



CONFERENCE PROCEEDINGS

**4th ICSTR Singapore – International Conference on Science & Technology
Research, 15-16 November 2019**

15-16 November 2019

CONFERENCE VENUE

**The National University of Singapore Society (NUSS), The Kent Ridge Guild
House, 9 Kent Ridge Drive, Singapore**

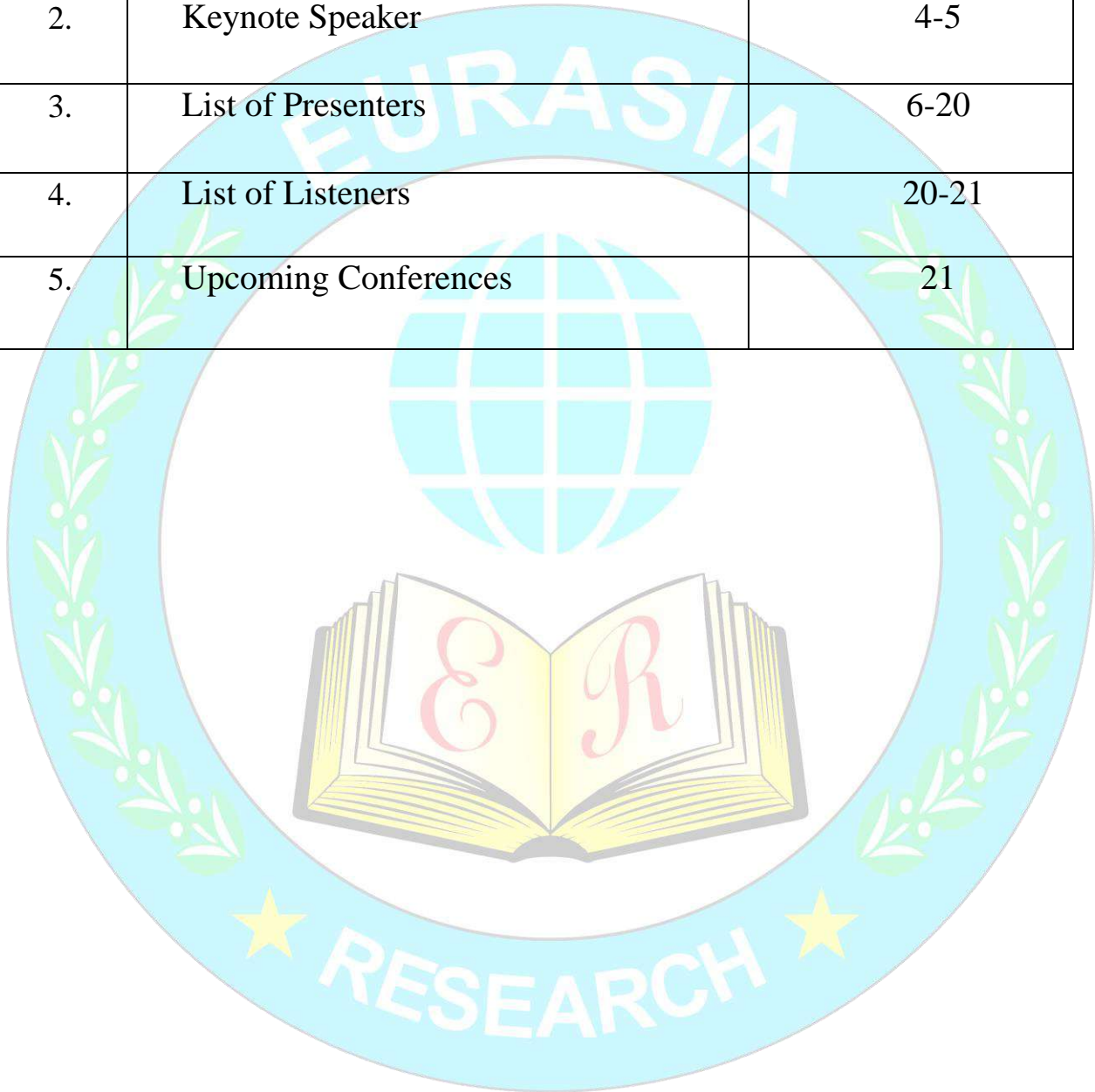
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Preface:

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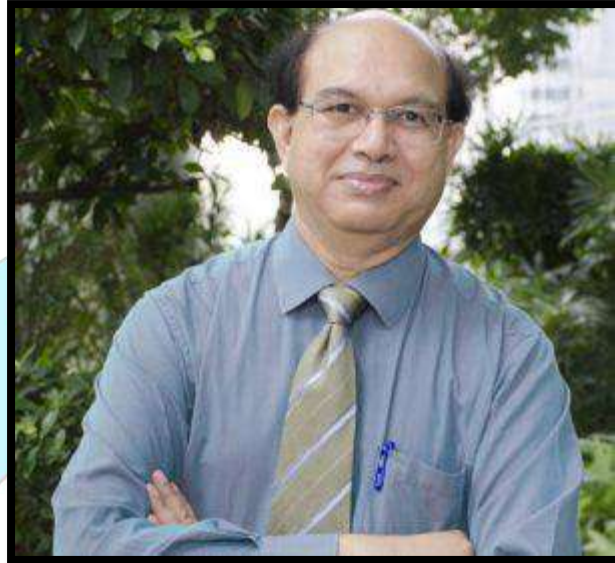
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Our mission is to make continuous efforts in transforming the lives of people around the world through education, application of research & innovative ideas.

KEYNOTE SPEAKER



Dr. Deepak Waikar

Managing Partner for EduEnergy Consultants LLP, Singapore, Chief Training Adviser for Tacstra Solutions Pvt. Ltd, Singapore, Associate Faculty for Overseas Universities in Singapore, Vice-Chair for IEEE Education Society Singapore Chapter

Topic: “Transiting Smartly from Fossilised to Clean, Green & Renewable Energy for Sustainable Future”

Dr. Deepak Waikar is Managing Partner for EduEnergy Consultants, Singapore, Training Adviser for Tacstra Solutions Pte Ltd, Singapore & Member of Indo-Universal Centre for Engineering Education. He has been associated with the premier institutions in India, Singapore & with British & Australian Universities offering courses in Singapore. He has authored/co-authored book chapters, research articles and delivered keynote & plenary session presentations. He is a recipient of IEEE-PES Outstanding Power Engineers’ Award 2003 and SP Green Buddy Award 2004. He has served as Chairman of the IEEE Power & Energy Society (PES) Chapter, Singapore. Currently, he is serving as Vice-Chair of IEEE Education Society Chapter Singapore. Dr. Waikar has conducted several students & faculty development programmes on various topics.

PLENARY SPEAKER



Sankalp Arpit
School of Energy Science and Engineering, IIT Kharagpur,
Kharagpur, India

He is currently working as research scholar in IIT Kharagpur (School of Energy Science and Engineering) and carrying out performance assessment of combined cycle power plant applying thermodynamic principle (Exergy). Broadly, the objective of his research work is to carry out performance assessment of combined cycle power configured into captive power plant with a focus on energy, environment, and sustainability aspect.

Prior to his aforesaid research he was appointed as Junior Research Fellow under Dr. Sandip Kumar Saha in IIT Bombay (2014-2015) where he contributed in two projects: –
Development of thermal storage system using phase change material for ORC based solar thermal power plant.

Effect of Nano-fluid concentration and composition on laminar jet impinged cooling of heated steel plate.

Further, he have refined his teaching/research strategies through Assistant professor Job. The feedback from faculty members and students on his approachability, communication, knowledge, and temperament has been positive: in an anonymous evaluation, he was praised at Manipal Institute of Technology, Manipal (Udupi, India). In addition, throughout his academic and professional life, he have mentored and supervised students/colleagues in different capacities, and demonstrated a commitment to service, leading to several recognitions for team work and policy leadership.

PRESENTERS

**Milano Carlitos
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ERCICSTR1924051**

Diverse Attachment between Humans and Robots

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Fernando P. Oringo

Abstract

Robotics throughout the years, it has become a foundation that continues to opens doors to many opportunities that lead to a greater impact in our society. Therefore it is a must to understand the capabilities of both humans and robots creating a co-operative relationship between them that can strengthen the bond. The main goal of our study is to be able to spread awareness on how robots or automatons can give us an advantage in life, how it can assist us in the things we need to do, especially towards the minority: those who have special needs that can possibly be catered by robots. The theoretical framework is based on how a robot's behavior can be evaluated by comparing it to another entity which is also capable of social interaction, which, in this case, are PWDs. The process we used for Data Procedures are using Coding, Thematization and Triangulation. With the data gathered by the researchers, functions and applications of robotics among people with disability were analyzed. The Human Robot Interaction among the perspective of PWD's such as its relationship and challenges of integration were also effective as it gives them a keen understanding that this could also benefit and help them whether, physically and mentally. We researchers conclude that the process of the interview conducted gave an opportunity to discover and understand the certain aspects concerning the PWD's. With this, it serves as a foundation that continues to develop and open doors to many opportunities that lead to a greater impact in our society.

**Keya Zia Pitero
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Hypoglycemic Activity of Syzygium Polycephaloides in Alloxan-induced Mice

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Abstract

Diabetes mellitus is the most common endocrine disease associated with various metabolic disorders. Currently, oral hypoglycemic agents and insulin have serious side effects, so there is a need to find an alternative yet safe anti-diabetic medicine. The present study aimed to determine the hypoglycemic property of the *Syzygium polycephaloides*. Test tube method, thin layer chromatography, qualitative and quantitative analyses revealed the secondary metabolites of the *S. polycephaloides* leaf extract such as alkaloids, flavonoids, triterpenes, terpenoids, tannins, and phenols. Hypoglycemic activity was investigated through in vivo assay using mice. The in vivo assay indicates that metformin and the two different concentrations of extracts (500mg/kg and 250 mg/kg) were able to considerably reduce blood glucose level compared to negative control. The blood glucose level before and after the oral administration have significant effect on the blood glucose level of mice ($p < 0.05$). The histopathological observations confirmed the improvement in treated groups compared to the negative control. Histopathological studies further revealed the effectiveness of *S. polycephaloides* when the reduced islet cells were restored to near-normal conditions to alloxan-induced mice. Therefore, *S. polycephaloides* has a capability in lowering the blood glucose level.

Keywords: Hypoglycemic, Phytochemical Analyses, Secondary Metabolites, Histopathology

Spatial Analysis of Erosion Hazard Level at Melikan Watershed Area Karanganyar District

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Abstract

Melikan Watershed Area located on the western slopes of Mount Lawu, Karanganyar District. This research aims to: (1) determine the level of erosion hazard in the Melikan watershed, and (2) provide priority guidance on conservation actions in the Melikan watershed. Data analysis techniques used to determine the level of erosion hazard are using the Universal Soil Loss Equation method. Based on the method used, four types of maps are needed as a basis for calculating erosion hazard levels, i.e. rainfall, soil, slope, and land use maps. From the four maps then produce land units through the overlay process, this land unit is used as a analysis unit. In this research the level of erosion hazards are classified into five categories, i.e. very light, light, medium, heavy, and very heavy. The results showed that in the Melikan watershed there were four categories of erosion hazard levels, i.e. very light, light, medium, and heavy. The amount of erosion in the research area is due to various factors, i.e. erosivity, erodibility, length of slope and slope, land cover, and land management (conservation). The suggestions put forward in this research are; (1) for the community, in conducting land processing must pay attention to the principles of correct land conservation so as not to cause greater soil erosion, (2) Don't make changes to conservation actions that can increase erosion levels, (3) the relevant agencies should provide guidance and provide counseling to the community regarding proper land processing by promoting conservation principles.

Keywords: Erosion, USLE, land management, Melikan Watershed

Design and Implementation of Digital Temperature and Humidity Data Logger and its Comparative Analysis with The Conventional – ones

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Abstract

Data acquisition systems have become inevitable tool for analyses in science and technology. With advancement in research and manufacturing processes, there is a growing demand for sophisticated yet cost-effective data logging systems to address the complexity in data acquisition and analyses. This work addresses the temperature and humidity data acquisition needs in research and manufacturing by implementing an embedded system suitable for monitoring and analyzing temperature and relative humidity at specified intervals of time. The hardware was designed and constructed using five functional parts that comprising of ATmega328P microcontroller, real-time clock, liquid crystal display unit, SD card and a low-cost DHT22 temperature and humidity sensor to capture the temperature and relative humidity. The hardware is powered by an AC source through a regulated



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power supply comprising of a shunt-regulated IC, LM7805. The captured data is processed and stored to a memory chip (SD card) which can be retrieved at any time and displayed in a Microsoft Excel format by inserting the SD card into a computer system. Data captured is displayed and managed with the aid of a visual interface display unit of a 16 x 2 alphanumeric LCD. This provides a handy system that makes data-logging easy and effective. The hardware was tested and errors of $\pm 2.24\%$ and $\pm 3.12\%$ were obtained for temperature and relative humidity respectively. Thus, this hardware is capable of performing the required task with high accuracy.

Keywords: Temperature, Humidity, Comparative, Analysis, Logger Conventional-Ones

Umar L. A
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Organic Means of Preserving and Controlling Woods Against Termite Attack Using Neem Seed (Azadirachta Indica Juss) Extracts and (Parkia Biglobosa) Seed Extract

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Abstract

There is an increasing interest in the use of natural products for termite control and environmental safety. Some local plant materials have been mentioned as potential alternatives to synthetic termiticides. The objective of this work was to determine the effect of *Parkia biglobosa* (Seed extract) and neem seed extract (*Azadirachta indica juss*) on preserving wood against termite attack. The dried wood species of *Gmelina arborea* and *Digitaria iburria* was processed into test samples measuring 30cm (1ft) in length and 5cm x 5cm in width and thickness each. Non-pressure method (Brushing) was used in applying the preservatives. The treatments combination consists of four treatments which include two local bio-insecticides Neem seed extract (LBI-I) and *Parkia biglobosa* seed extract (LBI-II), one conventional insecticide (*Solignum*) and a control replicated five times and laid out in randomized complete block design (RCBD). The treated wood samples were exposed to termite mound to test the efficiency of the preservatives. Resistance to termite destruction was measured by the loss in weight of the treated wood samples buried in the termite mound and by visual assessment of extent of destruction. The results show that there was significant difference between the two species and treatments. *Solignum* and LBI-I has the lowest percentage of weight loss of 20.8g and 30.6g respectively, then LBI-II recorded 46.3g weight loss and control sample have the highest percentage of weight loss of 86.9g. It can therefore be concluded that *Solignum* and Neem seed extract were more effective in reducing the biodegradation of *Gmelina arborea* and *Digitaria iburria* woods used in our daily activities.

Keywords: Termite, Organic, Neem, *Parkia*, Wood-species, *Solignum*



Abdullahi
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Synthesis of Antimony Selenide (Sb₂Se₃) by wet milling: Structural properties

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Abstract

Mechanical alloying is a technique involving repeated welding, fracturing, and rewelding of powder particles in a high-energy ball mill and thus all the structural and chemical changes are produced by mechanical energy. Ball mill as the name suggests consists of balls and a mill chamber has now been established as a viable path that is capable of synthesizing a variety of equilibrium and non-equilibrium alloy phases starting from blended elemental or pre-alloyed powders.

In a world with growing demand for energy, there is a need for identifying cost effective and environmentally friendly solar absorber materials. Pertaining to thin film solar cells. Sb₂Se₃ recently has been considered as a potential material for solar absorber application, because of its suitable band gap (1.0 to 1.2eV), high absorption coefficient ($>105\text{ cm}^{-1}$), non-toxicity, excellent electronic properties and abundance. In this paper, the details of synthesis of Sb₂Se₃ by high energy wet ball milling process will be presented. The collected sample has been successfully characterized by X-Ray diffraction for wet mill to investigate the formation of Sb₂Se₃ phase. From the XRD results analysis, it was found that Sb₂Se₃ single phase was formed in 13 hours of milling. Raman shifts of 188 and 252cm⁻¹ for wet milled Sb₂Se₃ had been recorded. EDS exhibits two strong peaks confirming the purity of our sample

by detecting only Sb and Se element respectively.

Keywords: Mechanical Alloying; Sb₂Se₃; Phase Evaluation



Arpita Paul
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Sustainable Development and Supply Chain Coordination in a Three Layer Supply Chain : A Green Growth Perspective

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Abstract

Green growth is becoming an extremely important issue for the sustainable development of economy and society in the world. All countries are developing innovative methodologies to achieve green growth. This paper studies the coordination issue arising out of a three-layer supply chain consisting of one manufacturer, one distributor and one retailer. In this paper we explore the impact of green initiatives taken by the manufacturer and the promotional efforts put by the distributor on the supply chain. We will study the impression of cost sharing contracts on the key decision of the supply chain players undertaking the green initiatives as well as promotional effort. Our problem construction is motivated by the recent developments in the burgeoning field of green supply chains and carbon footprint reduction. We will show product greening levels, promotional efforts, prices and profit of the chain are influenced by cost sharing contract within the supply chain. We will take game theoretic approach to examine the impact of greening, advertising and consumer sensitivity towards green channel. We will study two different cost sharing contracts one between the manufacturer and the distributor and another between the distributor and the retailer. The key contribution of this paper lies in analysing the impact of promotional activities of a green supply chain and different strategies of collaboration between channel partners.

Waste heat recovery through Air-preheater in metal casting process: A Case Study

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B. A. Dave

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Abstract

Abstract— Lost-wax casting process uses high temperature at its prior or later stages. A major quantity of heat wastes through stacks flue gasses and radiation in shell-baking furnace is worth mentioning. An energy lost in waste gasses if recovered can save much fuel and reduce GHG emissions. The authors have posted away a practical case study of efficient air-preheater technology on a shell-baking furnace. The finish was to demonstrate conventional but efficient heat recovery technology to aware industrialists about huge energy saving potentials. A techno-economical solution having a nominal payback period with 30% fuel savings is the state-of-art for the proposed work. The habit of waste heat for wax melting and heat pump for refrigeration with the proposed study may add more novelty. Thermal Imager and flue gas analyzer used for measurements. Implementation concludes with fuel savings of 10 to 30% and 6-7 months payback period with a reduction in GHG emission of 237.5 – 293.39 ton per year.

Keywords—Energy savings, Foundry, Heat recovery, Flue gas analysis, Recuperator, Energy efficiency

Maryam Bello Ali
ERCICSTR1924062

Role of UNICEF towards Girl Child School Enrolment among Farm Families of Sokoto State, Nigeria

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Abstract

The study assesses the role of UNICEF towards Girl Child education among farm-families in Sokoto State, Nigeria. The sampling frame of the study involved parents whose daughters were beneficiaries of UNICEF intervention in the affected Local Government Areas. A multi-stage sampling technique

was used to come up with 120 beneficiaries as sample size for the study. The data were obtained using structured questionnaire while descriptive and inferential statistics were used for data analysis. Objective 1,2,5&6 were achieved using descriptive statistics of frequency and percentage. While Objective 3 were achieved using Likert Scale and Objective 4 were achieved using T-Test analysis. Hypothesis of the study was achieved using Regression analysis. Findings of the study shows that 35.9% of the beneficiaries were within the age range of 35-45 years while 3.3% within the age range of 66 years and above, the study also reveals that 55.7% of the beneficiaries have house hold size of 6-10 people while 16% has 1-5 people. The forms of support provided by UNICEF to the beneficiaries include monthly allowance (41.7%) school materials (39.2%) and tuition fee (19.2%). The result on attitude of beneficiary's studies reveals that there is favourable attitude towards girl child school enrollment in the study area. The study concluded that there is a significant difference between UNICEF intervention and level of girl child education. Government, NGOs, traditional rulers, religious leaders as well as general public could play very significant roles towards the improvement of girl-child education in the State.

Keywords: Role, UNICEF, Girl Child, School, Farm Families



Alfazrin Banapon
ERCICSTR1924063

Cataract Image Classification using Convolutional Neural Network (CNN) Algorithm

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Abstract

In the last few years image classification has become quite a topic of discussion in the field of computer vision. In this study trying to apply this method in order to distinguish between cataract and normal eye patients, using the convolutional neural network (CNN) algorithm as a form of early prevention that can be used by the public. Because seeing in Indonesia itself the number of cataracts is high and the impact of this disease is blindness. The CNN algorithm is one of the deep learning methods that is able to carry out an independent learning process for object recognition, object extraction and classification and can be applied to high-resolution images that have a nonparametric distribution model. This study uses two classes, namely cataract eyes and normal eyes, which are derived from the google search engine. Data is divided into 80% training data and 20% test data, the testing process of test data produces an accuracy of 90%. The results of this study indicate that the use of the CNN algorithm has the potential to approach object recognition automatically in distinguishing cataracts and normal eyes.

Keywords: Cataracts, CNN, Image Classification

Muhammad Dahiru Audu
ERCICSTR1924064

Determination of Hygroscopic Growth of Continentals and Desert Aerosols

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Abstract

The hygroscopic growth of atmospheric aerosols influences human health, Earth climate and atmospheric chemistry. In this paper the microphysical properties such as radii, number concentration, volume mix ratio etc. were extracted from optical properties of aerosols and cloud (OPAC), the ZSR (Zdanavskii, Stokes and Robinson) is used to compute the hygroscopic growth of the aerosols mixture and modified Köhler equation was also used to predict water activities and kelvin

effect at eight different values of relative humidity 0%, 50%, 70, 80, 90, 95, 98, and 99%. We observed that hygroscopic growth of atmospheric aerosols of Continental Clean, Continental pollutant, Continental average and Desert increased with the increasing relative humidity and for the water activity the highest value was found in desert aerosols ($a_w = 1.36$) at 50% RH and the lowest was observed in continental aerosols ($a_w = 0.38$) at 0% RH also for p -value ($p < 0.05$) the data fitted the equations very well.

Keywords: Atmospheric Aerosols, Relative Humidity, Water Activity, Hygroscopic Growth Factor



Rajarajeswari Katta
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HPLC Comparison of in Vitro Oxidative Stress by AIBN, H₂O₂ & Urea Peroxide Adduct for Dimethyl Fumarate, A Recently Approved Disease Modifying Agent for Multiple Sclerosis Which Acts by in Vivo Oxidative Stress Mechanism

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Abstract

DMF (dimethyl fumarate) exerts anti-inflammatory and prometabolic effects in a variety of cell types, and a formulation (BG-12) is being evaluated in Phase III clinical trials for monotherapy in multiple sclerosis patients in which it acts by antioxidant pathway via its metabolite monomethyl fumarate (MMF). The oxidative degradation of DMF in liquid state is compared using Hydrogen peroxide and Azobisisobutyronitrile (AIBN) in a HPLC method. For solid state oxidative stress study Urea-peroxide adduct has been used. Heating with H₂O₂ may produce some misleading degradants which are not actually generated from the API. In this paper the degradations for DMF are performed with 3% H₂O₂, 1% AIBN and Urea-peroxide adduct at room temperature and correlated their kinetics of mechanisms involved. As DMF has generated only two impurities: MMF and fumaric acid, 15 minutes run time has become sufficient to separate them from DMF on XBridge C18 column using ammonium formate and acetonitrile as mobile phase at 1.0 mL/min flowrate. The developed HPLC technique can be used as a stability indicating method for DMF.

Keywords: Dimethyl Fumarate, In Vitro Oxidative Stress, AIBN, H₂O₂, In Vivo Oxidative Stress, Urea-Peroxide Adduct

Anand Nasalpure
ERCICSTR1924067

Preparation and Characterisation of Poly (Vinyl Alcohol): Polyvinyl Pyrrolidone/ Sodium Alginate Membrane By Freeze-Gelation Method

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Abstract

The aim of this study was to fabricate membrane based on poly (vinyl alcohol) (PVA): Polyvinyl pyrrolidone (PVP)/ sodium alginate (SA) with different weight ratio (w/v) by freeze gelation method. The prepared membrane were characterized by using scanning electron microscopy (SEM), fourier-transform infrared spectroscopy (FT-IR), thermogravimetric analysis (TGA), and universal testing machine (UTM). The results revealed that FTIR and SEM showed good molecular interaction among the PVA/PEG and sodium alginate. Decreased the tensile strength of the membrane as increase SA concentration. Moreover rate of thermal degradation stabilized with increased in SA ratio. Further water uptake and biodegradation also performed under water and PBS (Phosphate Buffer Saline) media respectively, resulted average swelling with enhanced the stability of water uptake and

	<p>biodegradation rate was decreased in blend. The results obtained from study exhibited moderate swelling and degradation, good mechanical properties with strong molecular interaction between PVA/PVP with SA these all characters might have advantage in the field of biomedical application. Keywords: Polyvinyl alcohol, Poly ethylene glycol, Sodium alginate Morphology, Swelling and degradation.</p>
<p>Matiin Laugiwa Prawira Putra ERCICSTR1924068</p>	<p>Deep Learning Convolutional Neural Network (Cnn) For Detection of Mustard Vegetable (Brassica Rapa) and Cabbage (Brassica Oleracea) in Real Time with Tensorflow</p> <p>Matiin Laugiwa Prawira Putra Faculty of Science, Universitas Islam Indoensia, Yogyakarta, Indonesia</p> <p>Alfazrin Banapon Universitas Islam Indonesia, Yogyakarta, Indonesia</p> <p>Raden Bagus Fajriya Hakim Universitas Islam Indonesia, Yogyakarta, Indonesia</p> <p>Abstract The Industrial Revolution has now entered the 4.0th round where humans and machines are connected to the Internet of Things (IoT), the efficiency arising from the current industrial revolution is a positive impact, not only that its application is widespread in various sectors. In this study related to the development of the industrial revolution which makes a machine that can recognize an object in real time. The method used in this study is a classification using the Convolutional Neural Network (CNN) algorithm with the Tensorflow Framework, SSD (Single Shot Multibox Detector) model and Mobilnet Feature Extractor. With the objects examined in this test are cabbage (Brassica Oleracea) and mustard greens (Brassica Rapa), the selection of these two vegetables was chosen on the grounds that they are pretty much exported from Indonesia, making it easier to recognize these two objects in a heap of vegetables a lot, the data in this study are primary data consisting of 1,000 images, each of which is 500 images of cabbage vegetables and 500 other images for mustard greens. Machines built with a configuration of 100,000 steps and 2 batches produce accuracy in detecting objects in real time ranging from 50% -99%. Keyword: Convolutional Neural Network, Object Detection, Real Time</p>
<p>Sonia Prakash ERCICSTR1924070</p>	<p>Start-Up Community Using Block Chain</p> <p>Sonia Prakash Student, Sri Sairam Engineering College, Chennai, India</p> <p>Subhiksha .S Student, Sri Sairam Engineering College, Chennai, India</p> <p>Abstract In India, 90 percent start-ups fail within the initial five years due to lack of huge capitals and innovations. So, our idea is to develop blockchain-based social network for start-ups, which will allow the collaboration between different start-ups and entrenched organizations who can provide some social and financial support to the start-ups. A token will be required to access this network, the user will earn the token through the Proof-of-Value protocol. In the proof-of-Value approach the user needs to attach a proof of their skills the subject matter expertise will verify it while stopping the spread of fake data. Thus, this will persuade the other member within the community and also the venture capitalist that the users are trustworthy and resourceful. In addition, the token will allow the users to get access for posting, commenting and voting. The blockchain technology will ensure that verification process to endorse skills is decentralized. The venture capitalist or a stranger will be able to trust the user more with this all-encompassing platform. And no second-guessing is required. Or delve into your social media profile to discover what sort of individual you are outside of work. Keywords- Blockchain, Start-ups, Social Network, Proof-of-Value, Venture, Decentralized</p>
<p>Siti Nur Iqmal Ibrahim ERCICSTR1924072</p>	<p>Pricing Power Options with Fractional Brownian Motion</p> <p>Siti Nur Iqmal Ibrahim</p>

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Abstract

Many of the problems involving option pricing has applied geometric Brownian motion process as the dynamics for the underlying asset. In this study, we aim to derive an analytical pricing formula for power options under fractional Brownian motion process using risk-neutral valuation approach. Fractional Brownian motion process models the dynamics of the long-range dependence of the underlying asset.

Keywords: Power Option, Fractional Brownian Motion, Analytical Solution

Ahmed Raza Khan
ERCICSTR1924074

Monitoring Folds Localization in ultra-thin Transition Metal Dichalcogenides using Optical Harmonic Generation

Ahmed Raza Khan

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Abstract

Folding is an effective technique to alter the optoelectronic properties of two-dimensional (2D) materials such as interlayer coupling, bandgap, etc. Optical techniques such as PL, Raman were used in the past to probe the folds localization. Here, we show that optical second harmonic generation (SHG), which is sensitive to the crystalline symmetry of 2D materials, is a powerful probe to monitor the fold localization in TMDCs. Two dimensional 2H Transition Metal Dichalcogenides (TMDC) are particularly well-suited for the study because their SHG investigation has already been done, in additional, they can be easily folded due to their high flexibility. Our study includes the fabrication of clean folds on ultra-thin layers of TMDCs, optical characterization of the folds using SHG imaging and theoretical calculations to prove our findings. We find that SHG from the folds is a coherent superposition of the SHG from the individual layers of the fold, with a very small phase difference depending on the folding angle. The SHG response is theoretically calculated as a function of the folding angle. Our results establish SHG as an effective tool to monitor folds localization in 2D TMDCs.



Divakar M S
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Acute Oral Toxicity Studies of a Methanol Extract of the Leaves of Syzygium Kanarensis (Talbot)
Raizada

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Abstract

The present study was carried out to investigate the effects of a new rare plant Syzygium kanarensis leaves extract from methanol for the study of phytochemicals, cytotoxicity and acute toxicity on wistar

rats. Preliminary screenings of phytochemicals were carried out and confirmed the cytotoxicity by MTT assay using NIH/3T3 mouse embryonic fibroblast cell line. To the study of acute toxicity 5 female rats is used accordance to OECD guideline 425. Female rats were divided into two groups. One group served as control while the other group as treated group that received methanol extract (2000 mg/kg body weight). Then Blood samples were collected by cardiac puncture, under anesthesia and assess the hematological and biochemical parameters. The vital organs of anesthetized animals were preserved for histopathological examination. The results revealed that methanol extract contains amino acids, phenolics, tannins, terpenoids, saponins and steroids. In cytotoxicity study on NIH/3T3 mouse embryonic fibroblast cell line showed the value of $IC_{50} = 359.02 \mu\text{g/ml}$. The median lethal dose (LD50) of the extract was estimated to be more than 2000 mg/kg body weight and hence the extract under investigation can be considered practically non-toxic in the study of acute toxicity. Histopathology examination of liver and kidney showed normally and no significant alteration found in organ to body mass Index. In the methanol extract, $IC_{50} = 359.02 \mu\text{g/ml}$ value in cytotoxicity, acute toxicity suggest that LD50 of the extract is greater than 2000 mg/kg body weight. No changes in the histopathology study of liver and kidney. This confirmation justifies the extract can be explored for the treatment of diabetes. Further investigation under process for the isolation of bioactive compounds and then each compounds study the effects on diabetes.

Keywords: Syzygium kanarense, Cytotoxicity, Toxicity, Histopathology



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Evaluation Of Anti-Mosquito Properties Of Psidium Species: Approaches Towards New Medicines

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Abstract

Mosquitoes act as a vector for most of the life threatening diseases like malaria, yellow fever, dengue fever, chikungunya fever, filariasis, encephalitis, West Nile Virus infection, etc. Under the Integrated Mosquito Management (IMM), emphasis was given on the application of alternative strategies in mosquito control. The continuous application of synthetic insecticides causes development of resistance in vector species, biological magnification of toxic substances through the food chain and adverse effects on environmental quality and non target organisms including human health. Application of active bioactive agents from plant extracts as an alternative mosquito control strategy was available from ancient times. These are nontoxic, easily available at affordable prices, biodegradable and show broad-spectrum target-specific activities against different species of vector mosquitoes. Extracts of selected South African indigenous plants, which are considered eco-friendly, are used for the treatment of numerous ailments and vector control worldwide. Two indigenous South African plant species, *Psidium guineense* and *Psidium x durbanensis* were tested for larvicidal, repellent and adulticidal activities against the adult female mosquito, *Anopheles arabiensis*. Both *Psidium* species were confirmed with the presence of terpenoids and their derivatives and the most abundant compounds were; 1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl, Caryophyllene oxide and 1,6-Octadien-3-ol, 3,7-dimethyl-. Essential oils from both *Psidium* species showed 100% effect on both larvicidal and repellency activity with concentration of 32 $\mu\text{l/ml}$. Current studies shows that natural products represent a rich potential source of new anti-malarial compounds.

Keywords: *Psidium* Spp; Essential Oils, *Anopheles Arabiensis*; Larvicidal; Inecticidal; Repellent Activity



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ERCICSTR1924078

Comprehensive Characterization and Investigations of Chitosan/Vanillin Blend Films Incorporated with Betel Leaf Extract

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Abstract

Novel Active Packaging Materials Of Chitosan/Vanillin/Betel Extract (CH/Vn/BE) Blend Films Were Prepared By A Solution Casting Technique. The Main Objective Of The Study Was To Investigate The Mechanical, Thermal And Phase Morphology Of The Prepared Blend Films. The Mechanical Properties Of CH/Vn/BE Blend Films Of Different Weight Ratios Were Revealed That Betel Extract Doped Chitosan/Vanillin Blend Films Exhibit Better Tensile Properties. Further, The Result Of SEM Confirmed That, Betel Extract At Lower Concentration Shows Blend Films Were Compatible With Each Other And Exhibiting Higher Mechanical Strength Due To Complete Miscibility. Meanwhile Interaction Among The Blend Films Was Evaluated By Fourier Transfer Infrared Spectroscopy (FTIR). The Results Of Thermogravimetric Analysis Displayed That, Small Change Was Noticed In Produced Films And All Blend Films Exhibited Lower Decomposition Temperature. On The Basis Of Obtained Results, CH/Vn/BE Blend Films Can Find Potential Application In Food Industry As Active Packaging Materials And Also In Pharmaceutical Industry For Controlled Drug Release.

Keywords: Chitosan, Betel Extract, Tensile Properties, SEM And FTIR

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ERCICSTR1924083

New Carboxyborane as Efficient Boron Agents for Boron Neutron Capture Synovectomy to Treat Rheumatoid Arthritis

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Abstract

Boron Neutron Capture Therapy (BNCT) is a binary cancer treatment based on a nuclear fission reaction of a boron isotope. It selectively aims to treat tumor cells and spare the normal cells using a boron compound. In the treatment, non-radioactive ^{10}B atoms are selectively concentrated in a tumor target followed by thermal neutron irradiation to initiate the ^{10}B nuclear fission reaction. The fission reaction releases a high linear energy transfer particles, which provide high kinetic energy along their very brief pathway (limited to the diameter of a single cell). Therefore, only neoplastic cells containing ^{10}B isotope are ravaged following thermal neutron irradiation. The therapy also shows high potential in the treatment of rheumatoid arthritis (RA) boron neutron capture synovectomy (BNCS). The alkylamine, cycloalkylamine and arylamine derivatives of fluorocycloboron analogs of amino acid, as promising drugs for BNCT for tumor treatment and BNCS in the treatment of RA, have been synthesized and their in vitro activities have been examined. The new compounds were characterized

by ¹H, ¹³C and ¹¹B NMR spectra, FT-IR spectra and elemental analyses and the crystal structure of compound Me₃NBH₂C(O₂BF₂NH₂) was determined to confirm its molecular geometry. The in vitro killing effects of Me₃NBH₂C(O₂BF₂NH₂) , along with its toxicity measurements, showed a special promise of such species as both BNCT and BNCS agents in the treatment of tumors and rheumatoid arthritis (RA), respectively in the presence of slow neutron beams.

Keywords: Boron Neutron Capture Synovectomy (BNCS); Rheumatoid Arthritis; Carboxyborane



Priya Patel
YRSICSTR1924050

Formulation and Optimization of Silibinin Loaded Inhalable Liposomal Nanoparticle for the Treatment of Lung Cancer

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Abstract

The purpose of present study was to optimize Silibinin loaded chitosan (CS) nanoparticles using modified ionic gelation method by application of quality by design (QbD) approach. Based on the risk assessment, effect of three variables, that is CS %, tripolyphosphate % and rate of addition of Chitosan were studied on critical quality attributes (CQAs); particle size, entrapment efficiency, CDR at 1 Hr., T50 and T90. Box Behenken design was implemented for design of experimentation with 15 runs. Prepared nanoparticles were characterized for particle size, Zeta potential, polydispersity index, entrapment efficiency, in-vitro release study, FTIR, differential scanning calorimetric, X-ray diffraction along with scanning electron microscopy (SEM). X-ray diffraction analysis revealed transformed physical state of silibinin after encapsulation. Based on the QbD approach, design space (DS) was optimized with a range of selected variables with entrapment efficiency > 50% w/w and a particle size between 300 to 400 nm, CDR at 1 hr. between 10% to 15%, T50 between 5 – 6 hrs. and T90 between 11 – 12 hrs. In-vitro drug release followed dual mechanism via, diffusion and polymer erosion shows 95.63% in 8 hrs. By SEM Study its shows particles are spherical in shape and Size distribution agreement for prepared metred dose inhaler was better (MMAD = 3.3 ± 0.17 μm with Fine particle fraction from 48% to 62% investigated by cascade impactor indicate deep targeting of FP to alveoli. The concentration of Silibinin in the lung reached a maximum level at 0.5 h post Formulation Inhalation. A 17.8-fold larger area under the curve of Nanoparticle was achieved compared to that of solution of silibinin. Tumour cells in lungs were observed in approximately 98 % rats after 5 months of NNK treatment, as evident by histopathological analysis. This rodent model showed slow progression of lung tumours which has helped us to assess early indicators of oxidative damage in lungs by studying the levels of lipid peroxidation and antioxidant parameters. LPO was elevated by 46.94 %, SOD, CAT, GSH and GR activity was decreased by 48.67 %, 22.04 %, 21.46 % and 20.85 %, respectively in serum of NNK treated rats when compared with control. . These findings suggest that increased oxidative stress can represent a risk factor for the development of lung cancer. Silibinin loaded formulations showed inhibitory effects against A549 cells in a dose- and time-dependent manner for 24, 48, and 72 h. IC50 of Silibinin loaded liposomal nanoparticles on A549 lung cancer cell line showed that systems could be useful in treatment of lung cancer. There was no significant changes occurred in the physical properties of nanoparticles during 6 month storage period. Containers also fulfilled all requirement. Inhalation nanoparticles were prepared successfully using QbD approach with the understanding of the high risk process and formulation parameters involved and optimized DS with a multifactorial combination of critical parameters to obtain predetermined nanoparticle specifications.

Keywords: Modified Ionic Gelation, Box Behnken Design; Qbd Approach, Particle Size, In- Vitro Drug Release

Manoj Kumar Ghosal
ERICSTR1924086

Performance of Solar Photovoltaic Module through Combined Air and Water Cooling in Warm and Humid Climatic Condition of India

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Abstract

A study was conducted to evaluate the performance of photovoltaic module through combined air and water cooling arrangements in warm and humid climatic condition i.e. in Odisha in India during winter and summer months. Solar photovoltaic system requires neither fuel nor produces any pollutant resulting into its increased importance in today's energy sector. Generation of electricity from solar photovoltaic (PV) system is a function of the efficiency of the photovoltaic (PV) module and other factors influencing its efficiency. Temperature among the various factors affecting the efficiency of PV module is the major parameter causing the effects on the efficiency of the PV module and power output. With the exposure of PV module to sunlight, the amount of energy from the sun converted to useful energy is about 31 %, a greater percentage is changed to heat energy, which tends to make the temperature of the module to rise and thus leads to a reduction in the generation of electricity by the module. This energy causes an increase in the temperature of module and is wasted as heat which ultimately damages the material used to fabricate the PV module and hence reduces the life span of cell as well as its conversion efficiency. To enhance the efficiency and power output from the module, the cooling arrangements such as air cooling, water cooling and combined air and water cooling were incorporated and compared its effectiveness without any cooling device. From the experiments, it was found that the efficiencies of solar module were increased in the range of 8-11 %, 12-15% and 16-20% in air, water and combined air and water cooling respectively compared to without cooling in a clear day.

Keywords: Photovoltaic Module, Cooling Of Photovoltaic Module, Efficiency Of Photovoltaic Module, Tilt Angle For Photovoltaic Module



Sankalp Arpit
ERCICSTR1924066

Assessment of Sustainability Indicators of Two Gas Turbine Plants with Naphtha and Naphtha-Rfg Mixture as Fuels

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Abstract

The aim of the present paper is to determine sustainability aspects of gas turbine engine (GT) based power plant. For this purpose, exergetic sustainability indicators are calculated for two GT power plant configurations, case A for Naphtha based power plant, case B for Naphtha-Residual fuel gas (Rfg) mixture based power plant. The investigated sustainability indicators are exergy efficiency, waste exergy ratio, environmental effect factor and exergetic sustainability. Results show that exergetic sustainability index is obtained as 0.36 for case A and 0.24 for case B. The reason being case B has high exergy destruction as compared to case A.

Keywords : Exergy, naphtha, residual fuel gas, sustainability analysis



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ERCICSTR1924082

Photovoltaic Performance of Marine phytoplankton Picochlorum maculatum extract as a Dye sensitizer in Solar Cells

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Abstract

Picochlorum maculatum is an important source for Polyunsaturated Fatty acid production and also acts as biological tool in bioremediation of shrimp culture pond effluent. The in-situ photosynthesis processes of marine phytoplankton in varying spectral irradiance attract the interest of developing natural Dye-Sensitizer for Solar Cells. In the present study pigment extract of Picochlorum maculatum was investigated for Dye-Sensitized Solar Cell (DSSC) property. The pigment extraction was carried out using Dimethyl sulfoxide (DMSO) and methanol as solvents. The spectral characterization of the extracts performed by UV-vis spectrophotometer revealed that the extracts absorbed wide range of simulated solar light spectrum in the UV and visible region between 350 and 700 nm. The absorption intensities of the extracts showed variations with diverse peaks at different wavelengths, which could be attributed to the presence of respective pigments corresponding to the polarity of the applied solvents. The extracts in different solvents were used as natural sensitizers for nanocrystalline TiO₂ photoanode based DSSC with Pt as a counter electrode. The solar cells sensitized with different extracts P.maculatum had revealed that short circuit photocurrent density (J_{sc}) varied from 0.19 $\mu\text{A cm}^{-2}$ to 1.28 $\mu\text{A cm}^{-2}$, open-circuit voltages (V_{oc}) ranged from 759 V to 614 V and solar to electrical energy conversion efficiency (η) varied from 0.60 % to 0.36 %. Among the P. maculatum extracts, the extract obtained using methanol as a solvent exhibited best sensitization effect as evident from the delivered photovoltaic parameters from the corresponding DSSC.

Keywords: Marine Phytoplankton; Picochlorum Maculatum; Dye-Sensitized Solar Cell; Photovoltaic Performance; Natural Dyes.



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ERCICSTR1924087

Exploring the Psychometric Properties of Computational Thinking Assessment in Introductory Programming

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Abstract

Computational thinking is considered as the skill of 21st century. The fundamental CT concepts include abstraction, algorithm design, decomposition, pattern recognition, and data representation or generalization. Computational thinking assessment is required to improve the understanding of the cognitive abilities and to relate them in related areas, such as computer science. A basic course of computer science is Introductory Programming. Assessing computational thinking skills however is a challenging issue since it measures latent variables that cannot be directly observed. According to psychometrics, appropriate test requires a validation process before it can be effectively used as a measuring instrument. The objective of this work is to determine the psychometric properties (item validity, reliability, discrimination, difficulty, and distractors) of the developed multiple choice questions of computational thinking in introductory programming by exploring classical test theory which has not been deeply investigated by previous works. The analysis results reveal that most of items are valid and the items are generally adequate reliable. However, some items are suggested to be revised since the item discrimination values, the distribution of difficulties, and distractor points are less than expected threshold.

Keywords: Classical Test Theory, Computational Thinking, Introductory Programming, Psychometric

Clarification of Sumatran Mulberry (*Morus macroura* var. *macroura*, Moraceae) from West Sumatra, Indonesia using Nucleus Ribosomal ITS (Internal Transcribed Spacer) Gene

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Abstract

Morus macroura is a mulberry group, especially Sumatran mulberry and different with mulberry another. Internal Transcribed Spacer (ITS) is highly conserved in plant systematics which is involved in Group II intron splicing. The size of the gene is 700-800 bp in length. This research was used direct collection and molecular analysis with Intrenal Transcribed Spacer (ITS) method. Phylogenetic relationship tree between eight accessions of *Morus macroura* that originaly from West Sumatra, four sequens of Himalaya Mulberry from genbank and *Morus nigra* as outgroup was analyzed using MEGA6 program. In the present study, ITS gene from *Morus macroura* (Moraceae) was taken for the analysis of variants, parsimony site, and phylogeny. The sequences contig and then alignments were performed by Seqman and reconstruction phylogenetic analysis with MEGA6. The result indicates that the *Morus macroura* (Sumatran mulberry) group with the cluster. *Morus macroura* from west Sumatra was diffred with Himalaya mulberry on varian of the haplotype, the genetic distance and clade. Acording the research can be indicated Sumatran mulberry different from mulberry another.

Keyword : Sumatran Mulberry, *Morus Macroura* Var. *Macroura*, Moraceae, Nucleus Ribosomal, ITS Gene



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Performance of Solar Photovoltaic Module through Combined Air and Water Cooling in Warm and Humid Climatic Condition of India

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Abstract

A study was conducted to evaluate the performance of solar photovoltaic module through combined air and water cooling arrangements in warm and humid climatic condition i.e. in Odisha in India during winter and summer months. Solar photovoltaic system requires neither fuel nor produces any pollutant resulting into its increased importance in today's energy sector. Generation of electricity from solar photovoltaic (PV) system is a function of the efficiency of the photovoltaic (PV) module and other factors influencing its efficiency. Temperature among the various factors affecting the efficiency of PV module is the major parameter causing the effects on the efficiency of the PV module and power output. With the exposure of PV module to sunlight, the amount of energy from the sun converted to useful energy is about 31 %, a greater percentage is changed to heat energy, which tends to make the temperature of the module to rise and thus leads to a reduction in the generation of electricity by the module. This energy causes an increase in the temperature of module and is wasted as heat which ultimately damages the material used to fabricate the PV module and hence reduces the life span of cell as well as its conversion efficiency. To enhance the efficiency and power output from the module, the cooling arrangements such as air cooling, water cooling and combined air and water cooling were incorporated and their effectiveness were compared without any cooling device. From the experiments, it was found that the efficiencies of solar module were increased in the range of 8-11 %, 12-15% and 16-20% in air, water and combined air and water cooling respectively compared to without cooling in a clear day.

Keywords: Solar Photovoltaic Module, Cooling Of Photovoltaic Module, Efficiency Of Photovoltaic Module, Tilt Angle For Photovoltaic Module

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