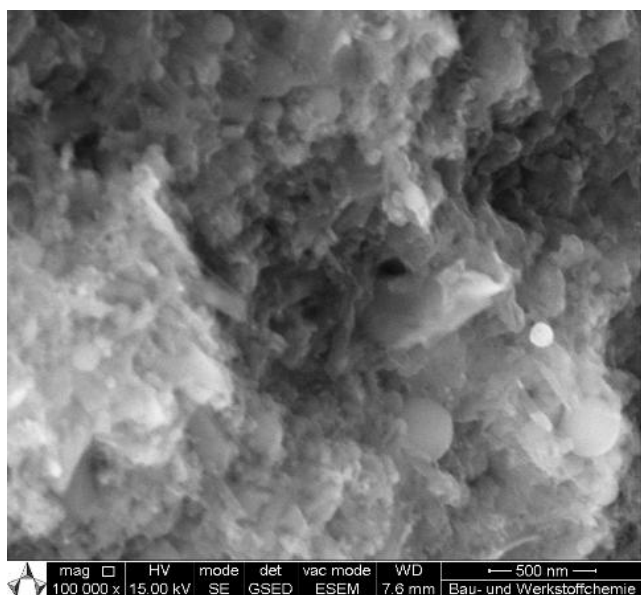


Figure 1: SEM images (100000x) of Ultra high performance concrete with Pox (UHPC)