

Proceedings of the International Conference
on Science and Science Education



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Contents

Editorial Team	iii
Proceedings Team	iv
Welcoming Address	v
Contents	vi
Lessons from the 20 th century for 21 st century science education [Berg]	AZ.1
Excited state dynamics of carotenoids free and bound to pigment-protein complexes [Rondonuwu–Koyama]	AZ.12
Problem solving and reasoning in the learning of mathematics [Vale]	AZ.23
Application of the Graphene Quantum Dots as a sensor of cancers: A review [Fauzi–Shah–Widyapuspa–Pratama–Wibowo–Fahmi–Uktolseja]	BC.1
Analysis of chlorophyll content in six traditional medicinal plants as an alternative food supplement [Gloria–Iswari]	BC.9
Cholesterol profile due to granting of the rice bran types in rats with diet used cooking oil [Wasikin H.–Iswari]	BC.13
Development of interactive digital book as teaching materials in animal physiology (Sub of the nerve physiology learning) [Hernawan]	BC.19
Vitamin A induction in reactive oxygen intermediate and nitric oxide intermediate production against <i>Plasmodium berghei</i> [Iswari–Susanti–Dafip]	BC.27
The effect of altitude against total phenolic and Epigallocatechin Gallate (EGCG) content in green tea leaves [Widyaningrum–Fudholi–Sudarsono–Setyowati]	BC.34
Carbon monoxide gas detector as integrated chemistry learning media on STEM (Science, Technology, Engineering, and Mathematics) [Ariesta–Putra–Kurniawan]	BC.41
Preparation and characterization of nanosize spinel $\text{Ni}_{0.9}\text{Fe}_2\text{Cu}_{0.1}\text{O}_4$ using pectin as binding agent [Djayasinga–Situmeang]	BC.48
Immobilization cocodust biomass with silica as adsorbent for Cd(II) and Pb(II) ions in solution [Endah–Buhani–Suharso]	BC.56
Oxidation against α -guaiene at various time of aeration [Harfiya–Utomo–Warsito]	BC.61
Modulated synthesis and characterization of Ni–UiO–66 [If lakhah–Ediati]	BC.64
Scaling of calcium carbonate (CaCO_3) in pipes: Effect of flow rates and tartaric acid as additives on induction time and phase transformation [Kardiman–Muryanto–Bayuseno]	BC.71
Catalytic cracking of <i>Jatropha Curcas</i> oil using aluminosilicate prepared from rice husk silica and aluminium metal through electrochemical method [Mediasari–Simanjuntak–Sembiring–Situmeang]	BC.78
Effect of silica to alumina molar ratio on crystallinity of mordenite synthesized using rice husk ash and kaolin from Bangka Belitung [Merdekawati–Ediati–Prasetyoko]	BC.84
Study catalytic oxidation of α -pinene using hydrogen peroxide-iron(III) chloride [Pradhita–Masruri–Rahman]	BC.90

Direct synthesis of mordenite from kaolin and rice husk ash [Rahmawati–Ediati–Prasetyoko]	BC.97
Utilization of modified dolomite as catalysts of transesterification of Refined Palm Oil (RPO): An experiment for catalytic chemistry course [Rodiah–Ediati]	BC.103
Synthesis and characterization of refractory cordierite precursors from rice husk silica [Sembiring–Simanjuntak–Situmeang–Buhani–Shella].....	BC.110
Mocaf characterization using Thermogravimetric Analysis (TGA) [Sugiharta–Hendri–Yuwono–Simanjuntak].....	BC.118
Characteristics of nanosize spinel $Ni_{0.9}Fe_2Co_{0.1}O_4$ prepared by sol-gel method using pectin as an emulsifying agent [Sulistiyo–Situmeang]	BC.122
Science, Technology, Engineering, and Mathematics (STEM) instructional development to understand redox reaction by using carbon dioxide detection system [Susanti–Putra–Kurniawan]	BC.129
Transesterification of coconut oil over alumina silicates prepared from rice husk silica and aluminium metal using electrochemical method [Susanti–Simanjuntak–Sembiring–Situmeang].....	BC.137
Needs analysis for the development of chemical adaptive assessment in vocational high schools [Suwahono–Budiyono–Prodjosantoso]	BC.143
Optimum ultrasound extraction of stevioside and rebaudioside a from <i>Stevia rebaudiana</i> leaves on isocratic RP-HPLC analysis [Martono–Riyanto–Rohman–Martono].....	BC.149
Production of magnesium hydroxide and bromine from bittern [Tutik–Simanjuntak–Situmeang]	BC.156
Penalized spline estimator in nonparametric regression [Andriani–Wibowo–Rahayu]	MA.1
Estimation of parameter in spatial probit regression model [Fahmi–Ratnasari–Rahayu]	MA.5
Parameter estimation of kernel logistic regression [Fa'rifah–Suhartono–Rahayu]	MA.8
Geographically weighted multinomial logistic regression model (Case study: Human development index value and healths status areas of districts/cities 2013 in Sumatera) [Fibriyani–Latra–Purhadi]	MA.13
Comparison of ϵ -insentive support vector regression and ϵ -support vector regression in nonlinear regression problem [Hustianda–Purnami–Sutikno].....	MA.20
Random forest of modified risk factor on ischemic and hemorrhagic (Case study: Medicum Clinic, Tallinn, Estonia) [Karisma–Kormiltsõn–Kuswanto]	MA.26
Bivariate generalized pareto distribution to predict the return level of extreme rainfall data (Case: Applied in Ajung and Ledokombo Stations) [Lestari–Sutikno–Purhadi]	MA.42
Box–Cox realized asymmetric stochastic volatility model [Nugroho–Morimoto].....	MA.48
Inflow and outflow forecasting of currency using multi-input transfer function [Reganata–Suhartono].....	MA.53
Classifying the poor household using neural network [Ruslau–Ulama]	MA.66
Path analysis model estimates using generalized method of moment (Case study: Maternal mortality in the Province of East Java) [Sari–Otok]	MA.71
Simulation study of reliability coefficient and discrimination index [Setiawan–Weku]	MA.79

The effect of enviromental attributes, facilities, and demographic profile on travelled option [Subanti]	MA.86
The determinant of traveled expenditure and the number of visitors in Semarang District [Subanti–Mulyanto–Kurdi]	MA.90
Combination of volatility and Markov-switching models for financial crisis in Indonesia based on real exchange rate indicators [Sugiyanto–Zukhronah]	MA.93
Inflow and outflow of currency forecasting using calendar variation model based on time series regression [Urusiyah–Suharsono–Suhartono]	MA.98
Performance of neural network model in forecasting Indonesian inflation [Warsito–Suparti–Mukid]	MA.103
Financial crisis model in Indonesia using combined of volatility and Markov-switching models based on international reserve ratio to M2 indicators [Zukhronah–Susanti–Sugiyanto]	MA.109
Modelling spatial extreme value with max stable processbased on Smith model (Case study: Modeling of precipitation extremes in Lamongan, East Java) [Anindita–Sutikno]	SC.1
Two-level parameter estimates GSTARX-GLS model [Ditago–Suhartono]	SC.12
Emission estimation of fuel consumption and CO ₂ absorption by green open space in Jakarta [Gusnita–Suaydhi]	SC.21
The simulation studies for Generalized Space Time Autoregressive-X (GSTARX) model [Kurnia–Setiawan–Rahayu]	SC.30
Proximate analysis of Kasem (the fermentation of blended shrimp & rice) local food of Grobogan Purwodadi Central Java, Indonesia [Listyono–Iswari]	SC.38
Science textbook development based on scientific literacy aspects theme matter changes in environment [Puspaningtyas–Rusilowati–Nugroho]	SC.44
Survival analysis for recurrent event data with Andersen–Gill approach [Sari–Purnamij]	SC.51
Meteorological analysis of the Banjarnegara Landslide on 12 December 2014 [Suaydhi–Siswanto]	SC.55
Designing mobile learning media of fundamental programming studies for vocational high school [Arifin–Wibawa–Prasetya]	SC.61
Mobile learning materials of networking operating system students for vocational high school [Firmansyah–Wibawa–Herwanto]	SC.69
Develoment of online HTML & CSS learning resources with Live Editor for Web-Based Programming subject [Fuadi–Fuady–Wibawa]	SC.75
Analysis and design of mobile-based learning materials in digital photo composition subjects for the students of class XI multimedia majors VHS [Rinawan–Wirawan–Wibawa]	SC.81
Strategic planning Information and Communication Technology (ICT) at Senior High Schools in Salatiga using Ward and Peppard method [Setiyanti–Thruph–Palekahelu–Sedyono]	SC.89
Developing accurate decision making skill by a crisis simulation on volcanic eruption [Prastowo]	SC.99
Estimates of the earth's liquid outer core velocity using toroidal assumption and the DGRF/IGRF 1990-2000 magnetic models [Prastowo–Jannah]	SC.106

Analysis of understanding concept of science literacy course students take integrated science theme of sustainable development [Sulistawati–Mudzakir–Sopandi–Riandi].....	SC.113
Research on University Student's self-efficacy scale in science education: A systematic review [Suprpto–Chang].....	SC.120
Chance of time lapse microgravity method survey for subsidence monitoring [Supriyadi–Hardyanto–Setyawan].....	SC.130
The use of poster on thermodynamics for concept mastery and students attitude in Vocational High School [Susilawati–Huda–Linuwih–Sudana].....	SC.136
Implementation of asking and group competition learning strategies to improve critical thinking skill [Wulandari–Rustaman].....	SC.141
Fabrication process of CO gas sensor devices based tin oxide (SnO ₂) by Thick Film Technology [Widodo].....	SC.149
Technology of anisotropic magneto resistive sensor on silicon substrate [Widodo–Kristiantoro].....	SC.163
Role of Bionik in product development [Arya].....	SC.174
The analysis of cesium-137 activity of sediment surface by gamma spectroscopy methods on dry season at Cilacap Donan Estuarine 2014 [Wahikun].....	SC.179
Analysis of magnetism problems in High School Physics National Exam based on concept required and student's science generic skills [Fatmaryanti–Suparmi–Sarwanto–Ashadi].....	SC.184

Appendix A. (Co-)Presenters Attendance List (Parallel Session)

Appendix B. Question and Answer

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

Preparation and characterization of nanosize spinel $\text{Ni}_{0.9}\text{Fe}_2\text{Cu}_{0.1}\text{O}_4$ using pectin as binding agent

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Abstract

$\text{Ni}_{0.9}\text{Fe}_2\text{Cu}_{0.1}\text{O}_4$ 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 thoroughly 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 characterization and Rietveld calculation indicated that materials consist of four crystalline phases, such as, CuFe_2O_4 , $\text{Cu}_{0.86}\text{Fe}_{2.14}\text{O}_4$, NiFe_2O_4 , and NiO . The first three crystalline phases is superimposed. DT-TGA result showed that spinel $\text{Ni}_{0.9}\text{Fe}_2\text{Cu}_{0.1}\text{O}_4$ 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 [Niyafar 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 $(\text{M}^{2+}_{1-\delta}\text{Fe}^{3+}_{\delta})[\text{M}^{2+}_{\delta}\text{Fe}^{3+}_{2-\delta}]\text{O}_4$, 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