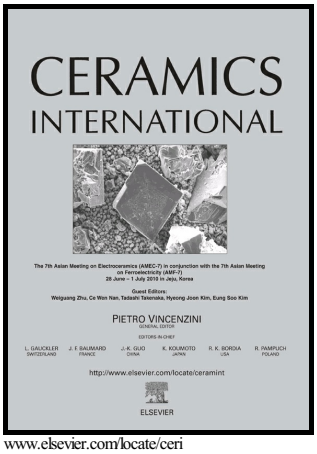

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Thermomechanical and thermophysical characteristics of alumina-carbon monolithic refractory containing surface-modified graphites in matrix

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Abstract

The thermophysical and thermomechanical behaviour of graphite-containing refractory castable matrix with 20.0 wt% of graphite had been compared with graphite-free high alumina based castable matrix analogous to it. The thermomechanical properties of similar type of castables with and without 5.0% of graphite had also been evaluated. Graphite was incorporated both as coated and as-received forms, the former having a thin sol-gel derived calcium aluminate coating on graphite flakes. The influence of thermal conductivity, thermal diffusivity and pore size distribution had been critically estimated. The changes in flexural strength, porosity and density of the matrices had also been determined to interpret the castable performance, namely refractoriness under load (RUL), spalling resistance and conventional physical properties. The role of coated graphite on improved densification and thermal tolerance of refractories was further explored by microstructure and phase evolution studies of all kinds of fired samples at 1500 ^{o}C. It was further supplemented with the scanning electron microscope (SEM) studies of surface-modified graphites at uncalcined and calcined condition.

Keywords:; B. Electron Microscopy, Porosity **; C.** Thermomechanical properties; **D.**Al_2O_3 , Carbon**; E.** Refractory castable**.**