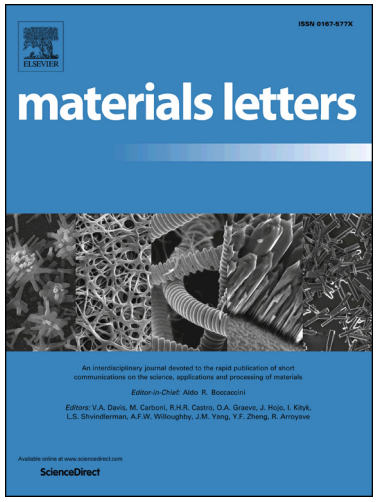

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Carbon fiber waste incorporation in blast furnace slag geopolymer-composites

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Abstract

This work evaluates the properties of geopolymer-composites based on blast furnace slag with additions of a carbon fiber waste coming from the aircraft industry. Two parameters were considered: slag/waste ratio (100/0, 80/20 and 60/40) and nature of activating solution (8M NaOH and sodium silicate). Open porosity and compressive strength were analysed. Geopolymers were also subjected to a sulphuric attack and thermal resistance test (compressive strength after 105, 300, 500 and 700ºC was assessed). Porosities increased and compressive strengths decreased as the slag was replaced by the carbon fiber waste. A positive effect of the carbon fiber waste on the acid attack was observed mainly due to the created porosity which could generate space to calcium-sulphate products precipitation. CFW incorporation improved the thermal resistance since higher porosity could provide channel to increase heat dissipation.

Keywords: Blast furnace slag, geopolymer, carbon fiber waste, acid attack, compressive strength, thermal resistance

1. Introduction

Geopolymers are ecofriendly inorganic polymers with comparable performance to Portland cement (1). They are considered amorphous or semi-crystalline binders, which are the product of the alkaline activation of aluminosilicate materials at room or slightly more elevated temperature (2). Geopolymers synthesis may also be a successful alternative for reusing industrial by products or wastes (3). Research on geopolymer-composites using different