INFORMATION FOR AUTHORS

ISBN: 978-81-940627-0-7

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International conference Energy Environment and Health 2020

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International Conference
Energy Environment and Health 2020
Proceedings

ISBN: 978-81-940627-0-7

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Proceedings of the Virtual International Conference on

ENERGY ENVIRONMENT & HEALTH

ISBN: 978-81-940627-0-7

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ENERGY ENVIRONMENT & HEALTH

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ISBN: 978-81-940627-0-7

ENERGY ENVIRONMENT & HEALTH
ISBN: 978-81-940627-0-7

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ISBN: 978-81-940627-0-7
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ISBN: 978-81-940627-0-7

Messages

UNIVERSITY OF
KERALA
(Re-accredited by NAAC with 'A' Grade)
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Vice Chancellor

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Monday, September 7, 2020

MESSAGE

I am happy to know that Sree Ayyappa College, Eramallikkara is organizing a Two Day Virtual International Conference on Energy, Environment and Health (VICEEH 2020). With the presence of eminent resource persons from the industry and the academic world, I am sure that the Conference would definitely provide fruitful outcome.

From the year of its inception in 1995, Sree Ayappa College has made incredible efforts to enhance research skills and quality education.

I take this opportunity to record my heartfelt appreciation and gratitude to all the delegates of this Conference.

I congratulate the Organizers of VICEEH 2020 for their sincere efforts.

I wish the Conference a grand success.

PROF. V.P. MAHADEVAN PILLAI

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Adv. N. VASU
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Message

It is indeed a special privilege and pleasure to cordially welcome the delegates to VICEEH 2020. The conference which brings together academicians, scientists and research scholars will provide a fertile ground for sharing innovative ideas, which eventually, will pave way for advanced research and the dispersal of technical knowledge.

The pertinence of the focal themes that unveils the intrinsic relationship between energy, environment and health policies will definitely unfold a better human environment. Together, we will mould a society that is conscious about energy-consumption and conservation.

My sincere thanks to the resource persons for imparting their expertise to our students. My heart felt appreciation to the faculty, non-teaching staff and students of the college who framed this event. Hope you will have the best academic experience.

Adv.N.Vasu
President
Travancore Devaswom Board

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Adv. K. S. RAVI
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Date 08/09/2020

MESSAGE

THE CONFERENCE ORGANISED IN ACADEIC INSTITUTIONS PLAY A VITAL ROLE IN ELEVATING OUR THOUGHT PROCESS. I AM EXTREMELY TO NOTE THAT SREE AYYAPPA COLLEGE, ERAMALLIKKARA IS ORGANISING A TWO-DAY VIRTUAL INTERNATIONAL CONFERENCE ON ENERGY, ENVIRONMENT AND HEALTH (VICEEH 2020).

I AM SURE THAT THIS CONFERENCE WILL INSTILL AND IGNITE RESEARCH CULTURE AMOUNG STUDENTS. I CONGRATULATE THE ORGANISERS AND WISH THE CONFERENCE A GREAT SUCCESS.

8/9/20

K.S. RAVI
MEMBER
TRAVANCORE DEVASWOM BOARD

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MESSAGE

The VICEEH-2020 organized by Sree Ayyappa College, Eramallikkara provides a venue to exchange recent developments and academic deliberations of exceptional quality will definitely help the industry to flourish.

My heart-felt appreciation to the entire team of organizers and wish the conference a grand success.

Adv.N.Vijayakumar
Member
Travancore Devaswom Board

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Date: 11.09.2020

PRINCIPAL'S MESSAGE

It is my great pleasure and honour to address you on the occasion of Two-Day VirtualInternational Conference on Energy, Environment and Health (**VICEEH-2020**) in association with Institution of Electronics and Telecommunications and IQAC.

It is the tenth episode of the **INFOFEST** Interdisciplinary seminar series, which is one of the prestigious events of Sree Ayyappa College. Celebration of silver jubilee adds more fragrance to the event.

Sree Ayyappa College, Eramallikkara is committed towards inculcating research-oriented endeavours among students with a broader vision of moulding them to serve humanity. Presence of Renowned Scientists, academicians, research scholars and students will assemble in a virtual platfaorm organized here. Eminent dignitaries from various disciplines will enlighten us with comprehensive knowledge on the focal themes.

On this occasion, I would like to thank the faculty and students for their sincere efforts and guidance. The conference would not have been possible without their constant support. On behalf of Sree Ayyappa College, sinere regards to all the delegates of the conference and hope that this conference would widen the horizon of our experience and learning/unlearning process.

Dr. Prakash K.C

ISBN: 978-81-940627-0-7

Invited Talk - 1

Advanced Solar Technologies: Development and Scale-up of Disruptive Perovskite Photovoltaics

Dr. Gregory J. Wilson
PhD BAppSci (Chem) (Hons I) FAIP FRACI CChem
Research Group Leader, Solar Technologies | Principal Research Scientist, Next Generation Photovoltaics
Professor (Adjunct), School of Engineering, University of Newcastle Callaghan Campus Newcastle NSW, Australia

The Solar Technologies Group represents CSIRO's core capability in solar thermal and photovoltaic technologies for power generation and energy storage. Our research activities cover the entire technology chain including new materials discovery, component design, fabrication and optimisation, materials and characterization. We operate Australia's largest pilot scale concentrated solar thermal fields, towers and receivers as a dedicated R&D facility and have established and operate the Southern Hemisphere's only accredited facility for standard performance measurement of photovoltaics (IEC17025) and flash and outdoor module testing through our Photovoltaics Performance Laboratory (PVPL).
In this talk I will provide an overview of CSIRO, our Missions and the Solar Technologies Group and Capability and then focus on our R&D into high-performance photovoltaics based on perovskite semiconductors, which have a versatile format from thin-film to flexible and tandem cell configurations[1]. This will be illustrated by a recent international collaboration where we discover that new levels of structural variation and compressive strain on the grain-scale manifest in increased defect levels which ultimately lower performance [2] and end with an overview of CSIRO's technical approach to scaling these materials reducing a barrier for commercialisation: lateral scale-up [3].
Further, to address the need and growth of new photovoltaic technologies beyond 30% power conversion efficiency (PCE), I will describe how we will apply this technology to tandem PV cell formation. The challenge of scale-up for tandem cells requires a highly uniform deposition to textured silicon surfaces – which may not be possible using conventional laboratory printing methods. To capture this opportunity, CSIRO's novel vapour deposition technique is compatible with existing industrial thin-film deposition processes and leveraging this approach, we are able to fabricate uniform large-area perovskite films, using high-performance interface materials [4] and unlock new opportunities for perovskite solar cells as silicon-perovskite cell architectures.

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ISBN: 978-81-940627-0-7

Invited Talk - 2

Comparison of standard size measuring techniques

Pratik Sen
Department of Chemistry
IIT Kanpur, India

Measurement is the critical step of human civilization, and among various parameters, the measure of size is one of the key requirements. With the progress of the enlightenment and emergence of scientific and technological developments, determination of the sizes of small particles (atoms, molecules, proteins, tiny substances) become crucial for a precise understanding of the phenomenon. In my presentation, I will focus on the measurement techniques and their comparison in the order of nanometers. There are various standard techniques available for size measurement utilizing different principles, and they are applicable to different systems. I will discuss some of the important methods that are routinely used, namely, scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM), dynamic light scattering (DLS) and fluorescence correlation spectroscopy (FCS). I will discuss the basic principles of each technique along with some advantages and disadvantages. Thereafter, with some representative examples, I will show their comparison.

ISBN: 978-81-940627-0-7

Invited Talk - 3

A Knowledge Framework for Energy Management in Eco-Industrial Parks

Aravind Devanand
Department of Chemical and Biomolecular Engineering, National University of Singapore, Engineering Drive 4, Singapore,117585

The strategies for energy management have evolved over the years. It started with a purely economic motive but has now been transformed into balancing economic, social and environmental impacts. Individual factories have come together to form industrial clusters called Eco-industrial Parks (EIP) where they interact with one another and share their resources to maximise efficiency. The energy management strategies in an EIP starts at the individual businesses level, then moves onto energy clusters and finally at the enterprise level.

Carbon taxing is becoming a popular strategy for energy management at the enterprise level for EIPs. In this paper, we present a model that determines the optimal power generator configuration for a region based on the imposed value of carbon tax in that region. The results from the model rein- force the effectiveness of carbon tax as a successful economic incentive tool in motivating energy producers towards greener alternative sources.

A large-scale commercial implementation of the proposed strategy requires a proper framework capable of handling the big volume and heterogeneity asso- ciated with the data from an EIP. An ontology-based Knowledge Management System (KMS) is proposed to represent knowledge from these domains and store data from them. These systems are capable of exchanging knowledge across dif- ferent domains without the need for a communication interface. The developed KMS is a part of J-Park Simulator (JPS); a multi-domain interactive simula- tion platform and expert system. The knowledge from the proposed model is embedded in the knowledge graphs of JPS.

ISBN: 978-81-940627-0-7

Invited Talk - 4

Pandemonium of COVID19 pandemic

Somdeb Bose Dasgupta
Molecular Immunology and Cellular Microbiology Laboratory, Department of Biotechnology,
Indian Institute of Technology Kharagpur
India

History repeats itself time and again and so does it in case of pandemics. Presently we are amidst a global pandemic of COVID19 and we are yet to conquer it. The recent developments in research and healthcare technology has not only allowed us to gain a plethora of knowledge on the pathophysiology of COVID19 or its causative agent the SARS-CoV-2 but has put forward multitude of options in curtaining it. Perhaps these pandemics of data in terms of pathophysiology, diagnostics, therapeutics, and vaccines might have helped us in limiting the mortality but the lack of sticking to one paradigm has created a pandemonium where the disease still prevails. Here we would analyse the available information, generate a standpoint and look for avenues to overcome this menace.

ISBN: 978-81-940627-0-7

Invited Talk - 5

Non-volatile CBRAM RF Switching Technology: An Emerging Solution for Low Cost and Low Power RF/Microwave Switching Applications

Jayakrishnan M.P
Ph.D., Post-Doctoral Researcher, Université Grenoble Alpes (UGA), France
Email: jayakrishnan.mp@lcis.grenoble-inp.fr, jkmpjk@gmail.com

Abstract:
Switches are an inevitably integral part of all RF equipment and play a significant role from essential basic control and regulation operations, till advanced requirements for cognitive and smart control. The Conductive Bridging Random Access Memory (CBRAM) based RF switching technology is derived from the CBRAM concept which is well known as a non-volatile memory technology. These switches are solid-state and non-volatile in nature meaning they do not contain any moving parts or require any continuous energy source to maintain their impedance states, and moreover they are potentially printable. Indeed, classic and commercially used RF switching technologies like semiconductor switches (which include PIN diode switches, FETs, Hybrid switches and so on) and RF-MEMS (Micro-Electro-Mechanical- Systems) switches, do not offer the feature of non-volatility, these switches require a constant power supply to maintain their impedance state, despite of their superfine and proven switching characteristics.
Here, we present our efforts and achieved results, focusing on the development of a new technology of low cost non-volatile RF switches based on CBRAM, with both high performance, and flexibility of implementation, which could be integrated using specially adapted classic circuit fabrication techniques, or could be printed on a substrate of choice including flexible materials like paper or PET or similar, along with the desired RF/microwave circuit. Such an advancement of non-volatile RF switches would be of great demand among the requirement of smart passive identifiers and sensors within the advent of Internet of Things (IoT) concepts backed by the Fifth Generation (5G) cellular communication technologies. Such switches would also be of appreciable interest for all RF and microwave applications, where power supply requirements are critical, like for satellite and avionics applications, in near future.

ISBN: 978-81-940627-0-7

Invited Talk - 6

Beyond Radio-Frequency Identification: the chipless RFID

E. Perret
Univ. Grenoble Alpes, Grenoble INP, LCIS, F-26000 Valence, France
Institut Universitaire de France, Paris, France

The need for information identification and capture is a matter of prime importance in modern societies. Every sector of society relies on the identification of data exchanged, the updating of the data recorded on a tag and the measurement of physical parameters. The ability to make objects interact with one another or with humans is an important factor in many applications, even more so if this interaction can occur without human presence. The way to reduce power consumption, improve the communication quality-of-service and enhance connectivity has become key issues for lots of industries. Researchers need to consider the multiple factors simultaneously to design state-of-the-art RF devices for the next generation of identification services. One important direction is to develop low-power, low cost tags for wireless identification and sensing. Lots of improvements have been done today on communication systems based on electronic devices where an integrated circuit is at the heart of the whole system. The democratisation of these chipped based systems like the RFID one will give rise to environmental issues in the future. However, these improvements pave the way for the development of new concepts based on approaches where the presence of the chip is not mandatory. These approaches are based on radar or reflectometry principles; these are non-invasive techniques, but they require specific theoretical and practical developments. The objective of this presentation is to introduce the paradigm of RF communication system based on chipless labels, i.e. tags without any chip, bringing an ID, able to communicate with radio waves and having extremely low costs.

ISBN: 978-81-940627-0-7

Invited Talk - 7

Scientific and economic aspects of groundwater contamination: A case study of Zoning Violated Areas of Chennai

Murali Prasad Panta[*], Mayak Gupta[**] and Tarun Gupta[***]
Professor, Department of Economic Sciences, Indian Institute of Technology, Kanpur, India

Abstract:
A Public Interest Litigation (*M. C. Mehta v. Union of India*, WP 4677/ 1985, Supreme Court of India) against the illegal activities of hazardous industries in the residential zone in Delhi, India (known as the Delhi Industrial Pollution Case), and the theoretical foundations of: (a) Bailey (Externality Zoning, 1959), (b) Fischel (Motivation of zoning is to enhance the value of the property and quality of life, 1998), (c) Owens (Zoning Policy, 2001) and (d) National Academy of Public Administration, USA (Separate incompatible land use, 2003) have motivated us to conduct a pilot study on the impact of groundwater contamination on households' expenditure in the Indian metropolitan cities (Panta *et al*., 2018). The pilot study indicates that among the three metropolitan cities, namely, Bangalore, Chennai and Hyderabad, Chennai is the most vulnerable city in terms of groundwater contamination with heavy metals and the households' expenditure on bottled water. Moreover, ex-post pollution mitigation measures have limited effectiveness in the reduction of pollution (Bali *et al*., 2019). Therefore, in the present study, we focus on the efficacy of ex-ante zoning regulation, which separates the incompatible land use. We examine the expenditure incurred by the households on drinking water (bottled water and water purifiers) in 14 Zoning Violated Areas (ZVAs) in Chennai, due to groundwater contamination with heavy metals and inadequate metro water supply. The city has a population of 8.78 million (according to the Census of India, 2011) and is known as The *Detroit of India*. To generate scientific evidence on groundwater contamination in the ZVAs, we have collected 90 groundwater samples, in 45 locations of 15 ZVAs in Chennai and tested the samples for the presence of heavy metals. We have found high levels of concentration of heavy metals in a few of the tested samples. We have further examined the consequences of heavy metals presence in the households' groundwater resources in the ZVAs. Our survey analysis has been limited to 797 households, in 42 locations of 14 ZVAs, and focuses on the households' water use pattern and the expenditure on drinking water. In addition, we have employed the linear regression technique to identify and analyse the determinants of the expenditure incurred on drinking water expenditure (bottled water and water purifiers) by the households in the ZVAs. The study, with its scientific, economic and policy orientation, pitches for the suggestions: (a). Mandatory Information Disclosure Rule (b). Metro water supply to the households of ZVAs (c). Design of Zoning Regulation for Sustainable Development of Cities.

Keywords: Urban land use; zoning policy violations; groundwater resources; water expenditure; sustainable development of cities.

JEL Classification: Q51, R52, Q53.

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ISBN: 978-81-940627-0-7

Invited Talk - 8

How do microbes interfere with human health? A SARS-Cov2 view

Goodwin G. Jinesh Ph.D.,
Moffitt Cancer Center, Tampa, Florida, USA

Abstract:
A brief overview of SARS-cov2 basics on how the virus spreads invades and influence human health. A brief but essential tips and tricks to tackle the pandemic problem in India. The purpose is to educate people in order to reduce the chances of SARS-cove2 spread.

ISBN: 978-81-940627-0-7

Preface

INFOFEST is an annual interdisciplinary symposium organized by Sree Ayyappa College, Eramallikkara, Chengannur, Kerala on a specific theme. This year, we have decided to focus ENERGY, ENVIRONMENT AND HEALTH as the focal theme of INFOFEST 2020. Since the use of energy has become an integral part of our life, its supply should be secure and sustainable. At the same time, it should be economical, environment friendly, and socially acceptable. The current trends in energy consumption are neither secure nor sustainable. Conventional energy sources are based on fossil fuels like coal, petrol, diesel, kerosene and natural gas are obtained from biologically degradable materials (such as plants and animals), but only after millions of years of heat, pressure, chemical and biological reaction. Thus, it takes a long time for their formation and as a result, fossil fuel reserves of the world are limited, and our demands are unlimited. Therefore, the obvious choice of a clean energy source, which is abundant and could provide security for the future development and growth, is the ***sun's energy***. Discussions on integrating energy, environment, and health policies to achieve the sustainable development is not new. Consumption of energy is the key for sustenance of life on Earth. However, our choices and decisions to realize the economic growth at the expense of depleting non-renewable energy resources has resulted only in harming the environment and human health. Making energy choices that improve the human health, the environment and the economic development is possible if we could understand the connections underlying between the systems of energy and healthy human environment. INFOFEST 2020 prepares an excellent international platform for discussing and sharing knowledge, and your research findings in these areas. This forum will bring together leading academicians, scientists, researchers and the young minds on a single platform to exchange and share their experiences and research results with the aim of creating, replacing, improving, or understanding about all aspects in energy, environment and health. In the current pandemic scenario of COVID-19, we are organizing the conference virtually, facilitating you to participate in our International Conference from anywhere in the world. Today's technology allows us to come to you! In addition, the access to the downloadable resources and information is offered to all attendees and can be referred even in the future.

Dr. Prakash K C
Dr. Suresh S
Dr. Madhavan N
Dr. Ananth Kumar R T

ISBN: 978-81-940627-0-7

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ISBN: 978-81-940627-0-7

Porous Graphene Oxide for Thermal Self-Charging Capacitors

Arsha M S[1], Biju V[2]
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Email: arshamurali94@gmail.com

***Abstract*—Low-grade heat energy is one of the sustainable and promising energy resources, which is usually ignored without any practical use. In recent years Thermal Self Charging Supercapacitors (TSC) drew intensive attention from the research community. Apart from the conventional direct energy conversion method, the utilization of temperature effects on energy production is the basic idea behind self-charging ones. A regular two-electrode configuration is employed in TSC. Fabrication of the device consists of identical electrodes dipped in electrolytes, deliberately maintained at two different temperatures. Each electrode/electrolyte interface represents a capacitor. The system requires only a very small temperature difference. Furthermore, a salt bridge is used to connect the two half cells, which maintain the electrical neutrality of the solutions. The coupled nature of temperature gradient, along with the particle motion generates electricity without using an external power supply.**

We devised a scheme which is different from the typical approach, to maintain a difference in thermal response at the boundaries of two identical electrodes. In this work, Nanoporous GO-based electrodes are maintained at a temperature difference < 30^0C generate a steady constant potential difference of few tens of mV. Porous carbon materials provide a significantly amplified surface area for ion transportation in the presence of suitable electrolyte. Temperature dependent effect of the output voltage is recorded using Keithley- Electrometer. In summary electrolyte, ion absorption desorption can occur without the application of a potential difference.

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ISBN: 978-81-940627-0-7

Assessment Of The Potential Of Green Wall On Modification Of Local Urban Microclimate In Tropical Humid Climate Using Envi-Met

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***Abstract*— The increasing urban infrastructure which is remarkably different from rural ones has led to a conspicuous growth in urbanisation. The key components of urban building materials are low albedo materials which absorb more solar radiation. This paper investigates the ambient air temperature variation under different underlying surfaces in the campus of Catholicate College, Pathanamthitta in South India during winter and summer season and microclimate simulation was done using ENVI-met. Four locations within the campus were selected with different surface materials like interlocked concrete tile surface exposed to solar insolation, shaded interlocked concrete tile surface with vegetation cover, surface with asphalt and exposed soil surface in open ground. The surface temperature and the ambient air temperature were measured on 13th December 2019 and 19th March 2020. It was observed that the air above asphalt and tile surfaces exposed to solar radiation showed a maximum temperature difference of 2.76 ^{o}C and 2.45 ^{o}C respectively from shaded interlocked tile surface during the winter and the same during summer was 2.13 ^{o}C and 1.22 ^{o}C respectively. Open area showed higher surface and air temperature compared to the shaded region due to the high sky view factor. It is also observed that different surfaces showed noticeable variation in the cooling and heating rates. Two microclimatic simulations were done with existing building morphology and with modified green wall building morphology using Envi-met V4.4.4. The ENVI-met simulations were carried out for 24 hours on the day of observation during winter and summer. The analysis of simulated data was done using ENVI-met Leonardo 4.4. Air temperature variation showed good correlation with simulated results during both seasons. It is also observed that the introduction of green wall reduces temperature to 1 ^{o}C -2 ^{o}C. Again, the model shows close correlation in the summer season compared to winter season and needs further study to check the validity of the model with seasonal change. Thus it can be concluded that the introduction of green walls in urban planning can be adopted as an effective measure in mitigating the rise of air temperature due to the effect of construction materials.**

***Keywords*—** Microclimate, Urban Modelling, ENVI-met**.**

ISBN: 978-81-940627-0-7

Gamma Irradiated Silver-Anthracene Nano Composites for Luminescent Material Fabrications

Dhanya I*, Malathy Krishnan*, Anu M.K, Rachel G. Varghese, Reni Renji
Department of Physics, Catholicate college, Pathanamthitta, Kerala, India, 689 645.
Email:dhanya.iv@gmail.com, malathymadhavam@gmail.com

Abstract—**Green synthesis of Silver nanoparticles is done using Aloe vera (Aloe barbadensis miller) as a reducing agent. The characteristic colour is also an indication of excitation due to surface plasmon vibrations in silver nanoparticles. Gamma irradiation of varying dosages are done on samples TEM analysis of before irradiated nano silver samples shows that the morphology is agglomerated with nano clusters. It disappears in gamma irradiated samples and HRTEM reveals spherical nature. The SAED pattern of silver nanoparticles shows a white ring like pattern indicating that the particles are polycrystalline in nature. The diffraction rings could be indexed on the basis of image-J and CrysTBox software and are found having FCC pattern. From Uv-visible spectroscopic analysis, it is observed that the absorption band for samples with highest concentration of leaf extract possesses a controllable grain size at nano regime. As the concentration varies, there is a clear variation in both intensity and broadness of peaks. The band gap energy for all the samples is well suited with the standard value of colloidal nano silver and it undergoes a direct allowed type band transition between the bands. CIE chromaticity diagram of silver-anthracene nano composite gives a better photoluminescence in blue green region of electromagnetic spectrum while the silver nano colloid and gamma irradiated silver colloid gives a fluorescence quenching effect in previous studies. Irradiation of gamma rays prevents agglomeration in nano colloids and confines the size in the nano regime. Photoluminescence studies of Silver nano colloids with organic monomers suggest a better fluorescence in the blue-green region can be effectively used for photoluminescence application.**

ISBN: 978-81-940627-0-7

Unity in Diversity - The Case of Bonding Between Two Water Molecules

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***Abstract*— Water, which is the basic ingredient of life, is also an enigmatic substance with anomalous properties. A detailed understanding of the structure and properties of water is the key to solving problems related to the environment, health and others. It is thus not surprising that water remains one of the important research topics both from experimental as well as theoretical perspective.[1] Bulk water is generally considered as a statistical mixture of various small water clusters like dimer, trimer, tetramer, pentamer etc.[2] Key behind accurate understanding of water is obviously dependent on accurate understanding of water dimer, which is the dominant contributor to the properties of water in comparison to higher-order water clusters. Though the water dimer is the simplest among all water clusters, it continues to draw the attention of the scientific community in various aspects, one of which is the exploration of closely lying isomers. Among six water dimer isomers reported by us recently,[3] linear non-planar (LNP) water dimer has the minimum energy and five other isomers are linear planar water dimer (LP), planar and non-planar ring dimers (RP & RNP) and planar and non-planar bifurcated dimers (BP & BNP). Topological analysis through NCI, RDG and AIM studies reveal that electron density distribution has a strong correlation with the energies of various isomers[3]. Here the work has been further extended by carrying out vibrational mode analysis for different isomers at the DFT/B3LYP/6-311++G(d,p) level of theory which has facilitated to unravel the pathway for interconversion between the higher energy isomers and the lowest LNP water dimer. Water clusters are dynamic in character as the hydrogen-bonded network constantly make and break facilitating interconversions of isomers among themselves and we have recently shown that even the higher energy ring dimer can be stabilized within the interstices of crystal host.[4].**

***Keywords*—** Water dimer, Frequency analysis, DFT, NCI, RDG, AIM**.**

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ISBN: 978-81-940627-0-7

Study on Urban Microclimate of a Tropical Coastal City in South India

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***Abstract*—Rapid growth in urbanization significantly alters the natural environments and leads to distinct urban climates. Many urban and suburban areas experience elevated temperatures compared to their outlying rural surroundings; this difference in temperature constitutes the phenomenon called Urban Heat Island (UHI). The unrestricted growth or the sprawl in many urban areas has resulted in the anthropogenic alterations of the environmental framework over the years. Recent year studies from cities and surrounding areas have shown that urbanization has seriously affected all climate levels: locally, regionally and globally. This study has investigated the variation of UHI intensity in Kochi, a fast growing city in the south west coast of India in 2019 and 2020. Mobile surveys were conducted within the city and adjacent rural areas during pre-dawn and early evening periods. Highest observed urban heat island intensities in Kochi during this study were 5.3 ºC and 3.4 ºC during winter morning in 2019 and 2020 respectively. Highest observed UHI during winter evening in the same period were 3.3 ºC and 2.8 ºC. The average cooling rate at city centre was 0.24 ºC/hr and sparsely built reference zones was 0.50 ºC/hr respectively during winter night in 2020. Proper planning of the built environment and selection of raw materials is necessary to reduce the problem of excessive nocturnal heat loads within the built environment. Conservation of wetlands is the easiest and appropriate method to reduce the heat island effect in the study area**.

***Keywords*—**Urbanization, Urban Heat Island, Urban Microclimate**.**

ISBN: 978-81-940627-0-7

Synthesis and Characterization of Tin Oxide Nanoparticle and its Ammonia and Ethanol Sensing Property using Fiber Optic Gas Sensor

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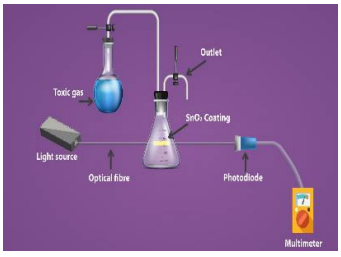
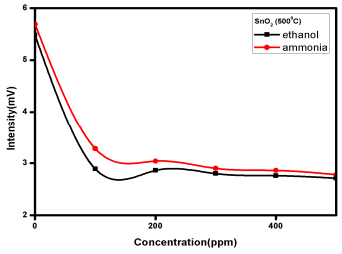
***Abstract*— SnO_2 is regarded as one of the promising materials for gas sensing because of its excellent characteristics, such as low cost, high sensitivity, rapid response, and fast recovery. In this work SnO_2 nanoparticle have been synthesized by microwave assisted solvothermal method using Tin(II) Chloride and urea as precursors. This method gives a large-scale production of SnO_2 nanoparticles easily. The average particle size was found to be 11 nm. The synthesized pure SnO_2 nanoparticles have been characterized by using XRD, SEM, TEM, UV - Visible and FTIR analysis techniques. X-ray diffraction pattern (XRD) reveals single phase tetragonal structure. Scanning electron microscopy (SEM) showed the spherical morphology of as prepared SnO_2 nanoparticles. The band gap value is calculated from the UV-Vis spectrum and is found to be 4.2 eV. The FTIR spectrum indicates the formation of SnO_2 nanoparticles.**
Air pollution problems are drawing more people's attention. Gas sensors that can detect toxic gases are of great importance. Nano SnO_2 have potential applications in the field of sensors because of their large surface-area-to-volume ratio. Fiber optic gas sensors based on metal oxides as the sensing medium have been reported for improving gas sensitivity and for room temperature operations. This paper reports the results of a study on the synthesis and gas sensing characteristics of SnO_2 nanoparticles based fiber optic gas sensor for ammonia and ethanol gases. Fig.1 shows Fiber optic gas sensor apparatus, Fig.2 shows intensity variation of SnO_2 nanoparticle towards varying concentration of ammonia and ethanol

Keywords—Microwave assisted solvothermal method, Fiber optic gas sensor**.**





ISBN: 978-81-940627-0-7

Influence of Urea to Cobalt Acetate Ratio in the Solution Combustion Synthesis of Co_3O_4 Nanoparticles: A Structural and Property Study

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Abstract—**Cobalt (II, III) oxide, Co_3O_4 is a p-type semiconducting transition metal oxide having spinel structure. The high redox activity of nanostructured Co_3O_4 makes it a potential candidate in several fields such as energy storage, catalysis and gas sensing. The properties of this nanomaterial are strictly influenced by its size and morphology, which depend on the synthesis conditions. Solution combustion synthesis (SCS) is an energy and time efficient method, which involves a redox reaction between the fuel and the oxidizer. The exothermicity of the reaction provides energy for the product formation. In the present work, Co_3O_4 nanoparticles were synthesized by SCS method using cobalt acetate tetrahydrate as oxidizer and urea as fuel. The influence of urea content on the properties of Co_3O_4 were investigated in detail by analyzing various properties of Co_3O_4 synthesized with four different fuels to oxidizer-ratios (0.5:1, 1:1, 3:1 and 5:1). The obtained samples were examined using X-ray diffraction (XRD), Raman spectroscopy, Fourier transform infrared (FTIR) spectroscopy, X-ray photoelectron spectroscopy (XPS), UV-Visible diffuse reflectance spectroscopy (DRS), and DC conductivity. Thermodynamic modeling predicts that the heat evolved during the reaction increases from 1668 to 4116 kJ with an increase in fuel to oxidizer ratio from 0.5:1 to 5:1. A corresponding enhancement in the adiabatic flame temperature from 3692 to 4067 K results in an increase in the crystallite size of Co_3O_4 from 34 to 70 nm. The increase in fuel content also changes the ratio of vacancy to lattice oxygen from 0.33 to 0.89 and a parallel fall is observed in the Co^{3+} to Co^{2+} ion ratio. This increase in oxygen vacancy results in a reduction in the optical bandgap from 1.90 to 1.63 eV. Moreover, the delocalized electrons associated with oxygen deficiency improve the dc electrical conductivity of samples from 5.9×10^{-9} to 21.4×10^{-9} Scm^{-1}.**

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ISBN: 978-81-940627-0-7

Li Doped Tin Oxide Nanocrystals for Photovoltaic Applications

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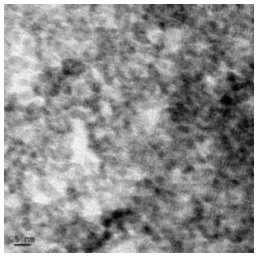
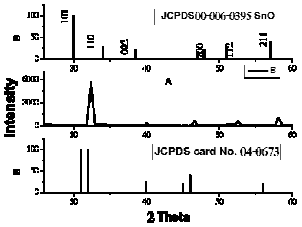
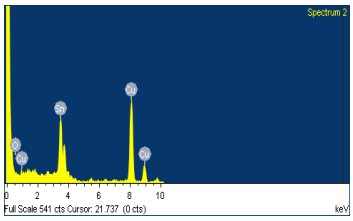
Abstract*—Nanocrystals of Li doped and undoped Tin oxide were synthesized by precipitation technique. Firstly, X-Ray Diffraction(XRD) studies, Transmission Electron Microscopy (TEM), and Energy dispersive spectroscopy (EDS) were employed to characterize and analyze the as-synthesized precursor. Then as-synthesized powdered after calcination were again characterized by (XRD), Scanning Electron Microscope (SEM), UV-Vis Absorbance and Photoluminescence(PL). The XRD results showed that Li doped Tinoxide samples did not have any extra peaks and found that it was in phase with SnO. In the TEM analysis carried out, it was found that the as-synthesized powder had spherical morphology and size was about 5nm, but after calcination agglomeration of the sample took place. The crystallite size after calcination found from XRD results calculation was upto 40-45nm. The optical properties of the sample were investigated by using UV-Vis DRS spectrometer and Photoluminescence (PL) studies. The absorbance was found at 254 nm and 272 nm for Li doped and undoped SnO and by Tauc plot the energy band gap was found. There is an increase in the band gap which may be due to the Burstein Moss effect. PL spectra of undoped SnO obtained after 280 nm excitation is characterized by broad peaks at 438 nm, 470 nm, 466 nm, 481 nm and 490 nm and Li doped had at 370 nm, 401nm 427nm and 441nm. Photoluminescence studies showed its applicability blue emissive devices which was confirmed by the chromaticity by coordinates XRD, TEM and EDS.







ISBN: 978-81-940627-0-7

Power Spectral Analysis of Breast Cancer

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***Abstract*—Acquiring new methods for diagnosing diseases is always valuable since they can contribute to the development of health science. Mammography is one among the valuable tool for the early detection of breast cancer and has been regularly used for breast cancer screening. Early detection of breast masses can prevent the invasion of a group of cancer cells from invading the surrounding breast tissues. If not detected at an early stage, they metastasize to other areas of the body through lymph nodes or blood fluids by sending "fingers'' to the nearby tissues. A typical characteristic of a breast mass to be a malignant one is the presence of microcalcifications in the mammogram. Even though there are different methods based on the analysis of mammograms, confirming a mammogram to be benign or malignant needs a thorough analysis of the image as well as a precise interpretation. Interpretation of the image by the radiologist may remain subjective and hence computer assisted methods become significant. The aim of the present study is to employ a simple mathematical tool - fractal technique for the classification of breast masses into normal, benign and malignant. The power spectral analysis is used for finding the fractal dimension of the mammograms in which the complexity of the images along a particular direction is estimated. Based on the values of fractal dimension and its distribution, the normal, benign and malignant region can be identified. In the samples, the malignant and benign regions are found to exhibit a higher fractal dimension with respect to the normal region..**

Keywords—Mammogram, Breast Cancer, Fractal Dimension, Power Spectral Density**.**

ISBN: 978-81-940627-0-7

Synthesis and Characterisation of Zinc Incorporated Carbon Matrix-Cellulose

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***Abstract*—Cellulose has a wide range of applications due to its greater adsorption capabilities caused by multiple interactions of hydrogen atoms. This enables them to be used in the removal of contaminants in the aqueous medium, drug delivery, efficient protein adsorption etc. surface functionalized cellulosic materials can be synthesised through various chemical reactions. Among them, hydrothermal method is a simple conversion method which can be used for breaking down multi-layered cellulose with the liberation of –OH group.The surface functionalized cellulose can act as a good carbon source for the preparation of various carbon-based materials. Chemical modification of cellulose structure with the incorporation of various metals finds a wide range of applications in diverse fields.**

In the present work, we aimed to incorporate zinc in a highly porous cellulose structure using a hydrothermal method. Cellulose and Zinc Chloride is added to a methanol-water mixture, homogenized, dried and kept in a furnace for 1hour at 270□C. The resultant product is powdered and kept in an open furnace at 600^{o}C for 1 hour to remove amorphous carbon content. The sample is collected and grounded.

Morphological modification of the sample is analysed using Field Emission Scanning Electron Microscope (Nova Nano FESEM). The regions of optical absorption as well as band gap are studied using UV-Visible NIR (Shimadzu UV3600plus) spectrophotometer. Identification of new elements, compounds and their structures can be well studied from X-ray diffraction (XRD) Analysis using Bruker D8 advanced Diffractometer with Copper K-α radiation (λ=1.5406 A).

***Keywords*—**Cellulose, Zinc- carbon matrix, hydrothermal synthesis**.**

ISBN: 978-81-940627-0-7

Water Quality Analysis by Thermal Lens Technique

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***Abstract*—In Indian states, the majority of people living in rural habitations face quality issues with drinking water. The Integrated Management Information System (IMIS) of the Ministry of Drinking Water and Sanitation reports that 16 States have a rural population of more than one lakh depending on metal-contaminated water. Iron is the most common contaminant of drinking water, followed by arsenic, fluoride and other heavy metals. Periodic monitoring of public water supplies is very essential to avoid the risk factor causing various health issues due to these contaminants. Different analytical techniques such as coagulation-flocculation, filtration, disinfection, chemical and physical treatments, antibacterial treatments etc have been adopted for decades to identify and purify various contaminants and mutagens present in different zones of our environment such as soil, water, air, food, medicines, and petroleum products as they can threaten the natural habitat as well as animal existence. The thermal lens (TL) spectroscopic technique has emerged as one of the promising analytical tools in ultra trace detection of metals or impurities than conventional analytical methodologies due to its renowned sensitivity (10^{-7}absorbance range), simplicity, low sample requirement, and nondestructive nature. The TL technique bases the photon absorption and the subsequent non-radiative deexcitation, which generates a refractive index gradient, inducing a diverging lens within the medium, known as thermal lens. Probing the refractive index gradient gives important information regarding the thermo-optical properties of a material, which can be employed in trace detection of elements in water by comparing with the pure water. The present work is an attempt to study the quality of drinking water by employing the simple and nondestructive TL technique.**

***Keywords*—** Thermal lens spectroscopy, Water quality analysis, Iron content**.**

ISBN: 978-81-940627-0-7

Speckle Interferometry Based Spirometer

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***Abstract*—Evaluating the lung's efficiency is a vital part of the present scenario due to the augmented rate in lung-related ailments and mortality. The study details the use of Electronic Speckle Pattern Interferometry (ESPI) for understanding lung efficiency. After a deep inhalation, the exhaled breath is directed to the diaphragm in the ESPI setup, resulting in the deformation of the diaphragm. The radius of curvature (R) of the circular fringe so formed during the process had been found out by using Newton's ring method. From 640 observations an empirical relation had been made between the radius of curvature (R) and peak expiratory flow rate (PEFR) obtained from the standard spirometer which spread over the range 100 - 500 L/min. The empirical relation setup gives PEFR from the value of the radius of curvature (R). Thus the ESPI spirometer is calibrated. The obtained PEFR from ESPIS is as per the standard spirometer reading, hence developing an optical interferometry based spirometer for biomedical purposes.**

***Keywords*—**Speckle Interferometry, Spirometer, Peak expiratory flow rate**.**

ISBN: 978-81-940627-0-7

Europium Activated Perovskites for Solid State Lighting

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***Abstract*—Global warming and the growing scarcity of fossil fuels worldwide represent challenges which will require changes in the way we consume and produce energy. There is an urgent need for savings in energy consumption and natural resources exploitation, and this will be made possible by changing our habits as well as the technology we use for producing and employing energy. Lighting consumes 16% of world electricity. Solid state lighting technology can reduce 33% of electricity used for lighting. Phosphors had been part of scientific interest over 100 years and now they play a significant role in SSL technology. Inorganic lanthanide phosphor materials are important because of their sharp emission, low toxicity and long life [1-3].**

An enhancement in the photoluminescence properties of $SrTiO_3:Eu^{3+}$ phosphor was obtained by preparing a solid solution host of perovskite compounds $SrTiO_3$ and $LiNbO_3$. Here we investigate to understand the effect of Eu^{3+} substitution at A-sites (Sr^{2+}) and at A-and B- sites (Sr^{2+} and Ti^{4+}) simultaneously Photoluminescence properties of phosphors were elucidated as a function of local structure variation by X-ray diffraction, Raman analysis, Energy Dispersive X-ray spectroscopy, UV-Visible spectroscopy, Photoluminescence spectroscopy and Photoluminescence Decay curve analysis. When the substitution was made simultaneously at A- and B- sites to produce $Sr_{0.8-x/2}Li_{0.2}Ti_{0.8-x/2}Nb_{0.2}O_3:xEu^{3+}$, enhancement in the intensity of red emission by 1.46 times with respect to that of A site substituted $Sr_{0.8-x}Li_{0.2}Ti_{0.8}Nb_{0.2}O_3:xEu^{3+}$ was observed. The variation in cell volume obtained from X-ray diffraction patterns and the increase in intensity of first order TO_2, TO_4 and LO_4 vibrational modes and the first order R-point vibrations in the Raman shifts confirmed the site selected substitutions of Eu^{3+} ions. The results indicate that $Sr_{0.8-x}Li_{0.2}Ti_{0.8}Nb_{0.2}O_3:xEu^{3+}$ can act as a promising red phosphor in a variety of application by exciting either at 395 or at 465 nm

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ISBN: 978-81-940627-0-7

Significance of Type 2 Diabetes Mellitus in the Risk Factor Analysis of Obesity among Childbearing Women

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Abstract—**Diabetes mellitus (DM) is a chronic disorder that can alter carbohydrate, protein, and fat metabolism. Obesity and Type 2 Diabetes Mellitus (T2D) are serious health concerns. The global epidemic of obesity and T2D is worsening. The global obesity epidemic is showing no signs of abating, and is fuelling an explosion in numbers of Type 2 Diabetes Mellitus (T2D) worldwide. Obesity occurs when fat mass gets located in the abdomen. The diabetogenic effect of obesity is due to the capacity of excessive fat mass to induce or aggravate insulin resistance. There is a close association between Body mass index and risk of developing T2D, the relative risk of T2D increasing with BMI. Obesity is the leading risk factor for type 2 diabetes. Women with a body mass index (BMI) of 30 kg/m2 have a 28 times greater risk of developing diabetes than do women of normal weight. The risk of diabetes is 93 times greater if the BMI is 35 kg/m2. In this paper, we discuss the currently-understood intricate associations between obesity and T2D among childbearing women.**

Keywords—Diabetes Mellitus, Obesity, Body mass index, Childbearing women.

ISBN: 978-81-940627-0-7

Corporate Social Responsibility Amidst Covid 19 with Special Reference to the Recent Amendments

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***Abstract*—"Corporate Social Responsibility" or CSR is a concept that aims to make a company socially accountable to itself, its stakeholders, and the public at large. Through their CSR practices, companies are conscious of the kind of impact they have on all aspects of society including economic, social, and environmental. It is a way of giving back to the society for the various resources it uses to run its business. Like it is rightly said, 'Money belongs to you, but resources belong to the society'.**

Today, the entire world is facing and overcoming a crisis of a magnitude which no one had anticipated. The much-dreaded Coronavirus (COVID-19), a pandemic declared by the World Health Organization, has shaken the entire world and the economy at large.

In view of the spread of COVID-19 and the decision of the Government of India to treat this as a notified disaster, the Ministry of Corporate Affairs (vide its General Circular No. 10/2020 dated 23rd March, 2020) was quick to clarify that spending of CSR funds for COVID-19 shall be considered as an eligible CSR activity. Apart from contribution to the PM CARES Fund and State Disaster Management Authority, expenditure incurred on preventive health care and sanitation, ex-gratia to temporary/casual workers over and above daily wages, providing quarantine facilities to those affected, amongst others, shall be considered as CSR spend.

This step was welcomed by Corporate India. The announcement to allow funds spent on COVID-19 relief work as CSR spend created a win-win situation for companies having an existing CSR obligation, who wanted to contribute to relief work and meet statutory requirements of The Companies Act at the same time. The response to the Government's call to support COVID-19 efforts has been overwhelming. Crores have been donated to various Government funds. This study is intended to analyse the recent amendments in the corporate social responsibility rules owing to the COVID 19 pandemic that render various avenues eligible as corporate social responsibility spend

***Index Terms*—** CSR, Amendments, COVID 19

ISBN: 978-81-940627-0-7

Agriculture Industry Interface: An Exploration into Opportunities in the Fisheries Sector

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Abstract*—Agriculture industry interface explains inter-sectoral, intra-sectoral, urban-rural, direct-indirect, forward and backward linkages. Industrial progress is essential for value addition and processing in agriculture. This agriculture industry interface has recently been discussed as agribusiness and agri-entrepreneurship. Fisheries which comes under the agriculture sector contributes to nutritional food security, income, employment, exports and raw materials. India ranks 2nd and 6th in world inland (14 per cent) and marine capture (4 percent) production respectively (FAO, 2020). The Fisheries sector contributes 1.03 per cent to GDP, 6.58 per cent to agricultural GDP, 5 per cent to national exports, 19.23 per cent to agri-exports, employment to 16.09 million people and twice along the value chain (Economic Survey 2019-20). Policy framework at national and state level demand research on agribusiness in fisheries. Agribusiness includes taking, culturing, processing, preserving, storing, transporting, marketing of fish and fish products. Literature survey reveals that professional entrepreneurship in fisheries can meet challenges like low profits, wastage, lack of processing, value addition, credit, supply chain and post- harvest management (Ayyappan and Krishnan, 2004). Strong synergies between agribusiness and fisheries growth stimulate economic development (Lakshmi and Raju, 2016). Processed fish has a wide range of ready-to-eat, ready-to-cook and ready-to-fry products. This research paper analyses opportunities of agribusiness and agri-entrepreneurship in fisheries through agriculture industry interface. The financial and economic feasibility of a micro model fish unit that produces fish cutlet, fish and prawns' pickles is analysed by NPV, BCR, Payback, Break-even, Sensitivity and Scenario analyses based on primary data collected from Ice and Freezing Plant of Matsyafed at Kochi. Study found that agriculture industry interface develops opportunities of agri-entrepreneurship in fisheries. Study suggests that agribusiness policy measures to be implemented through decentralised planning. Coordination of Panchayatiraj, Krishibhavan and Kudumbasree can popularise agribusiness units in the post Covid 19 pandemic phase of Kerala Economy.

***Keywords*—**Agribusiness, Agri-entrepreneurship, Linkages, Nutritional Security**.**

ISBN: 978-81-940627-0-7

Women's Participation in Environment Protection with Special Reference to India

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***Abstract*—Women are closely bound with the environment. They are actively participating in the protection of the environment. Through their role as farmers and collectors of food, water and fire-woods women have a close connection with their local environment. Vedic scriptures reflected women as the goddesses of the environment. But gradually her role was sidelined in the environment. But after increasing awareness about their rights and duties they consciously tried to raise their voice against environmental degradation. The origin of the environment protection movement in India dates back to Kejari movement and gained momentum through Chipko movement, Appiko movement, Save Silent Valley movement and Narmada Bachao Andolan. The major trend in the environmental protection movements in India highlights the fact that most of the participants are women. Similarly, nowadays Medha Patekar, a social worker, Menaka Gandhi, an environmentalist and politician are playing vital roles for the conservation of the environment. Kerala has a strong history of women involvement in environment protection and conservation. The movements like Silent Valley Movement, Anti-Coca Cola struggle at Plachimada, Anti Endosulfan movement under the leadership of Sugatha Kumari, Sara Joseph, C.K. Janu and Mayilamma and a number of Environmental NGOs inspire the women to participate in environment protection. The present paper analyses the role of women in environmental protection. It looks at some major environmental movements in India that were spearheaded by women. It will also emphasize the significant contribution of women in the environmental movement across the country**

***Keywords*—**Environment, Women, Protection, India, Environmental Movement**.**

ISBN: 978-81-940627-0-7

Development and Environment: -An Economic Dilemma

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Abstract—**"Man has everything for his needs, but not for his greed"-let's start thinking from this challenging quote by Mahatma Gandhi. Commencing from the stone age, passing through the barter system, continued by the classicals and revolutionization by Keynes ,had given economics her glamour. Industrialized countries like Japan,Britain,U.S, Korea had all given commerce and industries their glamour. As time passed, we grew, but nature is showing the signs of exhaustion and the question is that we are still confused about the facts on the things that made nature in the merge of depletion. Yes,the mistakes are made from the part of humans. The main problem includes the lack of mutual understanding and mutual agreement on (i) Resource utilisation (ii) sustainable development. Without taking necessary actions to control the loop holes and making a concern over the global concerns, no development is fruitful. What is sustainability? Do we have a future life? If yes, our actions and ambition to live longer are contradictory. Through this ,we are trying to focus on 3 objectives; 1)What are the valuable resources depleted due to unplanned development activities 2)What is the paradox arising in sustainable development and environment depletion 3)How can an equilibrium be regained or the 'environmental peace'. Environmental unrest is global unrest. It affects the whole world like recession, and is warned by many organisations and legends and the best example being 'silent spring' by Rachel curson. If the activities of power generation and energy production goes to the current level,then definitely the situation will become worse. Power generation, Industrialization are all our necessities, but conservation of resources are too needed. These are 2 needs,or are in the midst of two needs (1) consumption needs without sacrificing future generations' needs. (2) Production/development needs without sacrificing the balance of the environment. The only way is to think of possibilities to meet our needs, by entertaining the needs of the ultimate resource producer.**

ISBN: 978-81-940627-0-7

Coumestrol as Chemotherapeutic Drug: A Molecular Docking Investigation to its Interaction with Protein Kinases

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Abstract— **Cancer is a severe metabolic syndrome causing a large number of deaths around the world every year[1]. So far, developing anti-cancer drugs that are very effective as well as possessing lesser or no side effects have been a challenging task to achieve. In this regard, the bioactive components present in plants are interesting, as they usually affect cancerous cells without altering normal cells. The phytoestrogen coumestrol, a potent isoflavonoid present in red clover and soya is proven to show neuroprotective, anti-inflammatory and anticancer properties[2]. The human genome codes 538 protein kinases, many of which are linked to the initiation and development of human cancer[3]. The recent discovery of small molecule kinase inhibitors for the treatment of different forms of cancer has proved promising in clinical therapy.The present study is aimed at performing molecular docking studies involving the inhibitory effect of coumestrol on kinases such as Aurora A, VEGFR2, and MCL-1. The results show that coumestrol exhibits the best binding affinity value of -9.5kcal/mol with Aurora A. The binding energy values obtained for the molecule on VEGFR2, and MCL-1 are found to be -8.9 and -4.8kcal/mol respectively. The obtained data reveals the inhibitory function of coumestrol in kinase activity that makes it a potent and safe anti-cancer drug**

Keywords—Molecular docking; coumestrol; kinases; anti-cancer drug**.**

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ISBN: 978-81-940627-0-7

Chitosan Banana Peel Composite Membrane for the Delivery of Anticancerous Drug

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***Abstract*— Drug delivery is the method of administering an active Pharmaceutical Ingredient (API) to achieve therapeutic effect in humans or animals. Pharmaceutical component mainly consists of an active pharmaceutical ingredient and excipients. Development of efficient and smart excipient materials for the excellent therapeutic delivery of drugs is of paramount importance. Our study is focused on the development of biodegradable and bio adherent chitosan banana peel composite membrane and its application as a drug delivery system. Solvent casting method is employed to fabricate the aforementioned composite membrane. The synthesized membrane is used as the excipient for the anti-cancerous drug and followed its drug release and kinetics in the Tris HCl buffer resembling the biological environment using UV absorbance method. The fabricated membrane was characterized using SEM and FTIR techniques. The results show that the composite could be used as an excellent carrier for the drug release..**

***Keywords*—**Chitosan, Banana peel, Drug Release, SEM, FTIR, UV**.**

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ISBN: 978-81-940627-0-7

Effect of Substituents on the Reactivity of Phytochemical, Coumestrol

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***Abstract*—Phytochemical, Coumestrol belongs to the coumestan family of compounds, found in plants like clover, alfalfa, soya, spinach, etc. It shows anti-oxidant, anti-aging, neuroprotective, anti-cancer like activities and is supported by its low molecular weight and stable structure[1]. Reactivity is the propensity of a molecule to react with itself or some other substances, and is often influenced by substitution. The global descriptive parameters gives an idea about the relation between the chemical reactivity and sensitivity towards structural perturbations and changes in external conditions[2].**

In this study, by analyzing the GDP measured according to the energy vertical method, we investigated the effect of substituents such as NO_2, SO_3H, CHO, $COCH_3$, $COOCH_3$, COOH, OH, NH_2, OCH_3, and CH_3 on the C-17th position of the compound. All the calculations were performed via DFT-B3LYP/6-31+G(2d,2p). It was assessed that substitution of electron withdrawing groups on coumestrol leads to an increase in value of ionisation potential, electron affinity, electronegativity, softness and electrophilic index while the electron donating groups decreases most of the global descriptive parameters like ionisation potential, electron affinity, electronegativity, and hardness. Among the selected derivatives, 17-NH_2 and 17-NO_2 exhibit more reactivity than coumestrol

***Keywords*—**Coumestrol; Global descriptive parameters (GDP); Electron withdrawing groups (EWG); Electron donating groups (EDG).

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ISBN: 978-81-940627-0-7

Study of Molecular Orbitals of Ethene& Butadiene using Quantum Chemical Calculations

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***Abstract*—The aim of this project is to prepare a tutorial to help M.Sc students use Gaussian 09 calculations and correlate computational studies with material available in standard books. The concepts of LCAO (linear combination of atomic orbitals) which introduce students to bonding and antibonding orbitals are generally discussed using orbital diagrams which deal with the in phase and out of phase addition of atomic orbitals.**

The concepts can be put across with better clarity by using quantum chemical calculations. The calculations provide orbital diagrams (electron density plots) which present a 3D representation of the 2D board diagrams.

The purpose of this project is to construct a MO diagram for Butadiene starting from ethene. Using HF (HartreeFock) calculations the MO diagram of ethene and Butadiene is first constructed separately. The symmetry of the occupied and unoccupied orbitals is identified. A similar exercise is carried out for butadiene. The MO diagram is then constructed by identifying the appropriate symmetry. A comparative study was done after constructing a MO diagram for Butadiene starting from ethane by emphasizing conjugation effect and thermodynamic stability.

The orbital ordering for ethene is also verified by an analytical pen-and paper approach asdescribed in textbooks.

***Keywords*—**Gaussian, Hartreefock calculation, Molecular orbital**.**

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ISBN: 978-81-940627-0-7

Machine Learning Approach for Solving Multi-Objective Dynamic Software Project Scheduling

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***Abstract*—Software project scheduling is essentially a kind of project scheduling problem with limited human resources. With the increasing of software's complexity, more employees are allocated to complete the numerous tasks. Scheduling the complicated software project manually or by traditional numerical programming is inefficient and possibly falls into an infeasible projectschedule. Effective software project scheduling is crucial, when managing the development of medium to large scale projects to meet the deadline and budget .Creating a plan for a software project is a recurring activity in software development organizations that plays a critical role in the project success. Software Project Scheduling Problem (SPSP) consists of defining which resources are used to perform each software project task.**

The methodology focused to develop the software project scheduling problem in a dynamic environment by considering multi objectives and constraints. Here, the mathematical model is constructed by considering the four objectives of project cost, duration, robustness and stability, and a variety of practical constraints. In particular, reworking task arrivals, dynamic skill proficiencies, and employee leave and return are taken into consideration. To optimize these models, the methodology proposed the Randomized Cauchy Mutation Genetic Algorithm (RCMGA). GA maintains a population of encoded tentative solutions that are competitively manipulated by applying some variation operators to find a global optimum. It initializes with a set of solutions, known as initial population and then executes sequentially selection, reproduction, crossover and Cauchy mutation operations for a fixed number of iterations as stopping criterion. Based on this, we presented the duration and cost of the project, robustness, and stability of the schedules are the objective functions in the proposed dynamic multi-objective software project scheduling model. The objectives of this algorithm are usually to minimize the project duration, to minimize the project cost, and to maximize the quality.

ISBN: 978-81-940627-0-7

Two-Factor Private Data Protection Mechanism

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***Abstract*—Nowadays data security is an important issue in the world. Data security refers to the process of protecting data from unauthorized access and data corruption throughout its lifecycle. In this paper, we proposed a data security protection mechanism based on Two - factor private data protection Mechanism. The system proposed two-level data encryption and decryption techniques. Data Security includes data encryption, hashing and Key management. The sender sends an encrypted message to a receiver, sender requires to know identity of receiver but no need of other information such as certificate or public key. To decrypt the ciphertext receiver has a private key or secret key stored in the computer and a unique personal security device or some hardware equipment's (USB, CD). Without having these two things cipher text never decrypted. Unique security devices can be worked based on hash function. This data security mechanism improved the data security from unauthorized people. Using this technique, the data confidentiality and the security of data transition can be improved.**

***Keywords*—**Two-Factor, Protection, Security, Key, Security Device, Hash Function**.**

ISBN: 978-81-940627-0-7

A Review on Application of Deep Learning in Health Care

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***Abstract*—Deep learning is a set of algorithms in machine learning that attempt to model high-level abstractions in data by using architectures composed of multiple non-linear transformations. Since 2006, deep structured learning, or more commonly called deep learning or hierarchical learning, has emerged as a new area of machine learning research. During the past several years, the techniques developed from deep learning research have already been impacting a wide range of signal and information processing work within the traditional and the new, widened scopes including key aspects of machine learning and artificial intelligence. In this review paper we analyze the importance of deep learning in health maintenance .As per the study there are three main algorithms in deep learning: DNN, CNN, and RNN.**

***Keywords*—**deep structured learning, DNN, CNN and RNN**.**

ISBN: 978-81-940627-0-7

Evaluation of Genetic Variation within the Populations of AchatinaFulica (Giant African Land Snail) using ISSR Markers

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***Abstract*—Achatinafulica commonly called Giant African snail is one of the largest land snails in the world. It has become recognized as one of the world's most damaging pests and is listed in the Global Invasive Species Database among "One hundred of the world's worst invasive alien species". Eight samples of Achatinafulica (Giant African land snail) were collected from Willingdon Island, Kochi for genetic variation studies. Molecular characterization of Achatinafulica were carried out using Inter Simple Sequence Repeat (ISSR) markers for detecting the genetic variation and to study its suitability as an invasive species. Genomic DNA of eight snail samples of A. fulica were extracted using the CTAB method. Two ISSR primers namely HB08 & HB10 were utilized for PCR-DNA amplification and bands were visualized under UV light using Gel Documentation system. The obtained data were subjected to further analysis with DendroUPGMA web server. The level of variation between samples was established as a matrix of similarity and distance using Pearson Coefficient. Results obtained from the distance matrix revealed that for HB08 primer, genetic distance values ranges from 34.535 to 165.465, while genetic distance ranges from 33.333 to 111.111 for HB10. The distance matrix values andDendrogram clustering were evaluated and this analysis indicated that the snail samples of Achatinafulica having greater genetic distance values, exhibit a higher level of genetic variations even if they share a common origin. The genetic variation displayed by the samples within the species highlights the strong potential of Achatinafulica to adapt during invasion and thus can be assumed as a successful invasive species. Despite the genetic variations displayed within the snail samples of Achatinafulica, further insights about the genetic variations at a comprehensive level can be contributed only by extensive research.**

***Keywords*—**Snail; Invasive Species; Genetic variation; ISSR; DendroUPGMA; Pearson Coefficient.
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ISBN: 978-81-940627-0-7

Isolation, Screening and Molecular Characterization of Soil Bacteria Possessing Antibacterial Property

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Abstract*—Soil microbes represent the unseen majority in soil and serve as a rich source for a wide variety of useful biologically active natural products including clinically important antibiotics. There is a critical need for new antibiotics, as bacterial pathogens continue to evolve resistance to compounds in current use. An attempt was made to screen the antibacterial property of soil bacteria for further testing as antibiotics. In the present investigation, a preliminary screening program for isolation of inhibitory bioactive compounds producing bacteria from various soil samples is initiated to search for novel antibacterial compounds. The isolated soil bacteria were tested for their antibacterial activity by cross streak method against nine test bacteria including Bacillus coagulans, Bacillus circulans, Enterococcus faecalis, Staphylococcus aureus, Pseudomonas aeruginosa, Proteus vulgaris, Salmonella paratyphi, Escherichia coli and Klebsiellapneumoniae. Six bacterial isolates were observed with significant positive antibacterial activity. Using Kirby Bauer disc diffusion method, positive isolates were screened for their extracellular activity, data indicated that two isolates designated as AKM2 & AVP8 were able to inhibit the tested bacteria with notable inhibition zone and the isolate AVP8 was selected for molecular identification. PCR amplification of 16SrDNA gene was done for the isolate AVP8 using universal primers and was sequenced. BLAST analysis of the 16S rDNA sequence of AVP8 revealed that the selected isolates showed maximum similarity of 99% with Bacillus cereus (NCBI Accession No: KX024730.1). The dendrogram was constructed to establish the phylogenetic relationship.The unusual antibiotic profile of the potent strain AVP8 against the test bacteria P. aeruginosa, a ubiquitous environmental bacterium and one of the top three causes of opportunistic human infections, underlined their potential as a source of novel antibiotics and might be used as a promising candidate for discovering novel and potent antibiotics.

***Keywords*—**Soil bacteria, antibacterial, disc diffusion, PCR**.**

ISBN: 978-81-940627-0-7

Isolation, Screening and Molecular Characterization of Keratinolytic Bacteria from Soil

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***Abstract*—Keratin is an insoluble protein macromolecule with very high stability and low degradation rate, usually present in hair, nail, poultry feathers, wools etc. Keratinase is an extracellular enzyme used for the degradation of keratin as it attacks the disulphide bond of keratin to degrade it. These enzymes have the ability to degrade hair, poultry feathers, nails, wools etc. Recycling of keratin rich material provides a cheap and alternative protein. Keratinolytic microorganisms have a great importance in poultry waste degradation and its bioconversion to compost or animal feed. The aim of the present study is to isolate keratin degrading bacteria from soil samples collected from poultry farm areas and its molecular characterization. Isolation of bacteria was done by serial dilution of the soil sample followed by pour plate method. 12 isolates were obtained and were screened for proteolytic activity by patch plate method on agar plates containing 1% skim milk. Clear zones were seen around 9 isolates indicating proteolytic activity. The protease producing isolates were then screened for keratinolytic activity using 1% keratin agar plates. Nine colonies exhibited keratinolytic activity and the isolate ZVP8 which showed consistent and more keratinolytic activity was subjected to DNA isolation followed by PCR amplification of the 16S rDNA gene. The 16S rDNAamplicon was sequenced. The obtained sequences were analysed with bioinformatic tool, NCBI BLAST, which exhibited 99% identity with the organism Bacillus cereus and Multiple sequence alignment was done using BioEdit software and phylogenetic tree was constructed using MEGA software.**

***Keywords*—**Soil microbe, Keratinase, Molecular characterization, PCR**.**

ISBN: 978-81-940627-0-7

In Vitro Anthelmintic Activity of Aqueous Leaf Extract of RhinacanthusNasutus (L)

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***Abstract*—The current study aimed at the in-vitro evaluation of the anthelmintic activity of aqueous leaf extract of Rhinacanthusnasutus using Pheritimaprosthuma at various concentrations (10, 20, 30 and 40 mg/ml). The study composed of the determination of time of paralysis and mortality of the worms. At the concentration of 10 mg/ml in aqueous leaf extract exhibited very significant activities as compared to the standard drug Albendazole (20 mg/ml). The time of paralysis and death was recorded as 31.28±1.33 min and 39.11±0.48 in case of Albendazole extract, and 11.42±0.18 min and13.66±1.44 min in the case of aqueous leaf extracts of Rhinacanthusnasutusat the lowest concentration (10mg/ml). Morphological observations showed shedding of the body ruptures, bloody lesions, abnormal swellings, and necrosis of segments. Histopathological studies confirm various tissue alterations in ectoderm and intestinal wall layers of treated earthworms in various concentrations of aqueous leaf extract of Rhinacanthusnasutus compared to control. This study confirms the traditional use of leaf extract of Rhinacanthusnasutus as an anthelmintic drug of natural origin. It reveals its equipotent activity compared to standard drug Albendazole, and further studies are suggested to isolate the bioactive principles responsible for the activity.**

***Keywords*—**Rhinacanthusnasutus, Pheritimaprosthuma, Albendazole, Paralysis, Mortality, Histopathology, Circular muscles, longitudinal muscles**.**

ISBN: 978-81-940627-0-7

Macrophage Cholesterol Efflux Assay for the Identification of the Active Fraction in the Methanolic Extract of DesmodiumGyrans DCand Evaluation of Its Influence on Reverse Cholesterol Transport by Gene Expression Studies

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***Abstract*—The cardiovascular diseases occur as a sequel of atherosclerosis and lipid accumulation at the sub endothelial space as result of engulfment of oxidized LDL by macrophages is a fundamental event in atherosclerosis. HDL reduces atherosclerosis by playing a cardinal role in the transport of cholesterol from extra-hepatic cells to the liver through reverse cholesterol transport (RCT) pathway. Enhanced transport of effluxed cholesterol from macrophages is considered athero-protective and plasma membrane transporter proteins like ATP binding cassette transporter proteins A1 (ABCA1) facilitates macrophage cholesterol efflux. Various scientific studies have revealed the antioxidant, anti-inflammatory and hypolipidemic efficacy of the plants belonging to Desmodium species. Desmodiumgyrans are found to have good antimicrobial action and wound healing property with no much toxic effects and previous studies have shown that methanolic extract of Desmodiumgyrans (DGM) possess HDL enhancing property. The present study was done for the identification of the active fraction of DGM by macrophage cholesterol efflux assay using THP-1 derived macrophage in culture and evaluation of its efficacy in enhancing Reverse Cholesterol Transport by gene expression studies. The aqueous fraction of DGM extract (DGMAF) was identified to be the active fraction among the various column fractions of DGM. The gene expression studies using DGMAF showed up-regulation of expression of ABCA1 in THP-1 cells and LC-MS analysis revealed the presence of compounds like celastrol, theophylline and dodecanamide with antiinflammatory and hypolipidemic property which can account for the atheroprotective efficacy of DGMAF.**

***Keywords*—**Atherosclerosis, Reverse Cholesterol Transport, Desmodiumgyrans.

ISBN: 978-81-940627-0-7

Role of Zooplanktons for Ecological Status of Irumbakulam Pond, Aluva, Kerala, India

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Abstract*—Zooplanktons are chiefly microscopic organisms found in aquatic environment. They are indispensable organisms of the aquatic food chain providing food and energy for residing animals which ultimately become a source of food for humans. Extremely diverse, their constituent population varies from one pond to the next. The paper describes the characteristics, zooplankton diversity, bio indicator species among them and thus resulting ecological status of Irumbakulam pond (Kadungalloor, 10.096022°N 76.317829°E) Aluva, Ernakulam District in a study conducted during 2017-2018.The physical and chemical parameters such as temperature, turbidity, dissolved oxygen and carbon dioxide, total dissolved solids, pH salinity, nitrates, and phosphates of samples were measured for pre monsoon ,monsoon and post monsoon seasons. The preserved zooplanktons were identified, numerical abundances determined and biological indices estimated. The pond is well maintained with an area of 240m^2. Naturally coloured, it has high algal, and good fish diversity. Study of physico-chemical characteristics revealed few normal values but high dissolved oxygen and carbon dioxide, high turbidity and phosphate values in almost all three seasons. A total of 65 species, including 15 rhizopods, 33 rotifers, 8 cladocera, 8 copepods have been identified. Statistically, there is adequate abundance, diversity, dominance and richness season wise. Many pollution indicator zooplanktons like Arcella vulgaris, Centropyxisaculeata, Difflugiaoblonga, Brachionusspp, Asplanchnaspp, Lecanespp, Testudinellaspp, Platyiasquadricornis, Mesocyclopshyalinus, and nauplii have been observed in this pond. Physico-chemical features support abundant and diverse zooplanktons particularly in post monsoon. Present studies reveal that Aluva pond is polluted with urban waste water runoff containing phosphates and organic components and that the pond fall in meso-eutrophic status range. Ponds in the trophic region are more prone to eutrophication, and therefore imperative to prevent the accumulation of pollutants to slow down their productivity, support quality and existence, which is vital to human consumption.

***Keywords*—**ecological status, aluva pond, zooplankton, physico-chemical parameters, diversity index, bioindicators**.**

ISBN: 978-81-940627-0-7

Identification and Molecular Phylogeny of Ecologically Relevant Species of Spiders at KFRI via DNA Barcoding

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***Abstract*—With almost 40,000 species, the Spiders provide important model systems for studies of sociality, mating systems, and sexual dimorphism. However, work on this group is difficult due to constraints in their species level identification. DNA-barcoding is a promising approach to minimize the difficulties of taxonomists to delimit species. In the present work, we demonstrate that sequence diversity in a standard segment of the mitochondrial gene coding for Cytochrome c oxidase I (COI) is highly effective in discriminating spiders. Four spider species Oxyopidae, Thomisidae, Argiopepulchela, Leucagedecorata were collected from KFRI (Kerala Forest Research Institute) for the construction of DNA barcode and Phylogenetic tree. Examination of the morphological characters of the samples led to the identification upto the species level. The standard Barcode region in multiple specimens of most common spider species, Oxyopidae and Thomisidae were sequenced. The BLAST analysis revealed that constrained samples showed maximum similarity of 91.81% with Thomisusgranulifrons (Accession No. EUI68162.1) and 96.06% similarity with Oxyopesbirmanicus (Accession No. MK393048.1). Phylogenetic relationships were established using Maximum Likelihood method. Further study with these spiders can generate a permanent DNA barcode and can be submitted in GenBank. Present study would provide a first barcode record of some common spiders from KFRI. Hence it could also become the first step to develop a DNA barcode reference library for the spiders in KFRI. It is therefore concluded that DNA barcoding is a reliable tool to delimit studied spider species.**

***Keywords*—**Spider; DNA Barcoding; Cytochrome Oxidase I (COI); BLAST; Maximum likelihood method.

ISBN: 978-81-940627-0-7

Comparison of Glycogen and Protein Content of Two Brackish Water Fish Species: OreochromisMossambicus and EtroplusSuratensis

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Abstract*—Etroplussuratensis (Karimeen) and Oreochromismossambicus (Tilapia) are widely accepted as nutritionally high valued brackish water fishes in Kerala. Analysis on the proximate composition of these two species of fishes were carried out to evaluate the nutritional quality. These species were chosen for this study as they are abundant, highly preferred by the consumers and got good market value. Sample tissues were collected from both the species. Glycogen content was estimated using Anthrone method and protein by Folin-Lowery method. D-glucose was used as the standard for glycogen estimation and Bovine Serum Albumin (BSA) as the standard for protein. In species-wise comparison, glycogen content was highest in O. mossambicus (average 0.014mg/ml) than in E. suratensis (average 0.011mg/ml), though the protein content was highest in E. suratensis (average 0.38mg/ml) than in O.mossambicus (average 0.21mg/ml). These differences in the nutritional compositions of two different species may be attributed to food composition, food and feeding habit, feeding rate, habitats, sex, age, size, genetic traits and migration. Carbohydrate provides continuous energy supply for the body, especially the brain and nervous system. But the carbohydrate in excess reduces growth rate and suppresses immune functions and increases incidence of diseases such as obesity, non-insulin dependent diabetes, and cardiovascular diseases. Protein is a macronutrient which is needed in more quantity for the proper growth and tissue repairs of the body of an individual. So the present study recommends the consumption of E. suratensis rather than O. mossambicus, as the flesh of the first species has high protein content that is necessary for the development and normal wellbeing of our body. Moreover we estimated only protein and carbohydrate for the study and not dealt with lipid, fatty acids and moisture. Despite these observations, further insights at a comprehensive level can be contributed only by extensive research.

***Keywords*—**Brackish water species; proximate composition; Nutritional quality**.**

ISBN: 978-81-940627-0-7

A Review on Harvesting and Post Harvesting Technologies of Lantern Fishes (Myctophids) from Indian Ocean with Special Emphasis on Arabian Sea for their Better Utilization

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***Abstract*—The human activities are more focused on the coastal waters these days and the coastal resources are over exploited and therefore to meet the increasing nutritional demands, alternate sources from deep Sea and open Oceans need to be explored. The mesopelagic realm is the most promising potential resource at present scenario to resolve this issue. The mesopelagic fishes constitute 1000 million tonnes of biomass in the world oceans and the family myctophidae commonly known as lantern fishes makes up about 65% of all the total biomass. These fishes are reported to be a good source of protein, mineral and fat and a number of studies have evaluated the lipid content of vertically migrating myctophids and found that they include triglycerides, believed to serve primarily as an energy store and wax esters for their buoyancy. Studies show that both fish meal and hydrolysate from lantern fish can be used for fish, poultry and animal feed and as an excellent protein supplement with beneficial effects. Though the lantern fishes contribute significant fisheries globally, only few attempts have been made in this direction to utilize them in human diet. Also limited information is available on the commercial exploitation of lantern fishes. Aimed midwater trawling and pair trawling are measured suitable for harvesting myctophid resources. Their commercial exploitation was limited to some parts of Indian Ocean and in the Eastern Arabian Sea and hence study concentrates its harvesting from Arabian Seas and also aims to provide a baseline data on harvesting and post harvesting aspects which are essential to evaluate their viability for exploitation, either directly or indirectly for human consumption or product development.**

***Keywords*—**Lantern Fishes, Myctophids, Indian Ocean, Arabian Sea, Harvesting.

ISBN: 978-81-940627-0-7

A Review on the Changing Ecology of ThrissurKole Wetlands - A Ramsar Site

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***Abstract*—ThrissurKole wetland which covers more than 10,000 hectares is a unique natural wetland system lying in Thrissur District, acts as a sink for large surface run off during monsoon thus keeping Thrissur city free from flood and also provides natural freshwater resources for groundwater recharge. It also acts as a natural draining system through a network of canals and ponds and thus finally discharges water to the Arabian sea through back waters. This Kole wetland supports a large variety of endemic fauna. The faunal composition including sediment dwellers and fishes which occupy an important intermediate trophic position, are relatively sedentary and long lived andwidely used to assess the overall estuarine health and anthropogenic impacts. As a detritus based ecosystem, the wetlands act as feeding and breeding ground for many species of fishes, migratory and resident birds. The nutrients and pollutants introduced into the wetlands influence to a great extent the distribution and abundance of less tolerant species in ecologically sensitive areas of this ecosystem. Hence this study will impart a definite knowledge on the different species of flora and fauna existed/existing in this ecosystem, how they interact with each other, and how much depletion in density and diversity has occurred. The results will permit meaningful comparisons across different habitats, and the causes and consequences of changes in biodiversity due to human activities. Thus the major goal of this study is to improve the diversity of life in the wetlands, in order to improve conservation and management plans of this ecosystem.**

***Keywords*—**Kole wetlands, Pollution, Biodiversity**.**

ISBN: 978-81-940627-0-7

Tick and Tick-Borne Diseases in India - A Brief Review

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***Abstract*—Ticks are obligate blood feeding ectoparasites inhabiting a wide range of vertebrate hosts, all across the globe. The direct and indirect effects they cause has ranked them second to mosquitoes, as vectors. Direct effects of tick bite include dermatitis, allergy, haemorrhage, anaemia, tick paralysis etc., whereas indirectly they harbour a huge range of pathogens viz; bacterial, viral, rickettsial, protozoal causing several life-threatening diseases like Kyasanur forest disease, Crimean-Congo haemorrhagic fever, Lyme disease, Ganjam, Indian tick typhus, theileriosis, babesiosis, anaplasmosis etc. Even though several studies have been reported throughout the world, the literature on vector biology, ecology and control strategies of Indian ticks remain scattered. This review aims to provide an overview on the status of distribution of ticks and tick-borne diseases in India with a special emphasize on the control strategies adopted till date.**

***Keywords*—**ticks, tick-borne diseases, chemical control, acaricide resistance, resistance management, biocontrol**.**

ISBN: 978-81-940627-0-7

Plant as a Potential Alternative for Chemical Acaricides:A Review

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***Abstract*—Among the arthropod vectors of deadly diseases, ticks are a major group of hematophagous organisms which is awakening the world's mind nowadays. They are known for their effect on organisms, directly and indirectly. India being a country that relies largely on agriculture and livestock for economic growth, TTBDs cause a large impact over the same. From the earlier time itself, these notorious group has been controlled with the help of chemicals which are fast in the result. But extensive use of these acaricides has developed resistance power as well as environmental concerns. Thus, the effective and eco-friendly control of tick vectors in the present scenario is a crucial challenge. Exploration of plants with medical importance will be a potential alternative for the control of ticks. Here is a brief review of the plants being used as potential acaricides.**

***Keywords*—**Hematophagous ,arthropodvector,TTBDs, plant residues, lucas, neem**.**

ISBN: 978-81-940627-0-7

An Assessment of Physical Fitness among Preparatory Indian School Boys in Qatar

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***Abstract*—The purpose of the study was to determine the selected physical fitness variables among preparatory Indian school boys in Qatar. The purpose of the study also was to compare the selected physical fitness variables of Qatar-Indian students on the basis of International norms available. A descriptive study was carried out upon one thousand and five hundred (1500) preparatory Indian school boys from various selected Qatar Indian Schools, aged between 13-15 years were selected for the purpose of the study. All the selected subjects who had been residing in Qatar for more than five years and belong to Indian citizens were eligible for this study. The physically challenged students also may be exempted from the study. The selected variables were lower back flexibility (sit and reach test), upper body muscular strength and endurance (Push-Ups test), and abdominal muscular strength and endurance (Sit-Ups). Mean and standard deviation (SD) were reported as descriptive statistics for summarizing the collected raw data. The present study observed that 13-15 years' boy students average (Mean) and standard deviation (SD) scores of Sit-Ups, Push-Ups and sit and reach test are (32.44±17.35), (13.432±9.23), (19.92±6.97) respectively. Since more than 50% students fall in the poor performance category for all physical fitness variables, the research hypothesis was thus accepted. The study can be concluded that the majority of Qatar-Indian boy's children fall in the poor physical fitness category, as it is compared to available International norms. Similar study may be conducted throughout the Gulf nations to formulate National level norms as a standard reference for further Normative research work.**

***Keywords*—**Qatar-Indian preparatory boy students, Physical fitness variables, International AAPHER and Youth Fitness norms**.**

ISBN: 978-81-940627-0-7

Phytochemical Analysis and Neuroprotective Effect of VitexAltissima L. on Amyloid Beta Peptide Induced Injury in Human Neuroblastoma IMR32 Cells

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Abstract*—Vitexaltissimia L. belongs to the family of Verbenaceae, is used traditionally for treating stomatities, leprosy and worm infection. Alzheimers disease one of the most common neurodegenerative disorders is characterized by a protein misfolding disease due to the accumulation of abnormally folded beta amyloid(Aβ), a protein of 1-42 amino acids. In the present study, it was found that ethyl acetate extract of Vitexaltissima L (VAEA) protects IMR32, a neuroblastoma human cellular line, from toxicity induced by Aβ. In the preliminary investigation, we quantified the phytochemicals such as alkaloid, flavonoids and phenolics and determined the antioxidant activity by DPPH and reducing power assay of hexane, ethyl acetate and methanol extracts. Flavonoids exhibit a remarkable ability to control and modulate neurodegeneration by inhibiting neuronal apoptosis. The VAEA extract which contained the highest amount of flavonoid (0.784mgquercetin equivalent/g) were further selected for the experiment. Effect of VAEA on IMR32 treated with Aβ peptide was evaluated morphologically by phase contrast microscopy and the extract concentration of 12.5µg/ml retained the actual cell morphology compared to cells treated with Aβ alone. Cell viability was measured by neutral red assay. The extract significantly increased the percent viability of Aβ induced IMR32 cells. Results of LDH release assay confirmed the range of concentration of VAEA that affect cell viability. Amyloid induction on IMR32 cells upregulates apoptosis by increasing caspase 9 activity to 0.31units/mg protein. Coadministration of VAEA on amyloid induced IMR32 cells significantly reduces the caspase 9 activity to 0.15 units/mg protein. Analysis of autophagy by flow cytometer indicates that Aβ induction reduced the autophagy intensity from 24 arbitrary units to 19 reducing the ratio to 0.9. Coadministration of VAEA increased the mean autophagy intensity to 22 arbitrary units which confirms the restoration of autophagy. Based on these observations, we suggest that VAEA could be developed as agents for management of neurodegenerative diseases.

Keywords—Vitexaltissima L., Neuroprotective, beta amyloid, Alzheimers.

ISBN: 978-81-940627-0-7

Facile Green Synthesis of Silver Nanoparticles and their Characterization

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Abstract*—Metal nanoparticles have been extensively used over the years. Eco-friendly metal-nanoparticles need more attention in the field of green chemistry because of their non-toxic nature. Green synthesis (using plants) seems to be the best method for nanoparticle synthesis since it helps in their large-scale production.Moreover, green synthesis is safe, economically sound and an alternative to conventional physical and chemical methods. In the present study, silver nanoparticles have been successfully fabricated by the bioreduction route using the aqueous extracts of Emilia Sonchifolia leaves and Cocosnucifera leaf sheath scales. Leaves of Emilia Sonchifolia and leaf sheath scales of Cocosnucifera were collected from Wayanad district, Kerala. The specimens were authenticated by aTaxonomist, MSSRF, Kalpata, Wayanad. Aqueous extracts were prepared as per standard protocols. After mixing the aqueous extracts with 1mM $AgNO_3$ solution a colour change from yellow to brown was observed, which is the first evidence for the formation of silver nanoparticles. Spectrophotometric analysis was conducted with different concentrations of plant extract (10-1000 µl), temperatures (37, 50, 70, 90 ^{0}C) and different incubation periods(30, 60 and 90 min). FTIR spectra were recorded for the prepared nanoparticles. Spectrophotometric analysis of silver nanoparticles produced by aqueous leaf extract of Emilia Sonchifolia (300 µl, 100 ^{0}C, 30 mnts), and Cocosnucifera leaf sheath scales (1000 µl, 60 ^{0}C, 30 mnts) show sharp peaks (416-424 nm). Functional groups were detected through FTIR analysis.

***Keywords*—**Silver nanoparticle, Green Synthesis, UV- Visible spectroscopy, FTIR**.**

ISBN: 978-81-940627-0-7

Advantages and Various Sources of PHB Producing Microbes

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***Abstract*—Polyhydroxybutyrate (PHB), a lipid-like polymer of 3-hydroxybutyrate,is a representative member of PolyhydroxyButenoids (PHBs).Isolates were collected from various sources for obtaining PHB producing microbes. Approximately 25 million tons of plastics are produced by the plastics industry every year.The development of biodegradable plastics has become one of the major concerns in the present society. Polyhydroxybutyrate (PHB) is a suitable source for biodegradable polymer material because of their fully degradability and non- pollutant characteristics.This study includes various sources which were most promising for the accumulation of PHB producing microbes.**

***Keywords*—**PHB,PHB producing microbes,Bioplastics**.**

ISBN: 978-81-940627-0-7

Construction of Protein-Protein Interaction Network of DPP4 and ACE2 Proteins- An Insight into the Pathophysiology of Diabetes and Covid-19

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Abstract*—Unraveling protein-protein interactions help us to predict biological processes and hitherto unknown mechanisms that a protein may be involved in. Taking into consideration the bidirectional relationship between COVID-19 and diabetes, it is plausible that SARS-CoV-2 may cause pleiotropic alterations of glucose metabolism. Previous findings clearly indicate that the aggressive impact of CoVs (SARS–CoV, MERS–CoV and SARS-CoV-2) on tissues and organs is preferentially modulated, or co-modulated, by DPP4/CD26 which is also dysregulated indiabetes. Also, ACE2, the host receptor protein used for entry of SARS-CoV2 is upregulated in diabetic patients. Hence, we sought to construct the protein-protein interaction (PPI) network of these two proteins, namely DPP4 and ACE2 using a STRING web server. The interactome network extracted from the STRING database consists of many signaling pathways as clusters, which indicates the signaling processes and biological mechanisms linking diabetes and COVID-19. 42 interacting proteins were found in the network involving various signaling pathways which led to construction of five gene clusters based on evolutionary analyses. Furthermore, results showed that the proteins involved in the interactions were associated with the pathways of glucose metabolism, renin-angiotensin system and normal immune function. Our findings also suggest that DPP4 and ACE2 interact through a protein namely neprilysin or MME (membrane metalloendopeptidase) which participates in the angiotensin signaling pathway. Gene Ontology (GO) annotations indicate MME protein to be a neutral endopeptidase which can cleave peptides at the amino side of hydrophobic residues inactivating several peptide hormones including glucagon, enkephalins, neurotensin, oxytocin, and bradykinin. MME is also shown to be involved in insulin signaling and is proposed to be a potential therapeutic target to modulate insulin sensitivity. We believe these results will provide background to decipher the inter-relationship between diabetes and COVID-19 and finally understand the specific mechanisms for the development of new-onset diabetes in connection with COVID-19.

ISBN: 978-81-940627-0-7

Evaluating the Attenuation of Biofilm Development and Virulence Factor Production of Multidrug Resistant Uropathogensby Vanillic Acid- A Natural Flavouring Agent

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Abstract*—Pseudomaonasaeruginosa, being an opportunistic pathogen, is considered to be one of the major contributing organisms for nosocomial infections like catheter associated urinary tract infections. Our research is an attempt to investigate the effect of natural and synthetic compounds on the pathogenesis of Pseudomonas aeruginosa. A study was conducted to evaluate the ant-virulence and biofilm inhibition property of vanillic acid (plant derived flavoring agent) against urinary catheter isolates of Pseudomonas aeruginosa. The present study utilized P.aeruginosa PA01 (laboratory reference strain) and 2 catheter isolates; P. aeruginosa RRLP1 and RRLP2. Initially, the minimum inhibitory concentration (MIC) of vanillic acid against the vanillic acid was estimated and all further assays were performed using sub-MIC levels (3.5mM, 4.5 mM and 5.5 mM). Vanillic acid at all tested concentration exhibited biofilm inhibition and biofilm eradication property, significantly at 3.5 mM levels. Similarly among the tested levels of vanillic acid, 3.5 mM significantly reduced the virulence factor production.

ISBN: 978-81-940627-0-7

A Novel Radio Protective Agent from Edible Mushroom, MorchellaEsculenta

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Abstract*—Mushrooms have gained great attraction for their nutritional and medicinal value and the diversity of their bioactive components. Most mushroom derived preparations and substances find their use not as pharmaceuticals but as a novel class of dietary supplements ornutriceuticals. Morchellaesculenta, an excellently edible and nutritious morel mushroom, is recognized as an unparalleled resource of healthy foods and drug discovery. The present study was carried out to evaluate the protective effect of cultured mycelium of Morchellaesculenta against radiation induced damages in mouse spleen lymphocyte DNA and rat mitochondria. The rat brain mitochondria was exposed to 450Gy γ-radiation at a dose rate of 7 Gy/min. The lipid peroxidation caused by radiation was studied by Lipid hydroperoxide (LOOH) and thiobarbituric acid reactive substances (TBARS) assay. M.esculenta extract at a concentration of 200 µg/ml significantly inhibited the formation of LOOH in rat brain mitochondria and restored the level to almost normal. The extract at a concentration of 50 and 100µg/ ml reduced the TBARS formation in brain mitochondria when compared to the untreated groups. The protective effect of M.esculenta against radiation-induced damage to DNA of spleenic lymphocytes was measured using alkaline single cell gel electrophoresis or comet assay. Spleenic lymphocytes were exposed to γ-radiation at a dose of 6Gy in the presence and absence of the extract and the strand break were analyzed. Treatment with the extract reduced the % tail DNA and tail length, tail moment and olive tail moment by 51.87% ,69.74%, 87.15% and 71.28% respectively when compared to the control. The study indicates that M.esculenta mycelia extract is an effective antioxidant capable of protecting DNA and mitochondria from deleterious effects of radiation and is a great promise for the development of safe and non toxic radio protectors with significant nutritional properties.

***Keywords*—**Morchellaesculenta, mushroom mycelium, radioprotection, nutriceuticals**.**

ISBN: 978-81-940627-0-7

Recent Trends in Food Preservation

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***Abstract*—The importance of food preservation dates back to centuries and the main aim is to eliminate microbes, increase shelf life of food, make seasonal fruits available throughout the year, add variety to diet, save time and energy and improve nutritional value. Many new technologies have been developed for the preservation of food like High Pressure Processing, Pulse Electric Field Processing, Ohmic Heating Process and Encapsulation Technology. Unlike the traditional methods of food preservation, these techniques have been proved to be very efficient, for food preservation. HPP depends on the inactivation of certain enzymes and reduce the no. of spores by applying high pressure. PEFP uses short electric pulses to preserve the foods and mainly employed for semi solid or liquid foods. OHP is a process in which alternating electric current is passedthrough food material to heat them and is used for protein rich substances and heating liquid foods. ET employs the incorporation of food materials into small capsules. There are also many other new generation techniques employed for the preservation of foods thereby increasing food supply, adding variety to food, decreasing wastage of food, increasing the shelf life of food and retaining the quality of food-colour, texture, flavor and nutrition value.**

***Keywords*—**Preservation, HPP, PEFP, OHP, ET.

ISBN: 978-81-940627-0-7

Stepped Impedance Based Frequency Reconfigurable Dipole Antenna

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***Abstract*—In this study, we present a stepped impedance dipole antenna capable of achieving high tuning ranges without using any matching networks or additional substrates. The tuning of the antenna resonant frequency is realized by varying the effective electrical length of the dipole arms by embedding varactor diodes at the gap between the consecutive metallic strips of the dipole arms. The antenna is fabricated on a substrate of thickness h= 1.6 mm, relative permittivity ε_r= 4.4 and tan δ = 0.02. The dipole antenna has an overall dimension of 0.408 λ_0 × 0.245 λ_0 × 0.013 λ_0, where λ_0 represents the free-space wavelength at the frequency 2.45 GHz. Initially, the antenna is studied without activating varactor diodes. From the simulated and measured reflection coefficients, it is observed that the antenna is resonating at 2.45 GHz with 17.14 % bandwidth from 2.24 GHz to 2.66 GHz. Varactor diode D1 to D8 are positioned at the extreme end of the dipole arms to get maximum tuning range and better impedance matching. DC bias voltage is supplied from the variable power supply (0- 30V) through chip inductors. In the first case of switching, varactor diodes D1 and D2 are enabled, and the remaining diodes are disabled. The dipole antenna was then electronically tuned with a reverse DC voltage applied across the diodes. When the bias voltage is varied from 0 to 25 V, the tuning range of the resonant frequency is found to be 21.22 % or 520 MHz upwards (from 2.24 GHz to 2.76 GHz). In the second case, the diodes D3 and D4 also enabled. Hence the reconfigurability is achieved with two varactor diodes in each arm. In this case, the obtained tuning range of resonance is 17.67 %, from 2.04 to 2.42 GHz. Similarly, the diodes D5 and D6 are also enabled in the third case. In this case, the measured resonance frequency variation is from 2.05 to 2.31 GHz. The proposed reconfigurable antenna is well suited for WLAN (2.4- 2.48 GHz)/ Bluetooth (2.4-2.48 GHz)/ LTE (2.4-2.7 GHz) and WiMAX (2.5-2.7 GHz) applications.**

ISBN: 978-81-940627-0-7

Permittivity Measurement using Asymmetric Coplanar Waveguide Based Sensor

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***Abstract*—Compact and low cost complex permittivity sensors find significant applications in areas such as industries, agriculture, medical etc. Planar resonant sensors are the most preferred candidates for sensing applications because of its compactness and easiness of handling. Different parameters of the sensor such as resonant frequency, quality factor, phase slope are utilized for complex permittivity measurements. A compact asymmetric coplanar waveguide fed open stub sensor with improved complex permittivity sensing is proposed in this paper. A uni-planar sensor with an open ended transmission line and partial ground plane makes the sensor geometry simple. The width and length of the ground plane are optimized for proper impedance matching. Test materials with same dimensions and varying dielectric constant and loss tangent are considered for characterization. The prepared samples are placed on the top of the sensor and thus the effective dielectric constant and loss tangent of the sensor changes and this changes the sensor parameters. The unknown test materials are characterized by analyzing the changes in the sensor parameters. The dielectric constant can be measured by examining the change in the resonant frequency of the reflection coefficient. The resonant frequency of the sensor decreases with the increase in dielectric constant. For measuring the loss tangent, the authors propose the novel idea of using the radiation efficiency of the sensor. As the loss tangent of the test material increases the radiation efficiency of the sensor is decreased. The proposed sensor is simulated and optimized using a CST microwave studio with test materials of varying dielectric constant and loss tangent. The optimized sensor is fabricated on an FR4 substrate with permittivity 4.4 and loss tangent 0.02 and the simulations are validated by measurements.**

***Keywords*—**dielectric constant, loss tangent, radiation efficiency, resonance frequency.

ISBN: 978-81-940627-0-7

Human Activity Recognition:An Overview

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***Abstract*—Human Activity Recognition methods is an important application in Ambience assisted living, Sports, health monitoring and Quarantine of epidemic patients. Various methods are developed from handicraft featured methods to deep learning. In this paper the various categorization of human activity recognition methods,the algorithms used in shallow architecture are explored. Along with the discussion of various deep algorithms, the shortcomings of conventional pattern recognition features are presented. Also the comparison between deep and shallow techniques are mentioned. The various deep learning algorithms and its categorization are presented with the aid of existing paper reviews. Again the recently arisen hybrid techniques are clearly indicated with the details of present works. Open research challenges are listed with the area of innovations yet to be dug out. In addition,the benchmark dataset and different types of datasets used for activity recognition is mentioned in the paper.**

ISBN: 978-81-940627-0-7

Effect of Annealing Temperature on Photodetectionof Copper Phthalocyaninebased Organic Field Effect Transistors

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***Abstract*—Organic field effect transistor (OFET) based photodetector with high sensitivity was fabricated using copper phthalocyanine (CuPc) as a photoactive channel for weak light detection and studied its electrical properties under different annealing temperatures. The device fabrication was conducted at room temperature using the thermal evaporation technique. All the transfer parameters of the devices appear to enhance under higher temperatures. The performance of the photodetector also depends on the annealing temperature. Hence the impact of annealing on the device performance on photodetection has been also investigated with constant gate voltage. So the impact of annealing temperature on responsivity, on/off ratio and detectivity was also studied for the proposed device. The responsibility and detectivity increase with increasing the temperature of the device. The maximum responsivity and detectivity obtained from these OFET based photodetectors were 3.15 ± 0.21 A/W and $3.23 \pm 0.20 \times 10^{11}$ Jones respectively at a power density of 1 mW/cm^2. The high responsivity, good stability, low noise and fast response towards weak light with different temperatures imply that OFET based photodetectors are particularly suitable for photodetection in the emerging technologies for future optoelectronic applications.**

***Keywords*—**Organic field effect transistor, Copper phthalocyanine, Photosensitivity, Responsivity, Detectivity.

ISBN: 978-81-940627-0-7

A Compact Asymmetric Coplanar Strip Fed Monopole Antenna for Multiband Applications

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***Abstract*—A compact asymmetric coplanar strip fed monopole antenna for multiband application is presented in this article. The antenna achieves multiband properties by making a folded stub on the top of the signal strip and shorting the ground plane through a meander line. The proposed antenna occupies an area of 0.101 λ_{01} × 0.173 λ_{01} × 0.009 λ_{01} mm^3 (16.7 mm × 28.5 mm × 1.6 mm) where λ_{01} is the free space wavelength of the first resonant frequency, and is printed on a substrate of relative permittivity 4.3. The proposed antenna shows a - 10 dB impedance bandwidth up to 75 MHz (1.775 GHz to 1.850 GHz) and 1.15 GHz (4.75 GHz to 5.9 GHz) for the first and second resonance bands respectively. The antenna radiation characteristics like reflection coefficient, 3D radiation pattern, gain and efficiency are simulated and satisfy the requirements for some channels of DCS-1800 and entire channels of ISM 5.2, ISM 5.8 and WLAN applications.**

ISBN: 978-81-940627-0-7

A Study on the Effect of Substrate on Microstrip Patch Antenna Performance

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***Abstract*—Antenna is designed to transmit or receive electromagnetic waves. Among different kinds of antenna, Microstrip patch antenna is most widely used because of its low profile, easy fabrication and inexpensive. The main advantage is that it can be designed for any shape. In this paper, a microstrip patch antenna is designed for five different substrates. The substrate materials are taken according to the dielectric constant values. And the antenna parameters such as gain, directivity, bandwidth and return loss are variable with different substrates. Then the antenna parameters are noted and compared using High Frequency Structure Simulator (HFSS) software.**

***Keywords*—**HFSS, Bandwidth, MSPA, Shape, Substrate Material**.**

ISBN: 978-81-940627-0-7

Studies on CO_2 Sequestration by Campus Trees

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Abstract*—Enhancing carbon sequestration in biomass is presently considered as one of the major strategies of reducing atmosphere CO_2 concentration. Present study focused on the identification of tree species in the college campus which would efficiently respond to global warming due to the enhanced CO_2 sequestration. The primary data were collected by non-destructive methods from a total of 253 individual trees. Tree height and girth at breast height were measured using a clinometer and measuring tape respectively. Wood density of different tree species were obtained by authentic database and parameters viz., AGB (Above Ground Biomass), BGB (Biomass Ground Biomass), total biomass, carbon store and average amount of carbon dioxide sequestered by each tree were calculated. Highest total biomass was recorded by Tamarindusindica followed by Caesalpiniapulcherrima and Anacardiumoccidentale. Highest biomass in Caesalpiniapulcherrima can be attributed to the increased wood density in the species. Tamarindusindica exhibited the highest CO_2 sequestration followed by Artocarpusheterophyllus, Caesalpiniapulcherrima, Anacardiumoccidentale, Delonixregia, Tectonagrandis and Syzygiumcumini. The amount of CO_2 sequestered by Tamarindusindica was 70372.73 Kg, followed by Artocarpusheterophyllus (25567.29 Kg). Of the 30 families present in the campus, CO_2 sequestration was highest in Fabaceae followed by Moraceae. The major share of CO_2 sequestration in the campus was provided by Fabaceae, Moraceae, Myrtaceae, Anacardiaceae. Present analysis revealed a perfect positive correlation between total plant biomass and CO_2 sequestered with a correlation coefficient of 0.9721.

ISBN: 978-81-940627-0-7

Soil Fungal Population in Jhum Land,Mokokchung District, Nagaland

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***Abstract*—Jhum cultivation is a dominant land use system in North East region of India. It is a valuable subsistence agriculture for the local farmers. Jhum land can be considered as a vulnerable natural source of soil fungi. Among the soil microbes, fungi are one of the most important functional groups due to their essential role in ecosystem functioning such as decomposition of complex macromolecules and their involvement in nutrient cycling. The present study is an attempt to isolate and identify culturable soil fungi from two jhum lands of Mokokchung District, Nagaland. A cultivated jhumland(CJL) which was recently slashed-and-burned and a 1-year-old fallow jhum land(FL) were selected. Soil samples were collected from a depth of 0-15 cm from both the jhum land. Geographical coordinates of CJL was N 26º20'54.4 and E 94º28'16.5 with an altitude of 1023m while FL was N 26º21'05.3 and E 94º28'16.5 with an altitude of 1044m. Serial dilution plate method was used for the isolation of soil fungi in Rose Bengal agar. For the identification of soil fungi, morphological and microscopic characteristics were studied following relevant literature. A total of sixteen fungal species under 11 genera were isolated from the selected jhum land. Overall, the most common isolated genera from both the study sites were Aspergillus.**

Keywords—soil, fungi, jhum, fallow**.**

ISBN: 978-81-940627-0-7

Sustainable Uses, Management and Diversity of Bamboo Resources in Mokokchung District, Nagaland

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***Abstract*—Bamboos are an important resource for the rural people in Mokokchung District , Nagaland. There are 94 species of bamboo in North-east India and it is the largest reservoir of bamboo resources in India. However, the current rate of discoveries suggests that many more species are still unknown. The fascinating facts about bamboo is that it helps reverse global warming and effectively clean up the environment. It is a sustainable and green material and has immense prospects in near future.**

There are 46 species of bamboo in Nagaland . In Nagaland, with increasing demand of timber and wood, bamboo serves an alternative to forest products. Bamboo also provides food and livelihood to the people. In order to portray the socioeconomic characteristics of bamboo in relation to diversity and species preferences, a survey was conducted in Mokokchung district, Nagaland. The study was mainly focused to determine the density frequency and relative importance value (RVI) of bamboo resources. This was done to contribute further understanding of the distribution pattern and importance of bamboo in rural villages. A total of 14 speciesbelonging to 6 genera were identified from Mokokchung district, Nagaland and all the species have been used traditionally in the livelihood of the tribal people. The most dominant species were Bambusatulda, Bambusajaintiana, Dendrocalamushamiltonii and Dendrocalamusasper which signifies that these species are preferably used by the villagers.

***Keywords*—**Bamboo, global warming, socioeconomic, livelihood**.**

ISBN: 978-81-940627-0-7

Evaluation of Heavy Metals using Pollution Indices and Transfer Factor on Coal Mining Affected Soil and Plants at Changki, Nagaland, India

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***Abstract*—Heavy metals are natural constituents of coal and their concentration varies depending on the parental materials and geochemical conditions of the area. Soil pollution by trace elements is a major concern due to its potential toxicity and lethality when present in higher amounts. The present study aims to detect the heavy metals such as Zn, Cd, Cu, Ni and Pb on the soil and plants from the forest affected by coal mining activities and provide a critical assessment on the selected elements for estimating the pollution level of soil and accumulating factor in plants using pollution indices and Transfer Factor (TF). The Single Pollution Index (PI) points out that Cd (5.83) was the main potential contributor to soil pollution. Pollution Load Index (PLI) (1.263) and Nemerow Integrated Pollution Index (NIPI) (2.926) revealed 'moderate soil pollution' status. The TF of Zn in Thysanolaenalatifolia (1.22), Chromolaenaodorata (1.06) and Pteridiumesculentum (1.02) were significantly high. Cd was recorded highest in Thysanolaenalatifolia (1.00) and lowest in Melastomamalabathricum (0.25). Maximum Cu TF value of 1.52 was detected in Melastomamalabathricum and Chromolaenaodorata while TF of Ni was relatively low and recorded lowest in Melastomamalabathricum (0.2). However, Pb was not detected in any of the plants and soil samples. The result suggests coal mining activities, tailing and dumping of mine waste in the forest have increased the degree of heavy metal contamination and its severity reciprocate pollution level. The condition of soil pollution status stipulates the necessity to adopt proper management policy and prompt conservation efforts along the coal mining affected forest of Changki.**

***Keywords*—**Changki · Coal mines · Pollution Indices · Transfer factor**.**

ISBN: 978-81-940627-0-7

Comparative Assessment of Tea, Camellia Sinensis (L.)O. Kuntze Leaves Phytoconstituents ofMokokchung District, Nagaland, India

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***Abstract*—Camellia sinensis (L.) O. Kuntze is a notable plant commonly referred to as tea. It has been consumed globally as a medicinal drink and the most popular non-alcoholic beverage next only to water for many centuries. The phytoconstituents and quality of teas differ with geographic locations, climatic conditions and cultivation conditions.The main objective of this study was to characterize tea leaves phytoconstituents collected from tea gardens representing two different tea growing areas under Mokokchung district in Nagaland, India. Tea leaves grown at two different altitudes were analyzed during the year 2016. Total polyphenol, total flavonoid, total catechin, theaflavin, theabrownin, and thearubigin contents were determined for each sample. Tea leaves at the Tuli garden showed the maximum values in total polyphenol, total flavonoid, theaflavin, theabrownin, and thearubigin contents while tea leaves at the Ungma garden showed the maximum value of total catechin content. The potential medicinal uses of teas from Mokokchung district of Nagaland is supported by the presence of various health beneficial compounds.**

Keywords—Altitudes, Mokokchung district, Phytoconstituents, Tea**.**

ISBN: 978-81-940627-0-7

Effect of Land use on Soil Health in Mokokchung District, Nagaland, India

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***Abstract*—The present study aims to report the status of two selected sites viz Natural forest (NF) and shifting cultivation (SC) with varying land use in Mokokchung District, Nagaland, India. Soil samples were collected seasonally from March 2019-February 2020. Soil parameters namely pH, moisture, Temperature, Soil organic carbon (SOC) and Available Nitrogen were recorded seasonally. Variations were reported throughout the sampling period. Highest pH observed was 6.8 (SC) while lowest pH was 5.6 (NF). Highest moisture was 51.68% (NF) while lowest moisture reported was 23.74 (SC). Temperature ranged from 31 ^{0}C (SC) to 13^{0}C (NF), SOC ranged from 3.23% (NF) to 1.85% (SC) and available nitrogen levels varied from 552.28 Kg/hac (NF) to a low of 307.70 Kg/hac(SC). Correlation was observed between Soil moisture and Organic Carbon at Site NF and correlation of Soil Moisture with Organic Carbon at Site SC respectively.**

***Keywords*—**Mokokchung, soil physico-chemical parameters,shifting cultivation,Jhum, Soil organic carbon**.**

ISBN: 978-81-940627-0-7

Synthetic Seed Production In Sweet Potato

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***Abstract*—Sweet potato (Ipomoea batatas (L.) Lam.) is a dicotyledonous plant belonging to the family Convolvulaceae. This crop is the seventh largest food crop, cultivated in warm temperate, subtropical and tropical and tropical regions of the world. The leaves and tubers are highly rich in vitamins and minerals like vitamin B complexes, vitamin C, vitamin E, vitamin K, Beta carotene, iron calcium, zinc and protein. Beta carotene and Anthocyanin rich BhuSona and Bhu Krishna were used during the study.**

One of the key constraints to sweet potato productivity is lack of sustainable seed systems including improved pest and disease management, seed quality and supply .To overcome such problems synthetic seed production was introduced. Synthetic seed production is an applied technology which allows rapid multiplication of elite plants. Synthetic seed refers to artificially encapsulated explants such as shoot tips, axillary buds, somatic embryos or other tissues that can be developed into a plant under in vivo or ex vitro conditions. In present study, BhuSona and Bhu Krishna synthetic seeds were produced by using nodal segment and supplementary MS medium with enriched resources for regeneration. Then in vitro sprouting potential of the synthetic seeds was also recorded after a week of incubation in a culture room. 90% in vitro sprouting /germination were observed during the study. These seeds were used for future crop yield improvement.

***Keywords*—**Sweet potato, synthetic seed, sprouting potential.

ISBN: 978-81-940627-0-7

Coronavirus: A New Threat to the World

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***Abstract*—Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. They come under the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales. The structure of this virus is unique, having crown-like spikes. Coronaviruses are enveloped viruses with a positive-sense single-stranded RNA genome of 26-32 kilobases and a nucleocapsid, their average diameter is 125 nm. The viral envelope consists of a lipid bilayer, in which the membrane (M), envelope (E) and spike (S) structural proteins are anchored. They possess club-shaped spikes on their surface which help them to enter into the host cells via receptor binding. These spikes are homotrimersof S protein, which have S1 and S2 subunit.S1 subunit form the head of the spike (has RBD) and S2 forms the stem of the spike(which anchors the spike in the viral envelope). The structure of the virus is maintained by E and M protein. The lipid bilayer envelope, membrane proteins, and nucleocapsid protect the virus when it is outside the host cell. Coronaviruses (CoVs) are a large group of viruses, infecting a wide range of mammals and birds. Some regularly cause mild respiratory illness in humans. Signs and symptoms of COVID 19 vary widely among individuals, it can either be specific symptoms or non-specific symptoms. Thereare several risk factors for severe disease. Different methods are used for diagnosing COVID 19 infection. Isolation and quarantine duration help to cease the spread of the disease.**

***Keywords*—**Coronavirus, Transmission, infectious period, respiratory tract, lipid bilayer, diagnosing, contact tracing.

ISBN: 978-81-940627-0-7

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ISBN: 978-81-940627-0-7