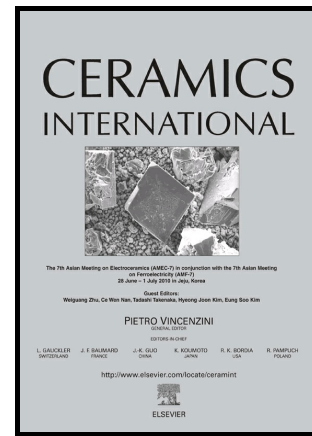


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Synergistic effect of glass fibre and Al powder on the mechanical properties of glass-ceramics

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ABSTRACT

To explore the synergistic effect of glass fibre and Al powder on the mechanical properties of glass-ceramics, blast furnace slag was chosen as the main material, and glass fibre and Al powder as reinforcement materials. The phase compositions, microstructures, compressive properties, and apparent density of the glass-ceramics with varying quantities of glass fibre and Al powder were investigated. The experimental results indicated that Al powder could exist as a simple substance in glass-ceramics and form a dense net coating on the surface of blast furnace slag to improve the plasticity of the glass-ceramic. The glass fibre had better reinforcement effect than Al powder because of its extremely high mechanical strength. The plasticity of glass-ceramics, however, severely decreased; the glass-ceramics exhibited brittle failure during compression. A slight increase in the content of CaSi_2 and SiO_2 in the glass-ceramics was closely related to the addition of glass fibre. Considering safety and economy, glass-ceramics with 6 % Al and 14 % glass fibre (S4) have the best mechanical properties. The compressive strength, strain at maximum force, and apparent density were 40 MPa, 19 % and 1.974 g/cm^3 , respectively.

Keywords: Glass-ceramics; Glass fibre; Al powder; Mechanical properties

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