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Didit Budi Nugroho, D.Sc.

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Welcoming Address

Welcome to the 2015 IConSSE – The International Conference on Science and Science Education!

This conference, which is organized by the Faculty of Science and Mathematics, Satya Wacana Christian University Salatiga, is held at Laras Asri Resort and Spa Salatiga.

Arts, science and technology are crucial components in the advancement of human civilization. There is art in the creation of technology, and science provides strong bases for the technological development. We are proud to inherit the temple of Borobudur which is a proof that Indonesian's ancient arts and technology are so advanced that not only is the masterpiece beautiful, but also technologically rich.

This International Conference on Science and Science Education is attended by more than 160 participants. There are more than 67 papers is presented orally covering wide-variety subjects of science and science education. We thank you all for your participation.

We thank the Organizing Committee, Reviewers, and Steering Committee for having been working hard. Finally, we would also like to thank the Rector of Satya Wacana Christian University, and Dean of Faculty of Science and Mathematics for their support for this conference.

We hope you will enjoy our togetherness. Thank you.

Salatiga, November 30th , 2015

Dr. Adi Setiawan
Chairman

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Preparation and characterization of nanosize spinel $Ni_{0.9}Fe_2Cu_{0.1}O_4$ using pectin as binding agent

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Abstract

$Ni_{0.9}Fe_2Cu_{0.1}O_4$ nanomaterial have been prepared using a sol-gel method. Preparation of material was carried out by dissolving nitrate salts of iron, cobalt and nickel, in pectin solution and then the sample was stirred throughly using magnetic stirrer while adjusting pH to 11. After freeze-drying process, the sample was subjected to calcination treatment and subsequently characterized using the techniques of X-ray diffraction (XRD), Debye Scherrer Methods, PSA, and DT-TG analysis. The results of XRD characterizationand Rietveld calculation indicated that materials consist of four crystalline phases, such as, $CuFe_2O_4$, $Cu_{0,86}Fe_{2,14}O_4$, $NiFe_2O_4$, and NiO. The first three crystalline phases is superimposed. DT-TGA result showed that spinel $Ni_{0.9}Fe_2Cu_{0.1}O_4$ formed at 400°C. Then, PSA determination proved that the grain size of spinel ferrites is a range of 30–95.2 nm as much as 21%. Crystallite size calculation using Scherrer equation, proved that the size is 35.42 nm and its size increased as temperature calcination inclined.

Keywords : Nanomaterial, BrØnsted–Lowry and Lewis acid sites, spinel ferrites

1. Introduction

Spinel compounds have attracted great attention due to their many enormous properties for diverse industrial field applications, such as electronic devices [Waqas et al., 2012; Roy et al., 2012], magnetic materials [Niyaifar et al., 2014; Qian et al., 2010], pigments [Candeiaa et al., 2004; Imanaka et al., 2015], and catalysis [Daadmehr et al., 2013; Abelo et al., 2011, Situmeang et al., 2011]. In general, the applications of this spinel compound is governed by peculiar properties, which in turn depends on the chemical composition and microstructure [refs]. In general, the structural formula of spinel compound is symbolized as AB_2O_4 for II – III cation systems or A_2BO_4 for II-IV, II-III, I-III/IV cation systems (Le et al., 2014; Hill et al., 1979). Furthermore, the structural formula of spinel compound such as ferrites can be written as $(M^{2+}_{1-\delta}Fe^{3+}_{\delta})[M^{2+}_{\delta}Fe^{3+}_{2-\delta}]O_4$, where parentheses and square brackets denote cation sites of tetrahedral (A) and octahedral (B) coordination, respectively. δ, which is determined by the preparation process, represents the so called degree of inversion defined as the fraction of the (A) sites occupied by Fe^{3+} cations (Corrias et al., 2008; Lazarević et al., 2012; Sutka et al., 2012).

Since the choice of preparation method can determine the formation of a peculiar property of the material, it is crucial to decide which method of preparation will be used. Based on the literatures, sol-gel method is the better method compared to another method (Perego & Villa, 1997; Maensiri et al., 2007). This sol-gel method have proved that nano-materials will be formed (Yehia et al., 2014; Situmeang et al., 2015a,b). The nano-size