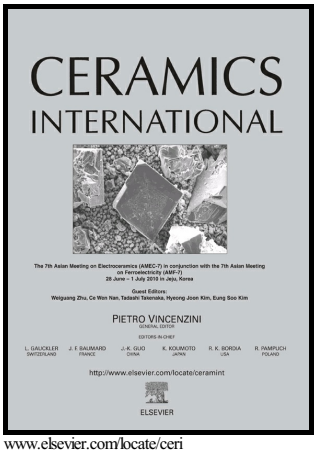

www.elsevier.com/locate/ceri

The Influence of Al_2O_3 Nanoparticles Addition on the Microstructure and Properties of Bauxite Self–Flowing Low-Cement Castables

Salman Ghasemi-Kahrizsangi, Hassan Gheisari Desheikh, Ebrahim Karamian, Ahmad Ghasemi-Kahrizsangi, Seyyed Vahid Hosseini

PII: S0272-8842(17)30606-5
DOI: http://dx.doi.org/10.1016/j.ceramint.2017.04.013
Reference: CERI14993

To appear in: *Ceramics International*

Received date: 29 January 2017
Revised date: 13 March 2017
Accepted date: 3 April 2017

Cite this article as: Salman Ghasemi-Kahrizsangi, Hassan Gheisari Desheikh Ebrahim Karamian, Ahmad Ghasemi-Kahrizsangi and Seyyed Vahid Hosseini The Influence of Al_2O_3 Nanoparticles Addition on the Microstructure and Properties of Bauxite Self–Flowing Low-Cement Castables, *Ceramic International,* http://dx.doi.org/10.1016/j.ceramint.2017.04.013

The Influence of Al_2O_3 Nanoparticles Addition on the Microstructure and Properties of Bauxite Self–Flowing Low-Cement Castables

Salman Ghasemi-Kahrizsangi[1*], Hassan Gheisari Desheikh[1], Ebrahim Karamian[1], Ahmad Ghasemi-Kahrizsangi[2], Seyyed Vahid Hosseini[3]

[1]Advanced Materials Research Center, Faculty of Materials Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Iran.

[2]Special Alloy Company, No.27, In front of Isfahan Tile Co., Shohadaye Kashi St., Isfahan-Najafabad Ave., Isfahan City, Iran.

[3]Material Science and Engineering, Shahrekord University, Shahrekord, Iran.

*Corresponding author: E-mail address: salman.gh1367@gmail.com

Abstract:

In this research, the impact of Al_2O_3 nanoparticles addition on microstructure, mechanical, and physical properties of bauxite self–flowing low-cement castables were investigated. Also, the optimum amount of Al_2O_3 nanoparticles is determined. For this propose, up to 3 wt. % Al_2O_3 nanoparticles were added to the bauxite castable compositions. The physical and mechanical properties of castable compositions such as bulk density (BD), apparent porosity (AP), self-flow values (SFV), and cold crushing strength (CCS) were examined. Also, the X-ray diffraction (XRD) and scanning electron microscopy (SEM/EDX) techniques were used for detection the ceramic phase's formation and microstructural analysis of the castables compositions, respectively. Results show that addition of Al_2O_3 nanoparticles up to 1wt. % improved the properties of bauxite self–flowing low-cement castables. As well as, the use of Al_2O_3 nanoparticles led to the formation of the platy and needle crystalline phases such as hibonite ($CaO{\cdot}6Al_2O_3$), calcium dialuminate ($CaO{\cdot}2Al_2O_3$), and mullite ($3Al_2O_3{\cdot}2SiO_2$), between the grain boundaries of the bauxite particles. Also, Al_2O_3 nanoparticles addition led to aforementioned phase formation occur at the lower temperatures.

Keywords: Al_2O_3 nanoparticles, self–flowing, castables, hibonite, mullite.