Influencing factors in the behavior of traditional mortars applied on different substrates to reach sustainability in construction

Summary

With the objective of being able to experimentally measure the characteristics of sustainable mortars applied to substrates, the research project funded is under development: IF MORTAR "Experimental and numerical analysis of interface mortar-support", PTDC/ECI-EGC/32223/2017, POCI-01-0145-FEDER-032223 is the basis for this PhD study.

The aim is to compare, for the same mortar, the characteristics analysed in laboratory specimens with the characteristics determined after application to the substrates. For this, it is necessary to apply the mortars to the substrates and, after hardening, to detach and analyse them.

When applying a mortar to a real substrate, which will always have some porosity — unlike the laboratory moulds where the specimens that are used to characterize mortars are made, which have virtually no porosity - an interaction will occur between the two surfaces. The same mortar moulded into specimens and hardened in laboratory, under standard curing conditions, when applied to real substrates subjected to real climatic conditions, will not acquire identical characteristics.

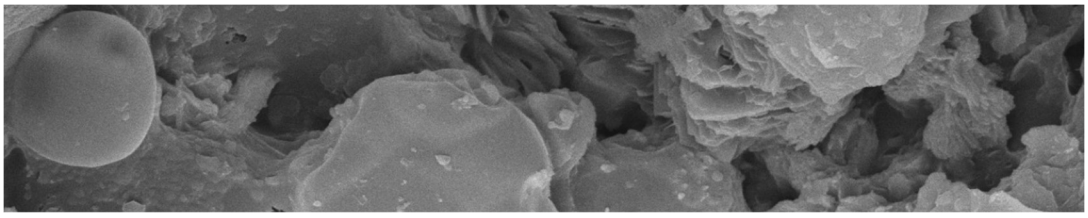
The incorporation of waste materials in mortars affects their performance. Also the study of the interface between these new sustainable mortars and their substrate is crucial to develop suitable solutions and accomplish sustainability issues in new and retrofitting buildings.

The key objective of this PhD work program is to extend the research for sustainable mortars with various types of aggregates (e.g. from by-products of industry waste) and substrates. The mortars will be characterized in laboratory at 28 days of curing and after accelerated aging. The tests to be performed will be those of physical, hygrothermal and mechanical characterization. Micristructural analysis will be also carried out (Figure 1). In this research, it is also intended to apply mortars to a larger in-situ substrates exposed to real weather conditions. The better coating solutions and with better technical performance will be assessed in terms of cost and environmental impacts, through LCA (Life Cycle Assessment) and LCC (Life Cycle Costing) tools.

This PhD study is under the scope of three thematic strands of CERIS: Product Development in Civil Engineering Industries; Rehabilitation of Built and Natural Environments; and Response to Natural and Societal Changes. The RG5 – Studies of Construction research group is aimed at carrying out fundamental and applied research in all aspects of constructive solutions development and experimental testing towards to innovation and sustainability in construction.

Keywords

Interface, mortar, waste, sustainability.



Microstructural analysis.

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