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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
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Judul Karya Ilmiah (Prosiding) : The precipitation synthesis of broad-spectrum UV absorber nanoceria
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Semarang, 15 Mei 2023

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**LEMBAR
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2. Ruang lingkup dan kedalaman pembahasan:

Artikel ini membahas mengenai sintesis nanopartikel cerium dengan menggunakan metode presipitasi sebagai penyerap sinar UV. Hasil penelitian nanoceria menunjukkan aktivitas fotokatalitik yang buruk sehingga nanoceria cocok untuk digunakan sebagai absorber sinar UV dalam produk perawatan pribadi. Paper ini juga dilengkapi dengan referensi pada bagian pembahasan untuk menguatkan diskusi.

3. Kecukupan dan kemutakhiran data/informasi dan metodologi:

Metode yang digunakan standar dengan data yang disajikan mudah dipahami dan informatif secara visual sehingga sangat baik dan mendukung hasil penelitian. Referensi yang digunakan juga cukup baik.

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Semarang, 15 Mei 2023

Reviewer 1



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NIP. 19710813 1995121001

Unit Kerja : Fisika

Bidang Ilmu: Fakultas Sains dan Matematika

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Dalam artikel ini membahas mengenai nanopartikel cerium sebagai penyerap sinar UV. Nanoseria yang dihasilkan disintesis menggunakan metode presipitasi. Proses pembentukan nanoseria dijelaskan secara baik dalam artikel dan dikarakterisasi menggunakan XRD. Analisis terhadap ransparansi cahaya tampak dan efisiensi perlindungan di wilayah UV A diteliti menggunakan spektrofotometer ultraviolet-tampak (UV-Vis). Hasil penelitian menunjukkan bahwa nanoseria menunjukkan aktivitas fotokatalitik yang buruk sehingga sesuai dengan tujuan penelitian bahwa nanoseria cocok untuk digunakan sebagai absorber sinar UV dalam produk perawatan pribadi.
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Penyajian data dalam artikel ini memberikan informasi yang mudah dipahami, metode sintesis dan perhitungan analitik disajikan secara detail sehingga data yang diberikan mendukung hasil penelitian.
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The precipitation synthesis of broad-spectrum UV absorber nanoceria

Nurhasanah, Iis ; Sutanto, Heri; Puspaningrum, Nurul Wahyu

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^a Department of Physics, Faculty of Science and Mathematics, Universitas Diponegoro, Tembalang Semarang 50275, Jl. Prof. Soedarto, S.H, Indonesia

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In this paper the possibility of nanoceria as broad-spectrum UV absorber was evaluated. Nanoceria were synthesized by precipitation process from cerium nitrate solution and ammonium hydroxide as precipitant agent. Isopropanol was mixed with water as solvent to prevent hard agglomeration. The structure of resulting nanoceria was characterized by x-ray diffractometer (XRD). The transparency in the visible light and efficiency of protection in UV A region were studied using ultraviolet-visible (UV - Vis) spectrophotometer. The results show that nanoceria possess good transparency in visible light and high UV light absorption. The critical absorption wavelength of 368 nm was obtained which is desirable

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Changes in UV-absorption properties of CeO₂ nanoparticles solution caused by X-rays and γ-rays radiation

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Zholobak, N.M. , Ivanov, V.K. , Shcherbakov, A.B.
(2011) *Journal of Photochemistry and Photobiology B: Biology*

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for excellent broad-spectrum protection absorbers. Moreover, analysis of photodegradation nanoceria to methylene blue solution shows poor photocatalytic activity. It indicates that nanoceria suitable for used as UV absorber in personal care products. © 2013 AIP Publishing LLC.

Author keywords

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Bis(1,2,5-thiadiazolo)-<i>p</i>-quinobis(1,3-dithiole) (BTQBT) templating effect on structure and performance of organic solar cells Yasuhiro Iwasawa and Yukio Furukawa	47
Synthesis of (Pb,Ni)-doped BiFeO₃ multiferroic systems via a sol-gel method and their magneto-electric properties Retno Asih, Muhammad Gufron, and Darminto	50
The precipitation synthesis of broad-spectrum UV absorber nanoceria Iis Nurhasanah, Heri Sutanto, and Nurul Wahyu Puspaningrum	54
Fabrications and characterizations of dye-sensitized solar cells (DSSCs) with sol-gel derived gel electrolytes Wa Ode Sukmawati Arsyad, Herlin Pujiarti, Pardi Sampe Tola, Herman, and Rahmat Hidayat	58
Structure and particle morphology characterization of La_{0.85}Ba_{0.15}Mn_(1-x)Ti_xO₃ Haniyah Nadhira, Budhy Kurniawan, Halimah Arifni, and Siti Ahmianti	62
Effects of nano anatase-rutile TiO₂ volume fraction with natural dye containing anthocyanin on the dye sensitized solar cell performance S. Agustini, R. A. Wahyuono, D. Sawitri, and D. D. Risanti	66
Composite electrodes of activated carbon derived from cassava peel and carbon nanotubes for supercapacitor applications E. Taer, Iwantono, M. Yulita, R. Taslim, A. Subagio, Salomo, and M. Deraman	70
Physical properties characterization of Porong Sidoarjo mud and its potentials as CO gas adsorbent materials R. S. Mustopa, A. F. Adzima, M. K. Asy'ari, and D. D. Risanti	75
Synthesis of silver nanosheets onto solid substrates by using seed-mediated growth method Iwantono, E. Taer, A. A. Umar, and T. T. Saputrina	79
Study of the stability coated and uncoated nanosilver colloid Harsojo, Respitaningrum, Toto Afrianto, and Harini Sosiati	83
Synthesis of lithium cobalt oxide using low-pressure spray pyrolysis Darmawan Hidayat, I Made Joni, Setianto, Camellia Panatarani, and Kikuo Okuyama	87
Analysis of CaCO₃ products from lime solution Zaenal Arifin, Suminar Pratapa, Triwikantoro, and Darminto	90
Carbon film deposition on SnO₂/Si(111) using DC unbalanced magnetron sputtering A. S. Aji and Y. Darma	93

Muon Site Estimation on La_2CuO_4 using Dipole Field and Density Functional Theory Calculation

Budi Adiperdana^{1,2,*}, Irwan Ary Dharmawan³, Rustam Efendi Siregar³, Shukri Sulaiman⁴, Mohamed Ismail Mohamed-Ibrahim⁴ and Isao Watanabe¹

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Abstract. It has been nearly 27 years since the discovery of the first high temperature (high- T_c) superconductor on LaBaCuO by Benor & Muller in 1986 [1], in which the mechanism of how high- T_c superconductor happening remain unsolved up until now. La_2CuO_4 are a parent compound for $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ superconductor, where show antiferromagnetic behavior on based temperature. By adding Sr doping about 0.05 its properties become superconductor. According to previous experimental and theoretical study [2,3], magnetism plays quite an important role for LaBaCuO . μSR was one of the good tools to investigate magnetic properties of magnetic materials, but its utility is limited by the lack of knowledge of the muon implantation site and because of that we need to know where muon was staying on crystals. For many years many methods already proposed to determine the muon site in La_2CuO_4 , but always lead to different sites from one to another. This lead to many confusion for researcher who want to continue and go to deeper understanding about magnetic behavior using μSR . On the present study, we reinvestigated the previous study sites by using dipole field and density functional theory calculation to see the relaxation and energy behavior for each sites. For the dipole calculation we used two kind of magnetic moment from experiment and theoretical, and expand the structure to be 50 Å radius. The potential minima position also included to be tested as the possible muon sites, GGA PBE correction was used to see the different behavior between them. The purpose of this investigation is the first step to find out the general method for muon sites determination, that can applied for many cases.

Keywords: Muon sites, Dipole field, Density functional theory.

PACS: 31.15.A, 74.72.-h

INTRODUCTION

La_2CuO_4 is one of parent material for high- T_c superconductor that has antiferromagnetic behavior below 30 K. La_2CuO_4 is still hot topic to be investigated since its discovery by Bednorz and Muller on 1987 [1], because theory was predicting that it would have a conducting behavior, while experiment shows that this material has an insulator properties. Prediction using Hubbard Model shows that to achieve the insulator gap from experiment that is 2 eV using photoconductivity [4], we need to set the correlation between d-orbital on copper atoms to be 10 eV stronger than that of normal value [5]. To understand the possible relationship between antiferromagnetic

and superconductor on La_2CuO_4 we need to have a deeper understanding on its magnetic behavior, and muon spin relaxation (μSR) is one of the good tool to understand the local behavior of magnetic materials.

μSR are spectroscopy that using muon particle as a probe, by implanting spin-polarized positive muon into sample. Muon was used its ability to sense a local field that makes it become more sensitive to feel spin or orbit compare to other spectroscopy like neutron scattering. Many experiment has been done on La_2CuO_4 [6-10], that show internal field between 400 – 430 G. Even though muon can respond to local field but we still not too sure about the sources of those field, so we cannot interpret the data further more. To do that, we need to predict where exactly those effects

Climate Change and Variability in the Palembang City: *Long-term Trends and Variability of Palembang Rainfall*

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Abstract. Long-term trends of Palembang rainfall are used to evaluate the climate change signal. The result shows that the long-term trend in Palembang rainfall is seasonally dependent. It indicates two distinct characteristics: a wetting trend during the southeast monsoon season (June–August) and a drying trend during the northwest monsoon season (December–February). This implies that there are a wetting-trend during dry-season and a drying-trend during rainy-season. Furthermore, a drying-trend is also observed during the monsoon break season in March–May and September–November. A positive-trend in rainfall during June–August is 4.57 mm/year, while the strongest negative-trend in rainfall observed during December – February is -16.02 mm/year. The variability of Palembang rainfall is linked to a coupled ocean-atmosphere mode in the tropical Indian and Pacific oceans. The connection between the seasonal rainfall variations and Indo-Pacific climate variability is demonstrated by the simultaneous correlations between the sea surface temperature (SST) and the Palembang rainfall. The SST anomaly in the tropical regions affects the climate and general circulation through change in the Walker circulation (e.g. Indian Ocean Dipole and ENSO events).

Keywords: climate change, El Niño, Indian Ocean Dipole, La Niña, Palembang rainfall.

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INTRODUCTION

A possible linkage between the increase in global temperature and the recent extreme climate events has received much attention of the society for its possible impact on human life. Earlier studies have shown that the global warming is making an intensification of rainfall and flooding in some part of the world as well as causing droughts more severe in other part of the world. Accurate temporal knowledge of global precipitation is essential for understanding the multi-scale interactions among weather, climate and ecological systems. In addition a better knowledge on multi-scale climate variations is useful for predicting the impact of extreme weather events such as floods, droughts and landslides [1].

Indonesia, located in between the Pacific Ocean and Indian Ocean, is strongly influenced by coupled ocean-atmosphere modes in both ocean, namely the El Niño–Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) dynamics. In particular, warm events (El Niño) in the Pacific Ocean and positive Indian Ocean dipole episodes cause drought conditions

in Indonesia [2-4]. This condition has significant consequences for agricultural output, rural incomes, and staple food prices. In contrast, the cold phase of ENSO cycle (La Niña) and negative IOD events bring a lot of rain to the Indonesian region and the surrounding countries [5].

Previous studies have demonstrated that the local sea surface temperature (SST) anomalies over Indonesia play important role affecting the Indonesian rainfall variability [6,5]. Their studies suggested that the local SST variation accounts for 10–16% of the rainfall variability.

The goal of this study is to evaluate the temporal variation of the rainfall in the Palembang city and to examine its relation to the warming trend of the Indo-Pacific region.

DATA AND METHOD

Data

Monthly rainfall data recorded at two rain gauge stations located in the Sultan Mahmud Badaruddin II

The Frontier of High Energy Physics and the Large Hadron Collider

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Abstract. High Energy Physics explores the most fundamental questions about the nature of the universe, e.g., basic building blocks of matter and energy, existence of the smallest sub-atomic particles, dark matter, dark energy etc. The Large Hadron Collider (LHC) is the most powerful accelerator on earth located near Geneva, Switzerland. It recreates the conditions just after the Big Bang by colliding two proton beams head-on at very high energy every 25-50 nanosecond. With the recent discovery of Higgs boson, the LHC is firmly marching on to explore the TeV energy scale.

Keywords: High Energy Physics, Large Hadron Collider, LHC.

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INTRODUCTION

Everything, including ourselves, is made of matter whose underlying structure is governed by basic laws of physics. The goal of high-energy particle physics is to understand the fundamental constituents of matter and their mutual interactions by looking at the sub-atomic particles that make up atoms.

THE BUILDING BLOCKS OF THE UNIVERSE

Most of us are familiar with the concept of atoms and understand that they are made up of protons, neutrons, and electrons. However, if we zoom in closer, we learn that of these well known particles, only the electron is “fundamental,” meaning that is isn’t composed of smaller particles as far as we know. Protons are composite particles, i.e., they are made up of even smaller particles. These particles are called “quarks” after a line from James Joyce’s *Finnegan’s Wake* (“Three Quarks for Muster Mark”). Like protons, neutrons are also made of quarks. There are 6 types of quarks that we have created and measured in laboratory: the up quark, the down quark, the charm quark, the strange quark, the top quark, and the bottom quark. A proton is two up quarks and a down quark, and a neutron is an up quark and two down quarks. The up quark has charge $+2/3$ and the down quark has charge $-1/3$, so we recover the well-known properties

that a proton has charge $+1$ and a neutron has charge 0 . The quarks inside a proton or neutron feel strong nuclear force. The things that bind quarks together, that make them stick to each other, are appropriately known as gluons.

WEAK FORCE: THE REASON WHY WE EXIST

Processes such as neutron decay can only be explained by introducing yet another new force of nature. By nuclear standards, the 15-minute lifetime of the neutron is extremely long (typical lifetimes of subatomic particles are in the range of a pico-second or smaller!), indicating a very weak process at work. Accordingly, the new force of nature is called the “weak force” and was first discovered in the neutron decay (also referred to as “beta decay”). Despite its slow rate and short range, the weak force plays a crucial role in the make-up of the world we observe. The sun would not burn without it since the weak interaction causes the formation of deuterium, then two deuterium nuclei fuse into helium, which provides the fuel for the sun. In fact, the weak force is responsible for our existence. If weak force didn’t exist, there would be no atoms, no molecules, and no stable matter. In short, the world would not exist.

The weak interaction is the only process in which a quark can change to another quark, or a lepton (electron or muon) to another lepton. This is possible

Application of Spectrometer Cropsan MSR 16R and Landsat Imagery for Identification the Spectral Characteristics of Land Cover

(Study case in Medan, North Sumatera Indonesia)

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Abstract. The spectral characteristics of land cover are basic references in classifying satellite image for geophysics analysis. It can be obtained from the measurements using spectrometer and satellite image processing. The aims of this study to investigate the spectral characteristics of land cover based on the results of measurement using Spectrometer Cropsan MSR 16R and Landsat satellite imagery. The area of study in this research is in Medan, (Deli Serdang, North Sumatera) Indonesia. The scope of this study is the basic survey from the measurements of spectral land cover which is covered several type of land such as a cultivated and managed terrestrial areas, natural and semi-natural, cultivated aquatic or regularly flooded areas, natural and semi-natural aquatic, artificial surfaces and associated areas, bare areas, artificial waterbodies and natural waterbodies. The measurement and verification were conducted using a spectrometer provided their spectral characteristics and Landsat imagery, respectively. The results of the spectral characteristics of land cover shows that each type of land cover have a unique characteristic. The correlation of spectral land cover based on spectrometer Cropsan MSR 16R and Landsat satellite image are above 90 %. However, the land cover of artificial waterbodies have a correlation under 40 %. That is because the measurement of spectrometer Cropsan MSR 16R and acquisition of Landsat satellite imagery has a time different.

Keywords: The Spectral Characteristics, Land cover, Spectrometer, Landsat image.

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INTRODUCTION

The electromagnetic wave interacts with an object in the earth in three ways; they are reflection, transmission, and absorption [1-3]. The reflection of electromagnetic waves usually can be exploited by field spectrometer. The reflection of electromagnetic recently can be detect using remote sensing technology. Remote sensing is defined as a method or technique for observing an object on the earth without direct physical contact with the object under investigation [4]. Remote sensing is also defined as a science or art and to obtain information about an object, or phenomenon through the analysis of data obtained with a device without direct contact with the object or phenomenon under study [5].

The Satellite imagery from remote sensing technology performance as the main source to obtain information regarding to land cover. The knowledge of spectral characteristic of land cover is very important for classifying satellite image in geophysics analysis [6-11].

The study aims to investigate the spectral characteristics from spectrometer Cropsan MSR 16R and Landsat 5 TM imagery. This study includes

the basic surveys of the spectral measurement in several type of land cover by using spectrometer, spectral characterization on Landsat 5 TM imagery and verify the spectral value of measurement from spectrometer and Landsat 5 TM imagery.

METHODS

This study was conducted in Medan and a part of Deli Serdang, North Sumatera, Indonesia. The area of the study is located in 03°34'05" - 03°55'08" S and 98°31'12" - 98°55'12" E. The multispectral image of Landsat 5 TM was used for measurement with an index location of path 129 and row 057 which is conducted on January 27, 2006 and March 30, 2011. Landsat satellite system is an optical remote sensing systems using passive sensors. Landsat 5 TM satellite is an artificial satellite in the United States that was launched on March 1, 1984. Landsat 5 TM satellite sensor consists of seven bands that are sensitive to radiation wavelengths of visible light and infrared [12]. The basic survey of the spectral characteristics of land cover was conducted by using Cropsan MSR 16R spectrometer produced by Cropsan, Inc. Cropsan MSR 16R equipped with