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Nucleation and early growth of Magnesium Silicate Hydrate

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The nucleation and early growth of magnesium silicate hydrate (M-S-H) have been investigated using a combination of physicochemical methods such as potentiometric titration, powder X-ray diffraction (XRD), attenuated total reflectance-Fourier transformed infrared spectroscopy (FTIR-ATR), electron microscopy (SEM and TEM). In this work, we present a first glimpse into the early stages of formation of M-S-H from electrolyte solutions in the presence and absence of organic additives. Monomeric and polymeric components of PCE-based superplasticizers were tested regarding their influence on the crystallization of M-S-H. Our results showed the formation of a M-S-H precursor phase that transformed into denser M-S-H networks composed by globular particles in less than 24 h. In all the experiments, the main precipitated phase was confirmed to be M-S-H with a Mg/Si ratio close to 1.