EFFECTS OF BIOCHAR ADDITION ON LONG-TERM BEHAVIOUR OF CONCRETE AND MORTAR

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Nowadays, the incorporation of by-product powders, such as fly ash, silica fume and ground granulated blast-furnace slag, is commonly applied for the production of concrete and cementitious materials. This work explores the feasibility of using biochar, a stable form of carbon produced via gasification of biomass, in cement mortars and concrete. This use of biochar could be particularly interesting to the aim of developing innovative “green” cement-based materials, able to provide not only adequate mechanical properties, but also above all environmental benefits connected with the re-cycle of biochar. There is evidence that when used in proper percentages as filler, biochar can enhance the mechanical properties of cement-based materials, such as compressive strength, flexural strength, and toughness. These positive effects, strictly depend on the percentage of biochar addition, on its physical and chemical properties, as well as on the curing type and time adopted for the cementitious material. To this aim, a biochar collected from a biomass power plant that transforms wood waste into syngas, was added in different percentages (from 1 to 2.5% in mortars and from 2.5 to 10% by wt. of cement in concrete) to the mix design. A comprehensive experimental program was then performed to assess the global physico-mechanical performances of the innovative materials developed. The results show that this application is promising if the optimal percentage addition is chosen.