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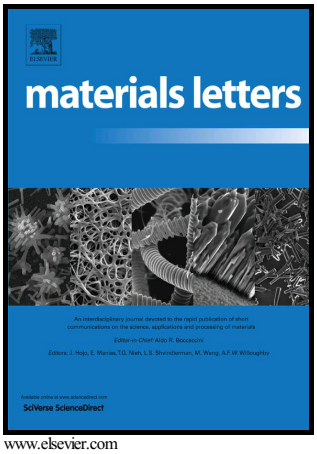

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A novel surface waterproof geopolymer derived from metakaolin by hydrophobic modification

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Abstract:

Protecting the surface of geopolymer is essential for improving its durability under certain exposure conditions. In this work, a novel surface waterproof geopolymer was proposed based on alkali activation of metakaolin and hydrophobic modification. The experimental results show that surface hydrophobic modification of geopolymer is completely achieved due to the increasing static water contact angle on the surface of modified geopolymer from 36° to 132° and the floating of specimens on water level after surface hydrophobic modification. Surface hydrophobic modification of geopolymer matrix obviously improves waterproof properties and reduces water absorption of geopolymer after 28 days of exposure. This newly developed modification method will broaden the application of geopolymer from environmental and economical consideration.

Keywords: amorphous materials; polymers; geopolymer; waterproof; hydrophobic modification; metakaolin

1. Introduction

The term “geopolymer” was generically used to describe an amorphous alkali aluminosilicate which was also commonly used as “inorganic polymers” [1], in which the alkaline activators such as sodium hydroxide (NaOH), potassium hydroxide (KOH), sodium silicate (Na_2SiO_3) and potassium silicate (K_2SiO_3) were used to activate aluminosilicate materials such as metakaolin[2-4] or industrial by-products including slag[5-6] and fly ash[7-9]. In

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