CARBON EMISSIONS

De-carbonization of the heavy clay industry

Given the scale of carbon emissions in heavy clay manufacturing, de-carbonization of a ceramic production process cannot be limited to a fuel switch towards low- or no-carbon sources of process energy but must include removal of greenhouse gas, GHG, emissions caused by eventual de-carbonization of raw materials. A different approach to raw materials is required as well. GHG management must become an essential part of corporate strategies even for small or medium sized businesses.

LIGHTWEIGHT CONSTRUCTION

Slip-based production of spherical structures based on zirconia and TRIP steel

Solid and hollow spheres are an important component for lightweight structures. They are currently manufactured using different processes. In this article, the development of a process route is presented, which allows the production of predominantly monomodally distributed solid and hollow spheres with powder metallurgical and slip-based processes using alginate gelation from partially stabilized magnesium zirconia and TRIP steel in only one process step at room temperature.

REFRACTORIES

Rare-earth oxide doped magnesium aluminate spinel- An overview

Magnesium aluminate spinel (MAS) is an important refractory material known for its high refractoriness, high thermal shock resistance, high temperature mechanical and thermal properties, high resistance to chemical attack and superior hydration resistance. MAS has been employed to replace traditional chromite based refractories in cement rotary kilns and steel ladles because chromite based refractories pose environmental issues. This review paper attempts to present the sintering aspects, mechanical and thermo-mechanical behavior of rare-earth oxide doped MAS.

RAW MATERIALS

Porogenesis in the alumina-brucite-magnesia-spinel system

Magnesium monoaluminate spinel (MgAl2O4) is an important raw material for refractories industries, and it’s in situ formation from Al2O3 and MgO sources is an expansive process due to its low density. Such an expansion can be a serious drawback for the production of dense structural bricks and castables, since it frequently causes deformations and cracks and hinders particles sintering. On the other hand, the same effects can be useful for the production of porous structures used in applications that require densification-resistance and high porosity levels such as thermal insulators and hot-air filters. In this study, calcined alumina and mixtures of magnesium hydroxide and magnesium oxide were combined towards maximizing the generation of pores after brucite dehydroxylation and the volumetric expansion during spinel formation.

NANOPARTICLES

Simple and economical route for synthesis of alumina supported metallic nickel nanoparticles

The present work relates to the manufacture of Ni/Al2O3 catalyst, and is particularly directed towards the preparation of nanometallic nickel supported on alumina catalyst through a novel method which permits the nickel and alumina to be derived from aluminum and nickel nitrates as the source of aluminum and nickel particles.