



Contribution ID: 343

Type: Poster

Effect of Mg on Mechanical Properties of $Mg_xFe_{(3-x)}O_4$ Prepared by Solid State Reaction

Thursday 25 May 2017 17:45 (15 minutes)

The synthesis of $Mg_xFe_{(3-x)}O_4$, $X = 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8$ and 0.9 was performed by solid state reaction with various rotating speed of ball milling (160, 240 and 320 rpm). Samples were characterized by X-Ray diffraction (XRD), scanning electron microscopy (SEM). Shrinkage and Vickers were used to determine the phase structure, physical properties and mechanical properties of magnesium ferrite. The result of XRD pattern shows that the single phase could be obtained with a rotating speed of 160, 240 and 320 rpm. Also, by using JCPDS200-002-013 showed ferrites phase and crystallize size with a range of $1.54\text{-}2.57\ \mu\text{m}$. Moreover, the maximum percentage of shrinkage, 16.641 was obtained with $X=0.8$ and a rotating speed of 240 rpm. The highest density of ceramic of $3.834\ \text{g/cm}^3$ was obtained with $X=0.1$ and a rotating speed of 320 rpm. The Vickers hardness of $7.442 \times 10^3\ \text{kg/m}^2$ was obtained with $X=0.8$ and a rotating speed of 160 rpm.

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Session Classification: Poster Presentation II

Track Classification: Material Physics and Functional Materials