

Thermochromic mortar based on eco-efficient belite cement for improvement of building sustainability

Abstract text

A thermochromic mortar based on an eco-efficient belitic cement is presented. The cement is synthesized at the laboratory by hydrothermal treatment of fly ashes and the mortar includes reversible thermochromic pigments based on microencapsulated organic compounds. The mortar morphological composition has been optimized to allow for the chemical stability of the pigments within the cementitious matrix while assuring proper physical properties. Chemical, morphological and microstructural properties of the optimized mortar are analysed by different analytical techniques (SEM, FTIR) to confirm pigment stability within the matrix. Moreover, surface appearance and optical reflectance measured by a portable spectrophotometer are monitored at a vertical north-oriented coating exposed to outdoor environment for 5 dry-sunny days in Madrid (Spain). A light colour and high solar reflectance is observed for temperatures higher than the expected transition value of 25 °C, while a change to a dark colour and low solar reflection for temperatures below this value confirm the reversible thermochromic behaviour of the mortar. A good stability of the mortar is observed in the particular conditions tested. Finally, taking into account the potential application of this material as an eco-efficient building envelope coating, suitable physical-mechanical properties are obtained, as well as, a proper behaviour of surface temperature to improve building energy efficiency.

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Preferred contribution presentation form

Oral

Contribution topic

4. Other Binders and their Application

Abstract subtopic

4.3 Belite-based cements and other low carbon binders