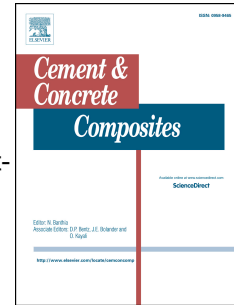


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# Effect of inorganic surface treatment on surface hardness and carbonation of cement-based materials

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**Abstract:** Surface treatment is a simple way to improve quality of surface of cement-based materials and thus increase the resistance of cement-based materials to environmental aggressions. Magnesium fluorosilicate, waterglass, sodium fluorosilicate, and combination of waterglass and sodium fluorosilicate were used as surface treatment agents. Their effects on compressive strength, surface hardness and resistance to carbonation were studied. The experimental results indicated that magnesium fluorosilicate and waterglass decreased the carbonation depth and increased surface hardness of concrete, while their effects were limited on compressive strength. A greater reduction in carbonation was found when sodium fluorosilicate pretreatment was used, because it could not only accelerate the hardness of waterglass but also react with cement. A liner relationship between Autoclam air permeability index and carbonation depth was found in all the treated concrete. Meanwhile, effects of treatments on morphology and microstructure were investigated by scanning electron microscope (SEM). Pore-blocking effects of inorganic surface treatment agents and new reaction products were observed.

**Keywords:** Surface treatment; Magnesium fluorosilicate; Sodium silicate; Sodium fluorosilicate; Carbonation; Surface hardness

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