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Wpływ dodatku grafenu na wytrzymałość zaczynu gipsowego

Study of compressive strength of gypsum with graphene addition

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Streszczenie

W zaprawach i zaczynach gipsowych popularne jest stosowanie nowych dodatków, które pozwalają na zmianę czasu wiązania i zawartości wody w mieszance. Dodatki umożliwiają również stosowanie różnych kruszyw w zaprawach gipsowych poprawiających ich właściwości. W tej pracy skupiono się na badaniu jednej z właściwości mechanicznych - wytrzymałości na ściskanie zaczynów z mieszanin gipsu z grafenem, w różnych proporcjach. Badania przeprowadzono metodami normowymi. Ciekawe wyniki uzyskano porównując wytrzymałości na ściskanie zaczynów z gipsu bez dodatków z wytrzymałościami zaczynów z gipsu z dodatkiem grafenu, w różnych proporcjach. Grafen spowodował 12% wzrost wytrzymałości na ściskanie.

Słowa kluczowe: gips, grafen, wytrzymałość na ściskanie, dodatki

Summary

Gypsum plasters are related to the use of new additives that allow changing the setting time and the water content of the mixture and also the possibility of applying different aggregates in the mortars, that improve their properties. The objectives on which we have focused in this study, is one of those mechanical properties, the compressive strength, of the mixture of gypsum with graphene, in different proportions, performing the tests by standard methods. Significant results have been obtained comparing the properties of compressive strength of the gypsum plaster without addition, with the results obtained for the gypsum plasters with graphene, in different proportions. Graphene gives a 12% increase in compressive strength.

Keywords: gypsum, graphene, compressive strength, additives

1. Wprowadzenie

W rozwiniętym i zglobalizowanym świecie postęp technologiczny oraz odkrywanie nowych metod produkcji lub ulepszanie już istniejących, nieustannie wiąże się z poszukiwaniem nowych materiałów. Głównie są to znane już materiały, które ewoluują w kierunku poprawy ich właściwości mechanicznych, optymalizacji produkcji lub po prostu poprawy ekonomii.

Celem tej pracy jest zbadanie właściwości mechanicznych zaczynów z siarczanu wapnia modyfikowanego grafenem

Artykuł opiera się na założeniu, że podstawowy surowiec, jakim jest siarczan wapnia, jest już przebadany, znany i szerokostosowany w budownictwie, również jako składnik materiałów o specjalnych właściwościach (1). Na Wydziale Inżynierskim Uniwersytetu Miguela Hernandeza od ponad dziesięciu lat prowadzi się badania mające na celu poprawę właściwości zapraw i zaczynów gipsowych. Grafen jest materiałem bardzo uniwersalnym, dlatego pojawiają

1. Introduction

In this world, so developed and globalized, with the technological advance of new techniques or improvement of the existing ones, we are in continuous research and development of new materials. They are mainly the existing materials that have been evolving, always intending to improve their mechanical properties, optimizing their production, or simply, to achieve an economic improvement of their technology.

The goal of this paper is the analysis of the mechanical properties of calcium sulphate plasters modified with graphene additive

This paper is based on the premise that the base element, the calcium sulphate plaster, is already developed, and widely known in the world of construction, also as special material (1). H owever, in the Engineering Department of the Miguel Hernandez University, the studies from more than ten years were conducted, to improve their properties. Graphene is a very universal material, therefore

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powder, with which this study has been conducted, to € 80/gram of graphene oxide, 220 €/gram of reduced graphene oxide.

As mentioned in this study, graphene powder, which is the cheapest, has been used. The reason why the utility of the use of this material mixed in small quantities with the plaster, represents between 10% and 15% increase in the price of the kilogram of normal plaster. Simultaneously it has been shown in this research that this addition is significantly increasing the mechanical properties of gypsum plasters. When using this mixture in coatings for construction, there will be a reduction in the thickness of the gypsum plaster layer and increasing its hardness, reducing therefore the amount of gypsum mortar to be used.

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Abstract

Author keywords

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Gypsum plasters are related to the use of new additives that allow changing the setting time and the

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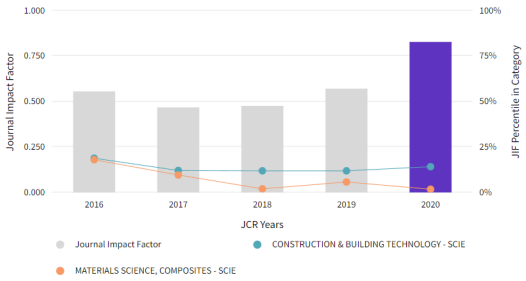

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