PENGARUH PENAMBAHAN SILIKA (SiO_2) DAN SUHU PEMBAKARAN TERHADAP KARAKTERISTIK KERAMIK KORDIERIT BERBASIS ABU SEKAM PADI

SKRIPSI

MUTIA ULFAH

1810441003

DEPARTEMEN FISIKA

FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM

UNIVERSITAS ANDALAS

PADANG

2023

PENGARUH PENAMBAHAN SILIKA (SiO_2) DAN SUHU PEMBAKARAN TERHADAP KARAKTERISTIK KERAMIK KORDIERIT BERBASIS ABU SEKAM PADI

ABSTRAK

Telah dilakukan sintesis dan karakterisasi keramik kordierit dengan menggunakan silika dari abu sekam padi. Tujuan penelitian ini dilakukan untuk mengetahui penambahan massa silika dan suhu pembakaran terhadap kerakteristik keramik kordierit dari abu sekam padi. Penelitian ini dilakukan dengan 3 tahapan yaitu pembuatan silika gel dari abu sekam padi, pembuatan bahan keramik kordierit, serta karakterisasi. Pembentukan silika dilakukan dengan pembakaran sekam padi pada suhu 700 °C selama 3 jam dengan penambahan NaOH 4M untuk membentuk silika gel. Sintesis keramik kordierit perbandingan massa 14% Magnesium oksida, 35% Alumina, dan 51% Silika dari abu sekam padi dangan metode *solid state* dengan pemanasan pada suhu (700, 800 dan 900) °C. Karakteristik sampel dilakukan menggunakan uji XRD dan untuk mengetahui nilai kekerasan digunakan *microhardness tester*. Selain itu dilakukan analisis sifat fisis kordierit meliputi pengukuran susut bakar, densitas dan porositas. Nilai susut bakar dan densitas mengalami kenaikan seiring dengan penambahan massa silika dan suhu pembakaran, kecuali pada suhu 700 °C dengan penambahan 10% silika nilai susut bakar menurun dan pada suhu 900 °C dengan penambahan 10% silika nilai densitas juga menurun. Penambahan massa silika dan kenaikan suhu pembakaran membuat nilai porositas semakin meningkat kecuali pada suhu 900 °C dengan penambahan 15% silika mengalami penurunan sebesar 20,65 %. Penambahan silika menurunkan nilai kekerasan keramik kordierit, sehingga dengan meningkatnya suhu kalsinasi maka nilai kekerasan juga menurun, kecuali pada sampel tanpa silika pada suhu 800°C. Berdasarkan hasil XRD tanpa penambahan silika pada suhu 700 °C diperoleh ukuran kristal sebesar 108,58 nm, dan pada suhu 900 °C dengan penambahan 10% silika sebesar 374,74 nm.

Kata Kunci: silika, kordierit, keramik, sinar-x, *Difraction.*

THE EFFECT OF ADDITION OF SILICA (SiO_2) AND COMBUSTION TEMPERATURE ON CORDIERITE CERAMIC CHARACTERISTICS BASED ON RICE HUSK ASH

ABSTRACT

Synthesis and characterization of cordierite ceramics using silica from rice husk ash has been carried out. The purpose of this study was conducted to determine the mass addition of silica and firing temperature on the characteristics of cordierite ceramics from rice husk ash. This research was conducted in 3 stages, namely the preparation of silica gel from rice husk ash, the manufacture of cordierite ceramic materials, and the characterization. The formation of silica was carried out by burning rice husks at 700 °C for 3 hours with the addition of 4M NaOH to form silica gel. Synthesis of cordierite ceramics with a mass ratio of 14% Magnesium oxide, 35% Alumina, and 51% Silica from rice husk ash using the solid state method by heating at temperatures of (700, 800 and 900) °C. Sample characteristics were carried out using the XRD test and to determine the hardness value a microhardness tester was used. In addition, an analysis of the physical properties of cordierite including measurement of burnt shrinkage, density and porosity was carried out. The values of fire shrinkage and density increased with the addition of mass of silica and combustion temperature, except at 700 °C with the addition of 10% silica the values of the fire shrinkage decreased and at 900 °C with the addition of 10% silica the values of density also decreased. The addition of silica mass and the increase in combustion temperature made the porosity value increase except at 900 °C with the addition of 15% silica which decreased by 20.65%. The addition of silica decreases the hardness of cordierite ceramics, so that as the calcination temperature increases, the hardness also decreases, except for samples without silica at 800°C. Based on the results of XRD without the addition of silica at 700 °C a crystal size of 108.58 nm was obtained, and at 900 °C with the addition of 10% silica it was 374.74 nm.

Keywords: silica, cordierite, ceramics, x-rays, Diffraction.