

Long Term Hydration of White Portland Cement Assessed by Micro-Raman Spectroscopy

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White cement hydration has been for the first time analyzed over a full 360-day period, through the careful study of the micro-Raman spectra, excited at 514 nm, taken at different hydration ages. This spectroscopic technique depicted the different hydration speed of the two silicate phases, C3S and C2S, and revealed the presence of sulphate and carbonate groups in different environments in the hydrated phase. The anhydrous phases were found to be consumed after 180 days. The Raman band at 836 cm^{-1} , characteristic of C3S, diminishes rapidly in the first few days of hydration, whereas the band at 851 cm^{-1} , associated with C2S, declined gradually during the first 90 days, disappearing after 180 days. The Raman spectra of the 180-days hydration aged samples are similar to the spectra for the 360-days ones, evidencing that the main changes take place in the first 3 months of hydration, when anhydrous phases are present.