

ABSTRAK

SINTESIS DAN KARAKTERISTIK *FOAM GLASS-CERAMIC* BERBAHAN BAKU LIMBAH PADAT ABU TERBANG BATUBARA, LIMBAH KACA DAN BATUAN BASAL

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Telah dilakukan penelitian dalam upaya peningkatan nilai tambah limbah padat industri menjadi produk *foam glass-ceramic*. Limbah padat industri yang digunakan sebagai bahan baku *foam glass-ceramic* adalah abu terbang batubara, limbah kaca dan batuan basal. Limbah pengecoran aluminium berupa aluminium *dross* digunakan sebagai *foaming agent*. Proses pembuatan *foam glass-ceramic* dilakukan dengan metode pemanasan serbuk dengan suhu *sintering* 1.000, 1.050 dan 1.100°C dengan waktu penahanan selama 30 menit. Variasi komposisi dilakukan dengan perbandingan persentase berat matrik keramik : *foaming agent* berturut turut adalah 97,5:2,5 ; 95:5 ; 92,5:7,5 ; 90:10 dan komposisi tanpa penambahan *foaming agent*. Untuk mengetahui morfologi *foam glass-ceramic* yang terbentuk dilakukan karakterisasi FESEM. Sedangkan untuk mengetahui komposisi kimia dan kristalisasi yang terbentuk dilakukan dengan analisis XRF dan XRD. Selain itu untuk mendapatkan nilai kuat tekan dilakukan analisis menggunakan *Universal Testing Machine*, nilai densitas dianalisis dengan metode Archimedes. Dari hasil penelitian diperoleh nilai densitas terendah 0,562 g/cm³ dicapai pada penambahan 5% berat aluminium *dross* pada suhu *sintering* 1.050°C, dan nilai kuat tekan terbesar 1,87 MPa, diperoleh dengan penambahan 2,5% berat aluminium *dross* pada suhu *sintering* 1.000°C.

Kata kunci: *foam glass-ceramic*, abu terbang, basal, aluminium, *sintering*

ABSTRACT

SYNTHESIS AND CHARACTERISTICS OF FOAM GLASS-CERAMIC FROM SOLID WASTE; COAL FLY ASH, GLASS BOTTLES AND BASALT ROCK

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This research was conducted to increase the added value of industrial solid waste into foam glass-ceramic products. Industrial solid waste used as raw material for glass-ceramic foam were coal fly ash, glass bottles and basalt rock. Aluminum casting waste in the form of aluminum dross was used as a foaming agent. The process of making foam glass-ceramic was carried out by heating the powder with a sintering temperature of 1,000, 1,050 and 1,100°C with a holding time of 30 minutes. Variation of the composition was carried out by comparing the percentage by weight of the ceramic matrix: foaming agent respectively 97.5:2.5; 95:5: 92.5:7.5; 90:10 and the composition without the addition of a foaming agent. To determine the morphology of the foam glass-ceramic, FESEM characterization was carried out. Meanwhile, to find out the chemical composition and crystallization XRF and XRD analysis were carried out. In addition to obtaining compressive strength values, an analysis was carried out using a Universal Testing Machine, and the density that occurred was analyzed using the Archimedes method. The results shows that the lowest density value of 0.562 g/cm³ was achieved by adding 5% aluminum dross at a sintering temperature of 1,050°C, and the highest compressive strength value was 1.87 MPa, obtained by adding 2.5% by weight aluminum dross at a sintering temperature of 1,000°C.

Key words: foam glass-ceramic, coal fly ash, basalt, aluminium, sintering