UNIVERSITY OF WAH

Pak-Turk ETSE 2022

5th Pak-Turk International Conference

on Emerging Technologies in the Field of Sciences and Engineering

1st and 2nd, December 2022

BOOK OF ABSTRACTS

The Pak-Turk Conference series is the technical event which focuses on the advances in new technologies in engineering sciences, computer sciences and natural sciences. The series of event was initiated in 2018 and since then these conferences have been successfully organized every year. The purpose of this conference is to provide a platform for researchers, academicians and practitioners to make them familiar with recent advancements in the various fields of engineering and sciences. The conference accepts wide range of abstracts/papers from Turkish and Pakistani participants to encourage young and experienced researches to present their work and also the possibility of initiating mutual collaboration with international repute researchers and industry personals.

ETSE, 2022

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BOOK OF ABSTRACTS

Editors:

Dr Syed Waqas Hassan

Ms Zeenat Haq

Published and Organized by University of Wah, Wah Cantt, Pakistan

CONFERENCE PROGRAM

Program Schedule Day 1

Inauguration Program Schedule (1st December, 2022) Auditorium UW		
09:00-09:05 AM	Opening and Recitation of a few verses from the Holy Quran	
09:06-09:10 AM	National Anthems of Pakistan and Türkiye	
09:11-09:20 AM	Welcome Speech	Prof. Dr. Jameel-Un Nabi, Vice Chancellor UW
09:21-09:35 AM	Address by the Chief Guest	Prof. Dr. Inayatullah Khan, Vice Chancellor UET Taxila
09:36-09:45 AM	Address by the Guest of Honour	Honourable Mr Mehmet Kiraz, Turkish Embassy
09:46-10:05 AM	Keynote Speech	Prof. Mahmut Böyükata, Kırıkkale University, Türkiye
10:05-10:25 AM	Keynote Speech	Prof. Dr Muhammad Shahab, Vice Chancellor SBBU
Group Photo and Tea Break 10:30-11:00 o'clock		
Technical Session 1 (Day 1)- Physical Sciences Venue: Auditorium UW		
Session Chair: Prof. Mahmut Böyükata Moderator: Dr Matti Ullah Shah		
Keynote Talks		
11:01-11:15 AM	Effect of Dead Layer Thicknesses of a HPGe Detector on Full Energy Peak Efficiency	Prof. Dr. Tuncay Bayram **(Keynote Speech)**
11:16-11:30 AM	Quality and energy optimization of AlSi10Mg parts manufactured by selective laser melting (SLM) technique	Dr. Arfan Majeed **(Keynote Speech)**
11:31-11:45 AM	Phase space generation of nuclei in high energy reactions	Prof. Dr. Nihal Buyukcizmeci, (ONLINE)
11:46-12:00 PM	A Self-Consistent Explanation of Allowed and First-Forbidden Beta Transitions within pn-QRPA Formalism	Prof. Dr. Serder ÜNLÜ (ONLINE)
12:01-12:15 PM	New era of Radiation: FLASH Radiotherapy	Prof. Dr. Ismail Sarpun (ONLINE)
12:16-12:30 PM	Preliminary results for the relationship between dmax and stopping power for incident electron beams	Prof. Dr. M. Çağatay Tufan (ONLINE)
12:31-12:45 PM	Q&A Session	
Lunch/Prayer Break 12:46-1.55 PM		

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Technical Session 2 (Day 1 Parallel)- Computer Science/ Mechanical Engineering **Venue: Seminar Hall-UW**		
Session Chair: Dr. Wazir Zada Khan **Moderator: Dr. Javeria Amin**		
11:01-11:15 AM	Artificial Intelligence and Human Factors towards Intelligent Transportation Systems	Prof. Zahid Halim **(Keynote Speech)**
11:16-11:30 AM	AI in agriculture for sustainable precision farming	Dr. Mudassar Raza **(Keynote Speech)**
11:31-11:45 AM	Gender Classification Using Novel Acoustics Deviated Local Ternary Patterns	Azmat Hayat
11:46-12:00 PM	Automatic filling of a product form in an E-commerce application from a video using machine learning	Muhammad Ibrahim
12:01-12:15 PM	Comparative Analysis of Software Development Process Models	Engr Inam Ullah Khan (ONLINE)
12:16-12:30 PM	From Grid Computing to Dew computing; opportunities and challenges.	Kainat Umar
12:31-12:45 PM	Design and Development of Solar Assisted hybrid bicycle	Mamoon Ahmad Khilji
12:46-01.00 PM	Design and Development of Speed Bumps System for Energy Scavenging	Engr. Zubair Butt
Lunch/Prayer Break 01:00-1.55 PM		

Technical Session 3 (Day 1 Parallel)- Statistics/ Data Science/ Civil Engineering **Venue: LR-04**		
Session Chair: Dr. Javid Shabbir **Moderator: Dr. Sidra Rana**		
11:01-11:15 AM	A Novel Estimator of Finite Population Variance	Dr. Shameem Alam
11:16-11:30 AM	A Data Mining Perspective on Polio Eradication in Pakistan	Mr. Muhammad Uzair Tariq
11:31-11:45 AM	Forecasting GDP and Exchange Rate Using Arima Models: Evidence from Pakistan	Mr. Abdul Rehman Malik
11:46-12:00 PM	Modelling of Socioeconomic and Cultural Discrepancies affecting Fertility Patterns in Pakistan: Evidence from 2017-2018 Pakistan Demographic and Health Survey	Dr. Maryam Siddiqa (ONLINE)
12:01-12:15 PM	Classification of Multivariate data using Regression Analysis and Artificial Neural Network	Ms. Zara Omar (ONLINE)
12:16-12:30 PM	Performance Analysis of Fiber Reinforced Concrete using different Fiber Proportions.	Shahrukh Abbas (ONLINE)

12:31-12:45 PM	MECHANICAL AND DURABILITY PROPERTIES OF 3D PRINTING CONCRETE A-REVIEW	Haseeb Murtaza (ONLINE)
Lunch/Prayer Break 12:46-1.55 PM		

Technical Session 4 (Day 1 Parallel)- Mechanical Engineering Venue: Auditorium UW		
Session Chair: Prof. Dr. Necla Cakmak Moderator: Dr Saleem Iqbal		
02:00-02:15 PM	Experimental Study of the Efficiency of a Tank Storage Gas Water Geyser by Applying Energy-efficient Techniques	Muhammad Kashif
02:16-02:30 PM	A Statistical Framework for Optimization of Cylindrical Grinding Parameters on AISI-D6 Steel	Iftikhar Ali Waleedy
02:31-02:45 PM	Numerical Analysis of wire rope using different Meshing Techniques	Haris Khan
02:46-03:00 PM	Analysis the Thermal Efficiency of the Pin Fin PCM Based Heat Sinks Utilizing Free and Forced Convection	Muhammad Umar Munir
03:01-03:15 PM	Design of a Low-Cost Prototype Underwater Vehicle	Ahsan Tanveer (ONLINE)
03:16-03:30 PM	Comparatively Study Between Monocrystalline and Polycrystalline Photovoltaic Panel Based on PCM	Bushra Nadeem (ONLINE)
03.31-03.45 PM	Engine fan speed control in a Short Take-off and Landing (STOL) Aircrafts	Kamran Ahmad Cheema (ONLINE)

Technical Session 5 (Day 1 Parallel)- Mechanical Engineering Venue: Seminar Hall-UW		
Session Chair: Prof. Dr. Tuncay Bayram Moderator: Prof. Dr. Waseem Shahzad		
02:00-02:15 PM	Tribological Analysis of Ionic Liquid as an Additive to the Bio Based Oils	Hira Nawaz
02:16-02:30 PM	Performance Analysis of Desalter and Vacuum Distillation Column in Oil Refinery	Muhammad Shahrukh Atta
02:31-02:45 PM	Energy, Exergy Analysis of PCM Based Solar Photovoltaic Panel.	Muhammad Tayyab Mohsin
02:46-03:00 PM	Implementation of Six Sigma Methodology for Design of Portable Water Filtration System	Ahmed Usman Yasir
03:01-03:15 PM	Assessing Pakistan Climate Mitigation to Support Nationally Determined Contributions Goals	Danish Hameed (ONLINE)
03:16-03:30 PM	Thermal Investigation of Rectangular Header Normal Channel Facile Heat Sink using Hybrid Nano Fluids	Amna Adil (ONLINE)

03.31-03.45 PM	Numerical Investigation of Dual Flow Integral Fin Mini channels using Nano Fluid	Taha Baig (ONLINE)
03:46-04:00 PM	The Influence of Fillers on Wear Behaviour of Epoxy Composite Coatings for Sliding Tribo-pair	M. Kamran Shaukat

Technical Session 6 (Day 1)- Chemistry & Chemical Engineering Venue: LR-04		
Session Chair: Dr. Khurram Shahzad Baig Moderator: Dr Shaukat Ali		
02:00-02:15 PM	Protonated Polyanilines as potential adsorbents for Removal of Dyes	Anila Tabasam
02:16-02:30 PM	Integration of Water Gas Shift (WGS) Reactions Using Membrane Reactors (MRs): A Review	Nidarish Gohar
02:31-02:45 PM	Adsorption Studies for The Removal of Arsenic from Contaminated Water	Engr. Aasia Farrukh
02:46-03:00 PM	Biosorption Studies of Arsenic (As) removal from Industrial Wastewater by using Fixed and Fluidized Bed	Ghulam Abbas
03:01-03:15 PM	Analysis of 1-Tetradecene Production from Thermal Cracking of Castor Oil & Ethylene Oligomerization by Modified Ziegler Process	Muhammad Bilal
03:16-03:30 PM	A Review on CO2 Capturing from Air through Reactive Absorption Technique	Hashir Farhan Arif
03.31-03.45 PM	Green synthesis of Propylene Glycol Via Hydrogenation of Biodiesel Production By-product Glycerol	Salman Khalid

Posters Session Day 1 (Parallel) E-Hall-UW		
01.00-3.00 PM	Poster Presentation	All Poster Presenters

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Program Schedule Day 2

Technical Session 7 (Day 2 Parallel)- Physical Sciences/ Material Science Venue: Auditorium UW		
Session Chair: Prof. Mahmut Böyükata Moderator: Dr Matti Ullah Shah		
09:00-09:15 AM	Impact of Modified Gravity on the Stability of the Einstein Universe	Prof. Dr. Muhammad Sharif **(Keynote Speech)**
09:16-09:30 AM	Beta decay chain between Lu-170 and Er-170 isotopes	Prof. Dr. Necla Cakmak **(Keynote Speech)**
09:31-09:45 AM	Asymmetric Piperidines from Substituted pyridine N-oxides	Prof. Munawar Hussain **(Keynote Speech)**
09:46-10:00 AM	Level Density and Talys	Prof. Dr. Ismail Sarpun (ONLINE)
10:01-10:15 AM	Primary Standardization by Counting Alpha-Particles at a Defined Solid Angle	Prof. Dr. Meryem Seferinoglu (ONLINE)
10:16-10.30 AM	Structural and Electrical Characterization of Pr0.5Ca0.5MnO3	Kamran Shahzad
10.31-10.45 AM	Dielectric relaxaction and hopping mechanisms of charge transport in $La_{0.3}Ca_{0.7}MnO_3$	Muhammad Shahzad Rauf (ONLINE)

Technical Session 8 (Day 2)- Biotechnology/ Microbiology/ Environmental Sciences & Engineering Venue: Seminar Hall-UW		
Session Chair: Prof Mushtaq Ahmad Moderator: Dr Shumaila Naz		
09:00-09:15 AM	Communication between Plant and Phytomicrobiome under salinity stress and the role of Bioactive metabolites.	Prof. Asghari Bano **(Keynote Speech) (ONLINE)**
09:16-09:30 AM	Utilization of targeted next-generation sequencing for quick identification of causative mutations to resolve dystrophic epidermolysis bullosa phenotypes	Dr. Pakeeza A. Shaiq
09:31-09:45 AM	Biocontrol rhizobacteria enhances growth and yield of wheat (*Triticum aestivum*) under field conditions against *Fusarium oxysporum*	Syed Inayatullah Agha
09:46-10:00 AM	Genome-wide identification and evolutionary analysis of CNGC gene families in sixteen Brassicaceae plant genomes	Akram Ali
10:01-10:15 AM	The challenges and prospects of EVs in Pakistan: An overview considering the environmental concerns	Zainab Rehman (ONLINE)
10:16-10.30 AM	Production, characterization and emission monitoring of biodiesel produced from fish waste	Javairia Ansar (ONLINE)

10.31-10.45 AM	Biogas Production from Fallen Leaves Using Physical and Chemical Pre-treatment	Iftikhar Ul Hassan (ONLINE)

Technical Session 9 (Day 2)- Chemistry & Chemical Engineering **Venue: LR-04**		
Session Chair: Dr. Khurram Shahzad Baig **Moderator: Dr Kashif Iqbal**		
09:00-09:15 AM	COD and BOD removal of textile waste water using rice husk activated carbon (RHAC)	Muhammad Sulaiman (ONLINE)
09:16-09:30 AM	Magnetite-Siltstone-Biochar composite for heavy metal adsorption from aqueous solution	Dr. Salah ud din (ONLINE)
09:31-09:45 AM	Highly Flexible Amino Functionalized Metal Organic Framework/rGO Composite Film for Advanced Anodes for Li-ion Batteries	Dr. Adnan (ONLINE)
09:46-10:00 AM	A Short Review on Latest Technologies for the Pre-treatment of Lignocellulosic Biomass	Engr. Aasia Farrukh
10:01-10:15 AM	Graphene Oxide based BaTiO3 Nanocomposite Films, Durable and Efficient Energy Harvesting Materials	Dr. Muhammad Sohail
10:16-10.30 AM	Process Design for Production of Synthetic Natural Gas from Gasification of Solid Waste -A Case Study of Lahore City	Muhammad Usama Saeed
10:31-10.45 AM	Production of Biodiesel from Algae to Overcome Energy Crises	Laiba Ashraf

Closing Program Schedule **Venue: Auditorium UW**		
11.00-11.05 AM	Recitation of a few verses from the Holy Quran	
11.06-11:20 AM	Guest of Honor and Keynote Speech	Prof. Dr Mushtaq Ahmad
11:21-11.35 AM	Chief Guest and Keynote Speech	Prof. Dr Mansoor Hameed Inayat
11.36-11.45 AM	Recap and Conference Statistics	Dr Syed Waqas Hassan (Conference Secretary)
11.46-11.55 AM	Thought sharing by Pakistani Speakers	Pakistani Speakers
11:56-12.05 PM	Thought sharing by Turkish Speakers	Turkish Speakers
12.06-12.15 PM	Vote of Thanks	Vice Chancellor UW (Patron in-Chief)

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KEYNOTE ADDRESSES & TECHNICAL TALKS

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Investigation of even-even Ti isotopes within the interacting boson model-1

Mahmut Böyükata[1], Yeşim Şahin[2]
[1]*University of Kırıkkale, Faculty of Science and Arts, Physics Department, Kırıkkale, Türkiye*
[2]*University of Kırıkkale, Institute of Science, Physics Department, Kırıkkale, Türkiye*

Abstract—This work includes the recent results for the nuclear collective properties of even-even Ti isotopes in the A~60 mass region. The interacting boson model-1 (IBM-1) was used for the investigation of given nuclei. This model is applicable to even-even isotopes and quite successful tool to describe the nuclear structure properties of given nuclei, especially in the mid and heavy mass region. This investigation includes the ibm-1 calculations on the energy levels and E2 transition probabilities. First, the energy ratio $R_{4/2}$= E (4^+)/ E (2^+) in the ground state band of all even-even Ti isotopes were analyzed to see their behavior along to isotopic chain. Then the model Hamiltonian were constructed and its parameters were fitted to calculate the energy levels of Ti isotopes and their B(E2) values were calculated by fitting the boson effective charge using as a free parameter in the quadrupole transition operator. The geometric shapes of given Ti isotopes were also predicted by plotting the potential energy surface in terms of the deformation parameters (β, γ). In this talk, the recent results will be presented for even-even Cr and Fe nuclei located in the same region.

Keywords— interacting boson model-1 (ibm-1), even-even Ti isotopes, energy levels, B(E2) values, deformation.

Beta decay chain between Lu-170 and Er-170 isotopes

Necla Çakmak[1]
[1]*Karabük University, Physics Department, 78050 Karabük, Türkiye*

***Abstract*—**Weak decays in heavy nuclei with proton numbers Z = 71 – 68 and neutron numbers N = 99 – 102 are studied by using both the Schematic Model (SM) and Pyatov Method (PM) in the proton-neutron Quasi Random Phase Approximation (pn-QRPA) framework with pairing correlations. In this study, the beta-decay chain started from the Lu-170 isotope and ends with the Er-170 isotope. A spherical shape is assigned for each nucleus throughout all simulations. The obtained log(ft) values in the Woods-Saxon potential basis for selected heavy nuclei are compared with the experimental data and the other theoretical results.

Keywords*—Beta processes, Pyatov Method, pn-QRPA, Woods-Saxon potential*

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Effect of Dead Layer Thicknesses of a HPGe Detector on Full Energy Peak Efficiency

Selim Kaya[1], Necati Çelik[1], Tuncay Bayram[2]
[1]*Gümüşhane University, Faculty of Engineering and Natural Sciences, Department of Physics Engineering, Gümüşhane, Turkiye*
[2]*Karadeniz Technical University, Faculty of Science, Department of Physics, 61080 Trabzon/Turkiye*

Abstract—High Purity Germanium (HPGe) detectors are widely used in most of the research area including nuclear physics, health physics, environmental sciences, life sciences etc. because HPGe detectors are important tools for radiation detection and radiation measurements. One of the important parameters for HPGe detectors is the determination of the full energy peak (FEP) efficiency. One of the important parameters affecting the FEP efficiency is the thickness of dead layers of the crystal itself. In our recent study, the effects of the thickness of front, lateral and back dead layer thicknesses of the detector crystal on the FEP efficiencies for the energy range 30 keV–5 MeV have been investigated in detail by using EGS4 Monte Carlo and GEANT4 simulation packages[1]. Significant effects of the thickness for the front, lateral and back dead layer have been carried out. In this talk, giving a detailed discussion on FEP efficiency of HPGe detectors by means of dead layers of the detector crystal is planned.

Phase space generation of nuclei in high energy reactions

N. Buyukcizmeci[1,2], A.S. Botvina[2], M. Bleicher[2]
[1]*Department of Physics, Selcuk University., 42079 Konya, Türkiye*
[2]*Institute of Theoretical Physics, W.G. Frankfurt University, Frankfurt, Germany*

Abstract—I will talk about phase space generation of nuclei in high energy reactions for central collisions. We have generated initial nucleon distribution(s), constructed clusters and applied statistical decay of excited nuclei. We take into account conservation of total energy and momentum and produce nucleon momenta strongly correlated with nucleon coordinates. Au+Au collisions at different energies are compared with existing experimental data including distributions of kinetic energy per nucleon. Our further step will be including hypernuclei formation in our model to propose future experiments at FAIR facilities.

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Artificial Intelligence and Human Factors towards Intelligent Transportation Systems

Zahid Halim[1]
[1]*Faculty of Computer Science and Engineering, GIK Institute*

***Abstract*—**This work addresses the problem of profiling drivers based on their driving features. A purpose-built hardware integrated with a software tool is used to record data from multiple drivers. The recorded data is then profiled using clustering techniques. k-means has been used for clustering and the results are counterchecked with Fuzzy c-means (FCM) and Model Based Clustering (MBC). Based on the results of clustering, a classifier, i.e., an Artificial Neural Network (ANN) is trained to classify a driver during driving in one of the four discovered clusters (profiles). The performance of ANN is compared with that of a Support Vector Machine (SVM). Comparison of the clustering techniques shows that different subsets of the recorded dataset with a diverse combination of attributes provide approximately the same number of profiles, i.e., four. Analysis of features shows that average speed, maximum speed, number of times brakes were applied, and number of times horn was used provide the information regarding drivers' driving behavior, which is useful for clustering. Both one versus one (SVM) and one versus rest (SVM) method for classification have been applied. Average accuracy and average mean square error achieved in the case of ANN was 84.2% and 0.05 respectively. Whereas the average performance for SVM was 47%, the maximum performance was 86% using RBF kernel. The proposed system can be used in modern vehicles for early warning system, based on drivers' driving features, to avoid accidents.

Impact of Modified Gravity on the Stability of the Einstein Universe

Muhammad Sharif[1]
[1]*Department of Mathematics, University of Punjab, Lahore, Pakistan*

***Abstract*—**This talk analyzes the stability of the closed Einstein static universe by using linear homogeneous perturbations in the framework of energy-momentum squared gravity. This newly developed proposal resolves the primordial singularity and yields feasible cosmological results in the early times. For this purpose, we consider the closed Friedmann-Robertson-Walker universe with isotropic matter configuration and adopt small perturbations on the matter parameters and scale factor. Further, we establish equations of motion for static as well as perturbed systems and analyze the stable regions for particular f (R, T^2) models corresponding to both conserved and non-conserved energy-momentum tensor. The graphical interpretation demonstrates that stable regions of the Einstein cosmos exist for all values of the model parameters and equation of state variable. We conclude that stable regions in this modified theory are large as compared to other modified theories of gravity.

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Preliminary results for the relationship between d_{max} and stopping power for incident electron beams

Mustafa Çağatay TUFAN[1] and Zeynep YÜKSEL[2]
[1] Ondokuz Mayis University, Institute of Graduate Studies, Department of Radiological Sciences, 55139 Samsun, *Türkiye*
[2]Ondokuz Mayıs University, Vocational School of Health Services, Medical Services and Techniques Department, 55139 Samsun *Türkiye*

***Abstract*—**To determine the radiation effects, especially in radiotherapy, absorbed dose and stopping power values of target material are the main parameters. These two parameters are strongly related each other. In our previous work (Yüksel and Tufan, 2021), we investigated this relation for electron beams incident on different biological targets and found linear relation between these two parameters as expected. By applying the curve fitting procedure, simple first order function between d_{max} and stopping power values was obtained. In this work, dose and stopping power values have been calculated for elemental targets from Z = 1 to 54. This early presentation involves the preliminary results for the relationship between dose and stopping power values for electrons incident on the elemental targets. In our works, stopping power values were obtained by using Roothaan-Hartree-Fock electronic charge densities as in our previous work, while d_{max} values obtained with Monte Carlo based software EGSnrc.

A Self-Consistent Explanation of Allowed and First-Forbidden Beta Transitions within pn-QRPA Formalism

Serdar Ünlü[1], Necla Çakmak[2], Hasan Bircan[3], Cevad Selam[4]
[1]*Burdur Mehmet Akif Ersoy University, Department of Physics, Burdur- Türkiye*
[2]*Karabuk University, Department of Physics, Karabuk- Türkiye*
[3]*Kütahya Dumlupınar University, Department of Physics, Kütahya- Türkiye*
[4]*Muş Alparslan University, Department of Physics, Muş- Türkiye*

***Abstract*—**We try to give a self-consistent explanation of the allowed and first-forbidden beta transitions within pn-QRPA formalism. The self-consistency of present approximation is based on Pyatov's restoration method which was originally introduced to restore the broken Galilean invariance of pairing interaction. According to the method, the broken commutation relations between nucleus Hamiltonian and the corresponding transition operators are restored by adding a suitable effective Hamiltonian. After the consideration of this effective perturbation, the total Hamiltonian can be solved within the framework of pn-QRPA method and thus, the energies and wave functions of the collective excitations in neighbor nuclei can be obtained without using any adjustable parameter.

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New era of Radiation: FLASH Radiotherapy

Timur KOCA[1], Ece ATAK[1], Yasemin ŞENGÜN[1], Atıl AKSOY[1], İsmail Hakkı SARPÜN[1,2,3], Aylin Fidan KORCUM[1]

[1]Akdeniz University, Faculty of Medicine, Radiation Oncology, Antalya Türkiye
[2]Akdeniz University, Physics Department, Antalya Türkiye
[3]Akdeniz University, Nuclear Research and Application Centre, Antalya Türkiye

***Abstract*—**Purpose: Radiotherapy (RT) is a widely used treatment modality in cancer patients. One of every two oncology patients receive radiotherapy during their treatment. Therefore, while improving the precision and conformity of irradiation, protecting healthy tissues, and delivering high doses to the tumor has been the main topics for years. The forthcoming technology of FLASH-RT is shown to achieve all three simultaneously. Ultra-high doses of radiation (>40Gy/s) provide a FLASH effect and spare healthy tissues better than conventional radiotherapy. FLASH-RT can be delivered by using electrons, X-Rays (photons), and protons, however, most of the studies in the literature have been conducted with electrons so far. Since its protective effect on lung fibrosis was first shown in 2014 in a preclinical trial, many other studies also demonstrated reduced normal tissue toxicity with FLASH-RT. The first patient with T-cell cutaneous lymphoma has been treated with FLASH-RT recently and results are very promising. Conclusion: Still, there are many aspects that need to be enlightened and long-term results need to be obtained, yet FLASH-RT is the upcoming most valuable technique and future of radiotherapy. Here in this study, we will summarize the history of FLASH-RT, the possible mechanism underlying the FLASH effect, and give a review of the literature.

Keywords*—*FLASH-RT; Radiotherapy; Ultra-high dose-rate irradiation

Level Density and Talys

İsmail Hakkı SARPÜN [1,2,3], Ali Onur KAYA[4]

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[3]Akdeniz University, Nuclear Research and Application Centre, Antalya Türkiye
[4]Akdeniz University, Vocational School of Health Services, Dept.of Radiotherapy, Antalya Türkiye

***Abstract*—**Talys nuclear-reaction code is a Fortran based nuclear code used to simulate nuclear reactions for heavier than lithium target nucleus using n, p, d, t, ^{3}He, α particles and γ ray could use as projectile in the energy region of 1keV-1GeV. Many nuclear models can be tested in this code as theory allows. Level density is defined as the number of levels per unit energy in the nuclei. In this study, information about nuclear level densities and its application via Talys nuclear reaction code are given.

Keywords*—*TALYS and Level Density

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Primary Standardization by Counting Alpha-Particles at a Defined Solid Angle

Meryem SEFERİNOĞLU[1]
[1]*Sinop University, Faculty of Engineering and Architecture, Department of Nuclear Engineering, Sinop- Türkiye*

***Abstract*—**The energy demand of Turkey has led policymakers to get a decision on nuclear power to supply energy to the industry. The decision has triggered the necessity to monitor the environment in terms of radiological protection. Moreover, Turkey is located on a region of great tectonic complexity. The continuation of tectonic activities has resulted in the formation of numerous cold and hot water springs. Thus, strict radiological controls are required regularly. An evaluation of any release of radionuclides into the environment through various pathways is vital to ensure the low levels of health risks. The accurate and precise measurement of the activity concentration of radioisotopes at ppm (parts per million) levels in the environment is of great interest for routinely monitoring. The number of radioactivity measurement laboratories is due to increase every. These create a strong demand for accurate, traceable, and certificated activity standards. The metrology laboratories spent a great effort to develop primary standardization techniques. Primary standardization of radioactivity related with the direct measurement of nuclear transition per unit time. Their results are independent of the various nuclear decay data and associated uncertainties. Their calibration based on basic physical principles, not other radioactivity measurements. The standardization by counting alpha-particle at a defined solid angle is one of the most accurate primary standardization methods for alpha emitting radionuclides. The method has a wide application on various standardization studies, also in the studies of half-live determination for long-lived radionuclides.

AI in agriculture for sustainable precision farming

Mudassar Raza[1]
[1]*Department of Computer Science, COMSATS University Islamabad, Wah Campus, Quaid Avenue, Wah Cantt, Pakistan*

***Abstract*—**Farming is a vital role-player industry that needs to grow for human survival. The human count in the world is expanding day by day and is now reached 8 billion. Farmers ought to find a strategy to boost crop output since they are facing massive pressure to satisfy the rising food demands. Traditional farming techniques are now becoming outdated to meet global food needs. The modern era requires precision farming for acquiring quality crops with the aim to utilize limited and optimized technology resources. Artificial intelligence (AI) can completely change farmers' work because it can manageably do activities that are typically time-consuming or complicated. In this talk, we will discuss the different scenarios/examples where AI can benefit precision farming. Apart, the problems faced by the farmers by adopting AI-based technologies will also be discussed. Furthermore, AI is the forthcoming phase in the evolution from standard to innovative farming. The possibilities of AI support for other modern technologies in precision farming will also be discussed

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Quality and energy optimization of AlSi10Mg parts manufactured by selective laser melting (SLM) technique

Arfan Majeed[1]
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***Abstract*—**As one of the core technologies, additive manufacturing (AM) has been evolving speedily and has revealed the great potential for energy-saving and cleaner environmental production. AM is broadly used to fabricate complex and lightweight structures for the aerospace, automobile and other industrial sectors. Among the AM techniques, selective laser melting (SLM) is one important technology which is a hot research spot from both academic and industrial area. During the SLM processes, a large amount of data is created, which has great potential to make decisions about quality management and energy control. However, three issues need to be deeply explored in the existing research. Firstly, significant progress has been made in the fabrication of qualified products from different AM processes, but limited work available on SLM built thin-walled parts of Al alloys. Secondly, energy consumption is mainly measured for the polymeric materials, and very limited work is done on the metallic parts or metal-based AM systems specifically for the SLM process. Thirdly, big data analytics (BDA) is mainly implemented on the upper-level management system of manufacturing enterprises, but its implementation on the AM processes is limited. In this research work, a novel big data-driven framework for quality and energy control is developed, and its effectiveness is explored through a practical application to the AM process of AlSi10Mg parts.

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Interdisciplinary Emerging technologies for Green energy, food and health security

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***Abstract*—**Until now, plants are still highly esteemed all over the world as a rich source of food, medicine, and greener energy sources for the treatment and prevention of various diseases via natural products extracted from botanicals. A country like Pakistan is endowed with an enormous wealth of plant diversity from Mother Nature. Over the past few decades, researchers have focused on green energy, nutraceutical, and natural drug discovery from botanical sources. Green chemistry, as a work philosophy, has contributed to the design and application of safer and green processes and products. This study provides an overview for the green chemistry and green engineering principles that could be instrumental in sustainable biofuel process development. In the current scenario of energy security, the pursuit of alternative energy sources is very important to utilize the non-edible plant resource via phytochemical screening leads to herbal drug development. Biodiesel as an alternative source provides a potential solution to present-day problems like fuel crises and environmental pollution. The main focus of our project is on the biosynthesis of natural products from botanicals using advanced analytical (TLC, HPLC, GC-MS, FT-IR, NMR, EDX, SEM) and biological techniques to isolate some novel bioactive phytochemical entities for further pharmacological studies. This investigation further will be useful for the large-scale production of nutraceutical and natural products as sustainable and viable sources of health care to locals in order to reduce dependency on highly expensive conventional synthetic drugs. Currently, academia, society, industry, and government are concerned about the application of green chemistry principles. There is a joint effort to pursuit sustainability. The worldwide concern for the sustainable future along with the advancement in the green products with biotechnological routes has enhanced the utilization of natural products obtained from botanicals in the industrial domains.

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FULL LENGTH PAPER ABSTRACT/ EXTENDED ABSTRACT

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Numerical Analysis of wire rope using different Meshing Techniques

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***Abstract*—**there are a lot of engineering structures in which wire rope is used such as cable cars, bridges, elevators etc. sometimes its disaster could be catastrophic. Apart from physical testing, approximates are performed on wire rope sample model using finite element method (FEM) and this method is compatible with the experimental method. While estimating the results as well as to attain accurate results using FEM method, the main complication is too much high computational cost. Researcher has either to compromise on cost or results. The methodology in this research is sub divided into two methods and both approaches has a similar purpose of computational cost reduction. First method is called sub-modelling and is used to optimize mesh over selected region and second method is use of beam element instead of 3D Solid element which is much more cost efficient than 3D Solid element. Hybrid model used for the application of beam element by keeping outer wires as a wire model while core wire as a solid extrusion model. The work is based on to achieve the results for 80 KN loading. Some of model details are, it is a single layer wire rope consisting of 6 strands and a core wire with pitch length of 230 mm and a lay angle of 12.453º. The defined material possesses modulus of elasticity value of 202×103 MPa and a poison ratio of 0.28. The results obtained after using sub-modelling were not in acceptable rang with an error of 35% from the main model values. Therefore, second technique was applied and valuable results were achieved by using one of Beam Element i.e. is B32 with an error of 0-1% when compared with solid element and 15% when compared with analytical results.

Keywords*—Finite Element Method, Computational Cost, Sub-Modelling, Beam Element, 3D Solid Element, Hybrid Model*

From Grid Computing to Dew computing; opportunities and challenges.

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***Abstract*—** In the last few years, grid computing, cloud computing, fog computing, edge computing and the most resent dew computing have gained a lot of attention in both industry and academia. The researcher cannot take a concrete picture of these paradigm easily. First, we address all these computing paradigms. We define and discuss the important characteristic of all of these computing paradigms. Than draw some important characteristic and parameter tables for these computing paradigms. And also show high level architecture of computing paradigm in the form of figure.

Keywords*—grid, cloud, fog, edge, dew computing, IoT.*

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Mechanical and durability properties of 3D printing concrete A-Review

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***Abstract*—**Due to control of digitization, mechanization, and a high degree of intelligence 3D-printing concrete has influenced extra and further recognition for bold construction. This article initiates fundamental basics, linked operations of 3D-printing concrete, and analysis its evolution through the subsequent four departments: the printing criterion, preparation technology, material properties, and assessment principles of 3D-printing concrete automation. Afterwards, actual awkwardness, evolution supervision, and crucial mechanization of 3D-printing concrete are defined. Lastly, we review the onward evolution anticipation of 3D-printed concrete via the appearance of printing mediums, hardware cooperation and software printing technology, etc.

Keywords*—Durability properties, mechanical properties; material properties: 3D-printing; concrete.*

Finite Element Modeling of Residual stress and Distortion in Dissimilar TIG welded joints of Aluminum 2024 and Stainless Steel 304

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***Abstract*—** In automobiles, hybrid structures of aluminum and stainless steel have the potential to reduce fuel consumption and air pollution. Stainless steel and aluminum have different thermal conductance and expansion, resulting in uneven distortion and residual stress. These residual stresses and distortions adversely affect the weld joint service life. This study aims to predict residual stresses and distortions in aluminum 2024 and stainless steel 304 joints. Finite element modeling of tungsten inert gas welding has been carried out using the ABAQUS software through the Distributed Flux (DFLUX) user subroutine. Effects of welding speed and welding current on distortions and residual stresses are investigated. The results revealed that an increase in welding current resulted in high stresses and distortions, while an increase in welding speed caused low residual stress and distortion. The minimum values of tensile residual stresses found are 175 MPa and 127 MPa for the aluminum and stainless-steel sides respectively.

***Keywords*—** *Thermal conductance, Expansion, Tungsten inert gas welding, Finite element modeling, Distributed flux*

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Investigation of Exergetic losses, Calculation of Exergy efficiency and Improvements in overall efficiency of Ceramic Industry: A Rotary Kiln of Cement Plant in Pakistan.

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***Abstract*—**Energy as well as exergy analysis both are the practical thermodynamics methods to measure the potentiality of waste-to energy technologies specially in cement plants. In a ceramic based factory like cement industry, about 26 % of the total heat provided is being losted through the kiln including shells, preheater cyclones, cooler, tertiary air duct and precalciner either in the form of radiation or convection losses. This article detail analysis the exergy losses (energy) in the ceramic sub sector like kiln operation plant available in Pakistan. The studied and evaluated exergy losses in the ceramic could easily reduce exergy losses with good kiln operations. To produce 2600 tons /day, the exergy losses from the kiln, precalciner preheater, tertiary air duct, cooler and kiln hood through radiation and convection are 36.13, 14.90 and 13.98 kcal /kg of clinker produced respectively. Furthermore, this paper also depicts the losses from kiln shell across the length of kiln and each cyclone including smoke chamber in detail and different trends are presented to see them clearly. Total exergy loss of the process is about 65.05 kcal /kg of clinker. Losses can be avoided by technological improvements, appropriate policies and appropriate steps for the stable kiln operation.

Keywords*—Exergy analysis; Ceramic industry; Efficiency improvements measures; Rotary kiln; Irreversibility in process; Clinker production*

Integration of Water Gas Shift (WGS) Reactions Using Membrane Reactors (MRs): A Review

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***Abstract*—**Membrane reactors are the catalytic reactors that contains cylinder of some porous material, the tube inside the shell of a shell & tube heat exchanger. This inner perforated cylinder is actually the membrane that impart the membrane reactor (MR) its name. The selectivity of membrane is being controlled through its pore diameter, that could be of the order of Angstroms, for micro-porous layers, or of the order of microns for macro-porous layers. The purpose of the integration of membranes in the catalytic reactors is (being an intensification strategy) to combine separation and reaction steps in one single unit to boost the conversion. In order to force the equilibrium to shift to the right (in forward direction), membrane allow one of the products to move through the

membrane so that more amount of product can be formed (higher conversion). Effective carbon neutral energy carriers give an important solution for the environmental protection and sustained industrialization. Hydrogen being a zero-emission energy carrier presents more than twice energy per unit mass as compared to the other fuels. The membrane reactors can transform gray hydrogen to blue by doing selective separation of hydrogen and capturing of CO2 from the reaction mixture. Furthermore, it improves the reactant conversion during reversible reactions like methanol, steam reforming of methane, water gas shift reaction etc. and increased hydrogen yield with high purity even at higher temperatures which are the resulted because of selective hydrogen separation from the membrane reactor during the reaction. Present review has discussed the applicability of membrane reactor technology to water gas-shift reaction and effects of the different membrane types, and effect of operating conditions on performance of membrane reactors. Effects of membrane technology on the conversion, yield of desired products, and efficiency of the overall process are also studied.

Keywords**—***Water Gas Shift, Membrane Reactor (MR), Conventional Reactor (CR), Conversion, Yield, Thermodynamic Equilibrium, Thermodynamic Restrictions*

Design and Development of Speed Bumps System for Energy Scavenging

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Abstract—Due to daily rise in inhabitants and lack of resources, many countries facing energy calamities problems. In order to cope with this, it is necessary to use other sources of producing electricity. The automobile industry is growing massively and manufactured a vast number of automobiles every year. In this paper, the energy scavenging from the motion of vehicles was considered. For this, Eco-Friendly Energy Generation (EFEG) bumps system was developed. Energy is produced when a vehicle passes onto the bumps via mechanical and electrical assembly. Many researchers have used crankshaft and roller mechanisms for power generation, but we have used the rack and pinion mechanism because of its good strength and efficiency. When a vehicle moves on a bump it presses rack and pinion, which transmits linear motion into rotational motion to the gear system. The gears are used to increase the rotations. The permanent magnet direct current (PMDC) motor scavenges the power, which is then stored in a battery. The generated power is to be used by traffic signals and lighting up the roads via streetlights. Two analog sensors i.e., voltage and current sensor are connected with the PMDC motor for data acquisition purposes. Both the sensors are interfaced with a microcontroller (ESP 32) and the results are examined on a serial monitor. The experiments were performed to check the voltage and current values gained by the bump in a sing push. By using a digital millimeter (DMM), the voltage and current values of 29 volts and 0.7 amperes were recorded. Also, current and voltage sensors were used as data loggers to check the exact amount of current and voltages via ESP 32 and Arduino. It was found that the speed bump generates 15 Watts of power on the application of 140 Kg only. Moreover, the voltage and current values were measured from the sensor as 18 volt and 0.6 ampere. A capacitor was also charged from 0 volts to 10 volts by pushes of a bump. The calculated power of 15.4 Watts is

obtained by using equations whereas actual power is measured in real-time with a speed bump. If we choose the vehicle with a heavy load, the output power was also increases. This mechanism of generating electricity is valuable because there are no harmful effects on the environment, and are also economical.

Keywords—*Energy Generation, Speed Bumps, Rack and Pinion mechanism, Eco-friendly System, Clean Energy Production*

A Data Mining Perspective on Polio Eradication in Pakistan

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Abstract—The eradication of polio in Pakistan has proved to be the toughest nut to crack for Global Polio Eradication Initiative (GPEI) and the Government of Pakistan. As rest of the world has been declared polio free by the WHO, Pakistan and Afghanistan are miserably losing their battle against polio. The eradication of polio in Pakistan is affected by many factors such as low literacy rates, poverty, rurality, vaccine refusal, counter insurgencies, poor management of immunization activities, misconceptions, poor health infrastructure and security issues. This work presents the data mining perspective on polio eradication in Pakistan. The aim of this study is to find the relationship between the number of polio cases with literacy, poverty, rurality, vaccine refusal and the number of children vaccinated using Data Visualization and Correlation Analysis and to find the high risk and high priority areas, age and gender groups for targeted vaccination using Naïve Bayes Classification and Density Based Clustering. 89% of the total number of cases occurred in the areas with literacy rates less than 50%. 75% of all the infected districts have literacy rates less than 40%. 82.8% of the cases occurred in the areas with poverty percentages more than 40%. 81.25% of the total infected districts have poverty percentages greater than 40%. 28.46% of the cases occurred only in Khyber Agency and North Waziristan, having poverty percentages 82.8% and 96.9% and rurality percentages 90.12% and 99.2% respectively. 93.13% of the total number of cases occurred in the districts having rurality percentage greater than 50% and 82.34% of the cases occurred in the districts with rurality percentage greater than 60%. 96.875% of all the infected districts have rurality percentage more than 50%. Khyber Agency has reported the greatest number of polio cases i.e., 15.34% with a future likelihood of 13.22%. North Waziristan has reported the second the greatest number of polio cases i.e., 13.12% with a future likelihood of 10.19%. Khyber Agency, North Waziristan, Peshawar, Killa Abdullah, Lakki Marwat, Karachi, Bannu, South Waziristan, Quetta and Tank have been identified as the polio hotspots with 65.7% of the polio cases. 65.19% of the polio cases are reported from KP and FATA alone.

Keywords— *GPEI; polio; vaccination; Data Visualization and Data Mining; Naïve Bayes Classification; Density Based Clustering.*

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Classification of Multivariate data using Regression Analysis and Artificial Neural Network

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Abstract— In statistic, multivariate tools are limited in providing predictions and classification of the variables. Many conventional techniques are commonly used for classify the variables, like most utilized technique is Regression analysis. Now a days new techniques for classification are in trends like Artificial neural network. This paper studied classification of multivariate data using multilayer perceptron method for multivariate data. The data used for this purpose has body measurements of students of University of Karachi, Pakistan. This data consisted of 675 students (309 boys and 366 girls). Regression analysis are used to identify the most impact having factor. The neural network is modelled with 7 input variables, 1 layers of hidden neurons, and 1 output layer. Levenberg–Marquardt algorithm is employed as the feed forward propagation training rule for the classification of variables having higher impact on height. The performance of both models is evaluated through the MSE and R^2. Overall, the neural network model has achieved a good prediction accuracy with limitations. The results show that the ANN is faster and accurate than the regression analysis.

Keywords: *Regression analysis, Artificial neural network, height, armspan, efficient*

Implementation of Six Sigma Methodology for Design of Portable Water Filtration System

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Abstract— Water Contamination is a major pr*oblem nowadays. The contamination of water is caused by discharging harmful pollutants into the water. These harmful contaminants cause different diseases. The significance of portable water filtration has grown in recent years. The quality of water is affected majorly by residual waste, bacteria, and so on. Based upon these issues in this study we use the six-sigma methodology for the design of a portable filtration system. This methodology is based on five steps. In the first step, we define the problem. In the next step, we rank the priorities based on the weightage average. The Quality Function Development (QFD) matrix is used to measure the user's needs. Based upon the user's information decision matrix tool is being used in Analyze stage. After this concept is generated and selection is done among various options. The complete drawing was made in the design stage after several stages of concept generation and selection. Then a prototype is developed to conduct proof of concept testing. Hallow fiber membrane (HFM) that is being used is manufactured usually by melt spinning, dry spinning, and wet spinning. But usually, a wet spinning method is predominantly used for manufacturing hollow fiber membranes. The polymer liquid like polyvinyl chloride (PVC) is used for the manufacturing of membranes with other liquids in different ratios. The pore size of the membrane

varies from 0.01 to 0.1 microns. The flux rate usually depends upon the volume, length, and size of the cartridge. Backwashing at regular intervals is done for the presentation of fooling due to the accumulation of solutes.

Keywords*—Contaminants, Six Sigma, QFD, HFM, cartridge, PVC*

The challenges and prospects of EVs in Pakistan: An overview considering the environmental concerns

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***Abstract*—**There exist many sustainability issues and major environmental problems in Pakistan. The transport and energy sectors have become the leading contributor to environmental degradation and sufficient measures need to be taken. If the situation continues to deteriorate further, then environmental pollution can become the leading cause of mortality in the country. This research focuses on the Pakistani automobile industry and how electric vehicles can offer a remedy. We will explore the reasons why electric vehicles are not purchased by Pakistani car buyers, their concerns and perceptions, the problems here, and how in recent years Pakistan has advanced to accommodate EVs.

***Keywords*—** *Electric vehicles, environmental concerns, market conditions, import*

Engine fan speed control in a Short Takeoff and Landing (STOL) Aircrafts

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***Abstract*—**Feedback control is an essential part of Jet/aircraft engine. In this research paper, we propose a system in which engine fan gets maximum speed within short takeoff time while being stable. Engine fan has controlling sensors and actuators (sensors for calculating speed in rpm i.e., tachometer and actuator for maintaining speed up to the desired level) which control the different parameters cardinal to get the efficiency of STOL system. In the situation of warfare, the main concern is to use aircrafts effectively even when the runway is destroyed or it too short for the traditional jet to fly. For this purpose, our aim is to achieve high fan or engine speed within shortest interval of time. Some modifications on runways are in use such as catapults to give extra boost during takeoff along with a shuttle attached to front wheel of the jet which gives extra thrust (a shuttle comprises hydraulic system containing steam and cooldown systems. PID and LQR controllers in Engine Fan system may boost the fan up to

required optimized speed and to maintain it. In case if the initial speed is not enough, it will be sensed and corrected so that required speed is achieved. After using the suggested approach, the aim is to achieve the takeoff within 90m of distance. For that, speed of almost 200 knots is required within that distance. The first part of paper includes an overview of conventional STOL technology, history of STOL aircrafts, changes made in STOL Technology, Limitations of STOL system, requirements of STOL, design specifications, V/STOL & VTOL system requirements, tilt rotor and controlling sensors have also been analyzed in detail. The second part of the paper includes analysis of engine fan speed control ignoring the coupling between engine fan and pitch control on step, ramp and parabolic inputs. The proposed system was unstable inherently. The best controller designed to stabilize the system first and suitable gain selected for the P-controller. In rest of the paper, the steady state error & the response of stabilized system observed with the help of root locus and bode plots. In the end overview of LQR controllers presented for further modifications.

Keywords— *STOL, V/STOL, Engine fan speed control, PID controller*

Biosorption Studies of Arsenic (As) removal from Industrial Wastewater by using Fixed and Fluidized Bed

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***Abstract*—**Present study investigate the removal of arsenic (III) from waste water by using adsorption onto biosorbents (i.e. activated carbon) by using batch and continuous adsorption studies. Industrial waste water consists of many inorganic and organic pollutants and discharging them to water and resulting the serious health problems. Removal of heavy metals (arsenic, chromium, nickel, lead, mercury etc.) ions from industrial wastewater is of prime importance for a clean environment and human health. One of the Evaluating the ability of biosorbents to remove arsenic from water has global significance due to the widespread availability and low cost of biosorbent materials. One of the biosorbents has been used extensively as an adsorbent in batch and fixed and fluidized bed experiments for arsenic removal. Adsorption of arsenic strongly depends on the initial metal concentration, and also pH. Initial metal concentration in the waste water was 25 ppb, and experiments were performed at pH of 7.5. The maximum arsenic As (III) removed at pH-7.5 is 70%. Adsorbent dosage (1.2 g), (72 %). Contact time (150 min), (70%). Agitation speed (400 rpm), (83%) and concentration ratio (98.7%), in batch experiments respectively. While in continuous mode experiments (Fixed bed) the maximum As (III) was removed in the first 50 minutes 81, 56, 24 and 13% at bed height and flow rate, 5 -10 cm and 2-6 L/min, and in Fluidized bed experiments, the maximum As (III) removed in first 50 min at flow rate 1-3 L/min, and bed heights of 5-15 cm, 70%).

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Performance Analysis of Desalter and Vacuum Distillation Column in Oil Refinery

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***Abstract*—** Desalting and distillation of crude oil are important process in oil refinery. To avoid operational problems, desalting is mandatory before separating the hydrocarbons into useful products. Vacuum Distillation Unit (VDU) is a modern unit of refinery which is used to convert long chain hydrocarbons into useful products under vacuum conditions of pressure and temperature. For optimization of these products, simulation is an important tool. This paper presents the unpublished rigorous simulation of VDU and desalter based on the real data of desalting and vacuum distillation process using ASPEN Hysys. ASPEN is a market leading software use for the process engineering and optimization. Performance analysis can be done with the use of process modeling and design tools which are integrated in this software. The process behavior of components is reproduced under operating conditions. Based on the literature review, all components of oil refinery are carefully designed, and a specific procedure is proposed to estimate the content of water in heavy crude oil and useful products from vacuum distillation unit. Accuracy of chemical contents, units process and operating conditions of streams are validated with the actual data of an existing oil refinery. These results show the comparison of modelling parameters, the performance of vacuum distillation unit with the actual data.

***Keywords*—** *Crude Oil, Vacuum Distillation Unit, Aspen Hysys, Modeling, Oil Refinery*

Experimental Study of the Efficiency of a Tank Storage Gas Water Geyser by Applying Energy-efficient Techniques

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***Abstract*—** Natural Gas accounts for almost 50% of Pakistan's total primary energy supplies. The residential sector consumes almost 25% of this Natural Gas and 33% of it is being used inefficiently in gas water geysers i.e., 500 MMSCFD. Tank storage water geysers have recorded thermal and combustion efficiency up to 45-52% and 80-85% respectively. To overcome this deficit, it is aimed to reduce the consumption of Natural Gas and improvise such equipment that has high thermal and combustion efficiency. The current study focuses on energy-efficient techniques applied to tank storage geysers such as designing cold water and flue gases exchanger, changing the type of baffle and burner design. A comparison has been made between the known companies' geysers present in the market and energy-efficient strategies applied to modified geysers. Experiment results show that in tank storage

geysers, thermal efficiency improves from 52% to 68%, and their combustion efficiency improves from 83.2% to 88.4%. Oxygen concentration dropped from 13% to 8.3%. The stack temperature is decreased from 101℃ to 54℃. This is all due to the decrease in temperature of flue gases, increasing resistance, and holding time of flue gases in the exhaust pipes.

Keywords—*Energy-efficient techniques, Combustion efficiency, Thermal efficiency*

The Influence of Fillers on Wear Behavior of Epoxy Composite Coatings for Sliding Tribo-pair

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Abstract— Wear is a common issue in different industrial applications which reduces the tribological performance of materials. Therefore, the developing of the protective layer is necessary to overcome wear issues. The epoxy composite coating is one of the key solutions to enhance the tribological efficiency and wear behavior of components. In this research work, the impact of fillers on the wear performance of epoxy composite coating was inspected. For this purpose, different material samples were prepared with filled epoxy coating. The experiments were conducted under four different scenarios such as epoxy filler under dry condition, epoxy filler under lubrication condition, and epoxy composite without filler under dry and lubrication conditions. Moreover, wear tests were also conducted without epoxy composite coating under dry and lubrication conditions. Wear tests were carried out on the pin-on-disk apparatus at various loads (10N, 20N, 30N, and 40N). The wear rate improved with the increment of applied load. Maximum and minimum wear rates were observed at applied loads of 40N and 10N respectively. The result shows that the maximum wear rate was experienced for epoxy coating without filler in dry condition. The lowermost wear rate was observed in lubrication condition for epoxy coating with filler material. Wear rate in lubrication condition with filler was improved by 98% than dry condition without filler. Similarly, under the dry sliding condition the reduction of wear rate with filler was 89% as compared to dry condition without filler. Furthermore, Scanning Electron Microscopy (SEM) analyses were also conducted to examine the wear mechanism on the worn surface of material samples.

Keywords— *Epoxy composite Coating, Wear Rate, Filler, SEM, Tribology*

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Design of a Low-Cost Prototype Underwater Vehicle

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***Abstract*—** In this study, a small, inexpensive remotely driven underwater vehicle that can navigate in shallow water for the purpose of monitoring water quality and demonstrating vehicle control algorithms is presented. The vehicle is operated by an onboard micro-controller, and the sensor payload comprises a turbidity sensor for determining the quality of the water, a depth sensor, and a 9-axis inertial measurement unit. The developed vehicle is an open frame remotely operated vehicle (ROV) with a small footprint and a modular physical and electrical architecture. With a net weight of 1.6 kg, a maximum depth rating of 20 meters, and a development cost of around $80, the ROV frame is composed of polyvinyl chloride tubes and has a length of 0.35 meters. As a ground station, a dedicated laptop shows crucial vehicle data in real time and can send commands to the vehicle. Initial testing in the pool demonstrates that the vehicle is completely operational and effectively complies with pilot commands.

Keywords*—remotely operated underwater vehicle, low-cost design, underwater robot, marine inspection*

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A Short Review on Latest Technologies for the Pretreatment of Lignocellulosic Biomass

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***Abstract*—** Due to the depletion of fossil fuel resources in gasoline as well as the developing issue with atmospheric carbon dioxide levels and related warming developments, it is becoming increasingly important to produce the next generation of renewable liquid transportation fuels. The most readily accessible bioresource is lignocellulosic biomass, which may be produced on a global scale at a rate of up to 1.3 billion tonnes per year. Various natural acids, phenols, and aldehydes, as well as a variety of reducing sugars that are highly prized in the production of biofuels like bioethanol and biogas, are released during the hydrolysis of lignocellulosic biomass. The majority of lignocellulosic biomass is made up of organic polymers notably cellulose, hemicellulose, and lignin that are strongly linked to one another using covalent and hydrogen bonds, creating a very sturdy structure. Numerous pretreatment strategies are developed as a way to decorate the separation of these interlinked components to take most enjoy the constitutes of the lignocellulosic biomasses. maximum commonplace pretreatment methods consist of bodily, chemical, physicochemical and biological processes. This evaluation's goal is to examine the various pretreatment strategies now in use and provide an outline of the way they are applied.

***Keywords*—** *Energy, Biofuels, Pretreatment, Lignocellulosic Biomass, Cellulose, Lignin, Reducing Sugars, structure*

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Analysis the Thermal Efficiency of the Pin Fin PCM Based Heat Sinks Utilizing Free and Forced Convection

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***Abstract*—**To prolong the lifecycle of electronic devices and avoid their premature failure, a thermal management technique that can control their high temperatures will be required. This study combines passive and active thermal management utilizing a hybrid system that includes a pin fin heat sink, a PCM, and forced convection. It has been developed and examined to guarantee that electronics are thermally managed. In this study, experiments with forced convection reverse flow directions and various pin fin configurations including square, round, and triangular as well as paraffin wax-filled heat sinks as Phase Change Materials to disperse heat are covered. This study showed that PCM, which includes pin-fin heat sinks and forced reverse convection, increases the lifespan of electronic equipment by keeping the temperature within a reasonable range. In the presence of heat sink and PCM the maximum temperature reduction is found to be 8.69% at 10 W with triangular configuration of pin fin heat sink. Triangular pin fin heat sinks configuration alongside reverse flow forced convection the maximum temperature achieved is 34.4 °C at which PCM maintained its solid phase. For Round configuration with Reverse flow maximum temperature achieved is 30.3◦ C which is about 10.4%. For square configuration of heat sink with reverse flow the maximum temperature achieved is 28.8 °C which is about 15.2% increase as compared to round configuration. Therefore, square fins are most efficient in reverse flow convection.

Keywords*—Thermal Management, Phase Change Material, Different Configuration, Pin Fins, Reverse Flow*

Automatic filling of a product form in an E-commerce application from a video using machine learning

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***Abstract*—** Innovation is the core and the most important component of technology and business. Business to Business (B2B) and Business to Consumer (B2C) businesses have evolved immensely and have adopted the methods which were not being used before the digital revolution. The shift from manual methods to the digital ones have provided enormous growth to the businesses. This work will let users add their products on a platform by recoding a video of the product which mentions its features instead of filling out the traditional web-forms which are laborious and time consuming. The work can be integrated with any online marketplace platform as an

add-on to enhance the experience of their potential users. It also extracts the best images of the product through machine learning. As a result, by adding the video to the platform, all the details of the product are auto-filled intelligently.

Keywords— *Innovation, Machine Learning, marketplace, Product, Natural Language processing.*

Adsorption Studies for The Removal of Arsenic from Contaminated Water

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***Abstract*—** It has been observed that a contaminated source will produce contaminated drinking water. Therefore, the composition of the industrial wastewater and ground water should be within the allowable limits of EPA-Pakistan and other global standards. Rice husk is decided to be treated for elimination of Arsenic from Arsenic contaminated water. Because rice is in abundance in Pakistan i.e., 7.00 x10^6 ton per year and it is renewable source. The amount of rice husk obtained would be 2.1 x 10^6 tons per year. Existence of the arsenic in drinking water up to toxic levels in ground water is a matter of immense trepidation due to their effects on human health. By and large, these metals are emancipated from various natural (i.e., wearing away of rocks, weathering, volcanic activities, and ore dregs) also from anthropogenic (smelting, mining, agricultural activities, and industrial incursion) sources. Arsenic in water is found out by Atomic Absorption Spectrophotometer. Theoretical studies based on Equilibrium Isotherm models like Langmuir and Freundlich isotherms studied to evaluate the amount of rice husk required to remove a known quantity of the contaminated industrial wastewater. The results show that the raw rice husk can be counted as an inexpensive and obtainable adsorbent for the arsenic removal from contaminated water.

Keywords*—Arsenic, drinking water, rice husk, adsorption*

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Comparative Analysis of Software Development Process Models

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***Abstract*—**The study of several software process models is presented in this work. A review of several publications is conducted in this article, and the software process model is detailed in the reviewed document. The comparison between the various process models and the suggested model is shown in this article. The requirement, planning, design, and implementation are also discussed in this comparative study. Business process models, however, have been heavily utilized to support these components in conventional software engineering approaches. It has not yet been determined to what degree advice to concentrate on coding mean that conceptual modeling should be abandoned.

***Keywords*—** *Introduction of Process Model, Phases, Comparative Study of Process, factors affecting to Choose Process Model.*

Emergence and Success of Various Approaches to Control Contamination in Banana Tissue Culture

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***Abstract*—**Nanotechnology anchors its root in almost every field of life such as agriculture to medicine, cosmetic to electronic so it is not surprise if we say that we are living in "Nano era". Plant tissue culture produces huge number of plants with rapid speed under aseptic conditions to meet the demand of food in growing world. Blend of these two technologies (plant tissue culture and nanotechnology) shows promising results such as increase availability of nutrient present in media for explant, callus generation, soma clonal variations, genetic transformation and organogenesis. Banana is important food crop produced through tissue culture. Despite use of many chemicals and antibiotics contamination remains a tough competitor in way of successful banana tissue culture. Contamination was near to unavoidable in plant tissue culture but in recent times application of nanoparticles to controlling contamination proves their lethal potential towards pathogenic microbes. Besides these influential impacts on tissue culture unwise use of nanoparticles, phototoxicity and unknown intimidations to environment are major concerns regarding application of nanoparticles. Future can be more fruitful by making certain changing in application of nanoparticles such as using variety of nanoparticles to different plants, understanding mode of action of nanoparticles and control usage of nanoparticles to avoid phytotoxicity and to minimize its impact on environment.

Keywords*—contamination, explant, nanoparticles, phytotoxicity.*

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A Statistical Framework for Optimization of Cylindrical Grinding Parameters on AISI-D6 Steel

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***Abstract*—**Surface finish and dimensional perfection of AISI D6 steel is costly but core constraint of many machining industries. An excellent wear resistance and high strength AISI D6 steel is used in blanking and forming tools due to its high strength and great wear resistance. In this research, main focus is to achieve viable production during cylindrical grinding of AISI D6 on CNC machine by the Aluminium Oxide grinding wheel. Thus, optimization of surface finish and material removal rate (MRR) with respect to cutting parameters is key part of this research. It is achieved through enhancing productivity (increasing material removal rate), improving surface roughness and ultimately, integrity of finished product. The effect of three major influencing factors i.e. Work speed (rpm), machine bed feed rate (mm/min) and depth of cut (mm) have been investigated for production performance measures. Taguchi L9-orthogonal array is used to get best combination of input parameters against each machining run. Optimum levels of process parameters are identified through S/N ratio response analysis. Contribution of process parameters over response parameters is analyzed through ANOVA. Empirical models have been developed for response parameters by regression analysis. Confirmation experiments are performed and results are compared with predicted values to check validity of developed models. According to the parameters used in this study, it is concluded that the impact of work speed on the surface roughness *is* 78.25% of total influence, while the contribution of feed rate and depth of cut on MRR is 49.80% and 43.12% respectively. Optimum surface roughness achieved at 200rpm work spindle speed, 200mm/min machine table feed rate and 0.007mm depth of cut.

***Keywords*—** *AISI D6 Steel, Grinding, Surface Roughness, Material removal rate, S/N ratio, ANOVA*

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Process Design for Production of Synthetic Natural Gas from Gasification of Solid Waste-A Case Study of Lahore City

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***Abstract*—**The exploitation of municipal solid waste for producing synthetic natural gas is an emerging pathway for substituting fossil natural gas. The bio-based natural gas, when produced has equivalent characteristics of local natural gas and is suitable to be utilize in natural gas infrastructure. Multiple routes are usually available for valorization of solid waste into synthetic natural gas by employing different technologies for upgrading either a biogas or synthesis gas. The raw gas is then conditioned in topsoe based methanation technology or through biochemical means. The upgraded gas has higher calorific value, methane content and equivalent relative density thus, offering benefit of interchangeability with natural gas.

***Keywords*—** *Synthetic Natural Gas, Municipal Solid Waste, Topsoe technology.*

COD and BOD removal of textile waste water using rice husk activated carbon (RHAC)

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***Abstract*—** In this work, performance of rice husk activated carbon (RHAC) was studied for the reduction of chemical oxygen demand (COD) and biological oxygen demand (BOD) of textile wastewater. RH was converted to rice husk activated carbon (RHAC), an effective form using phosphoric acid (85 % conc. RHAC was used as an adsorbent material. The wastewater was treated with RHAC by varying adsorbent amount at room temperature. To study the thermo-physical characteristics of RHAC, different techniques such as thermo-gravimetric analysis (TGA), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR) techniques were utilized. The characteristics of the wastewater like pH, turbidity, COD and BOD were also measured using advanced techniques. Mechanism for the removal of COD and BOD using adsorption onto RHAC was analyzed via batch process at different adsorbent amount to find the best possible conditions. The results confirmed that 89

% of COD and BOD were reduced from the wastewater using 4 gm of RHAC. This study also explores the effects of RHAC on pH, turbidity of the wastewater.

Keywords— *COD, BOD, rice husk, RHAC, pretreatment, turbidity, pH*

Tribological Analysis of Ionic Liquid as an Additive to the Bio Based Oils

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Abstract— As a result of ongoing environmental codification, the lubrication industry has been working to develop environmentally sound and efficient lubricants that may be utilized as metal cutting fluids. A lubricant that complies with environmental regulations and still provides great lubrication performance must be developed due to environmental concerns. In this research, the tribological workability of bio-based oils that have been combined with ionic liquid for metal cutting or machining applications is examined. Ionic liquid was used as an addition to bio-based oils to create tribologically enhanced bio-based lubricants. The specific bio-based oils examined in this research were coconut oil and cottonseed oil. In both bio-based oils, choline chloride was added as a lubricant additive. The research started with an examination of the behavior of pure coconut in terms of wear prevention and friction reduction. The examination of the lubricating behavior of various concentrations of ionic liquid added to bio-based oils has been done using a pin on disc tribotester. The outcomes have demonstrated that the addition of 1.5 weight percent of choline chloride to coconut oil reduces friction coefficient by 56% accompanying a 80% decrease in wear volume. Similarly, at a concentration of 1 wt% ionic liquid, cotton seed oil demonstrated a 40% decrease in average wear. The results of the surface analysis demonstrated that the ionic liquid enhanced the interacting surfaces ability to create tribo-films and hydrogen bonds, therefore improving lubrication performance. The measurement of the viscosity of formulated oil samples also revealed that an increase in ionic liquid concentration causes the viscosity of bio-based oils to increase as a result of the creation of hydrogen bonds. The results of the overall investigation showed that ionic liquids have the potentiality to amend the tribological behavior of bio-based lubricants used as metal cutting fluids.

Keywords— *Ionic Liquid, Material Removal Rate, Lubrication, Metal Cutting Fluid, Bio-Based Oils*

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Production of Biodiesel from Algae to Overcome Energy Crises

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***Abstract*—** Financial development of the world is genuinely founded on petroleum derivative parts which are obliged now not best through confined accessibility anyway also create high scopes of contamination. The world is going through energy crises and environmental issues in this century because of elevated industrialization and overuse of ordinary assets for strength which includes fossil fuels. Since diesel is getting utilized immensely in modern business, horticulture and different areas. Thusly, the creation and the usage of biodiesel from oil seeds plants have been getting recharged interest in current years inside Pakistan to win over the negative marks of oil from oil seed crops. Making biodiesel from microalgae gives many advantages over the above resources in form of higher oil productivity and algal biomass and the need for non-arable land for its development. This paper comprises the general summary and arrangement of the development of biodiesel from green growth in Pakistan. The data relating to the microalgae exploration will help partners and legislative associations working inside the sustainable power zone to consider its development on a major scale, involving wastewater as a feedstock to deliver biodiesel to satisfy the objective set through the public authority of Pakistan of utilizing 10% mixed biodiesel continuously 2025 in Pakistan. INDEX TERMS: Algae, Transesterification, Energy crises.

Assessing Pakistan Climate Mitigation to Support Nationally Determined Contributions Goals

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***Abstract*—** Pakistan is currently struggling very hard to cope with the scarcity of energy and environmental pollution due to GHG emissions. The power sector is mainly relying on fossil fuels, the huge imports of which contribute to massive import bills, trade deficit and poor GDP growth, pushing Pakistan under enormous debts from the IMF (International Monetary Fund) and other countries. Unlike developed countries, Pakistan does not opt for any model-based approach to enact our plans for energy and the environment, due to which Pakistan is not coming out of the dilemma for decades. In this study, a model is developed using MarkAL/TIMES focusing on the existing technologies to analyze the energy demands/supplies and carbon footprints to give us the least cost

analysis for Pakistan by 2040. The proposed model assists the government of Pakistan to achieve the emission reduction commitments made in Nationally Determined Contributions (NDCs) through improvement in the energy efficiency of demand sectors in power generation. Two policies (NDCs scenario) are adopted to cope with greenhouse gas (GHG) emissions which are 15% efficient devices at the supply side and renewable penetration (15%, 30% and 50%) with sensitivity analysis of renewable shares. The results suggest that the Business as Usual (BAU) scenario's energy consumption would expand from 366 PJ in 2018 to 3214 PJ in 2040 whereas the energy supply will increase by an average of 8% per year. By adopting a 15% efficient devices policy, total energy supply and GHG emission in the power sector have decreased up to 7.7% and 14% respectively whereas the system cost has also decreased as compared to BAU in 2040. By applying the renewable penetration policy, total energy supply is decreased by 1.91%, 4.93% and 7.8% by increasing the share of renewable in existing power plants by 15%, 30% and 50% respectively. The system cost for penetration of renewable energy shares increases due to high capital costs. Moreover, GHG emissions in the power sector are reduced by up to 5%, 11% and 17% by 2040. The as-developed model showed a significant reduction in GHG emissions and energy supplies when NDCs scenarios are applied.

Keywords— *Energy, GHG Emission, Carbon Footprint, NDCs, MarkAL/TIMES.*

Design and development of solar assisted hybrid bicycle

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***Abstract*—** Fossil fuel transportation is the most common type of transportation around the globe. Transportation in the developed countries consumes over one-third of all worldwide transportation energy and is a major source of the emission of pollutants like CO_2 which plays a great role in environmental pollution. To overcome the sustainability issue, a solar hybrid bicycle design is proposed as an alternative mode of transportation to address the ever-growing environmental pollution by minimizing CO_2 emissions as well as cost reduction. Hybrid Bicycle consists of a dual running mechanism such as solar energy and paddles. A BLDC motor is run with 12-volt dual batteries connected in series charged by a solar panel. In order to propel the Bicycle without physical human effort a 250-watt Brush Less DC motor is used. The motor is fitted in the rear wheel and relates to the help of a Chain Drive System. The design adopted in this study is to fit the panel as a roof of the vehicle due to the reasons that the load is equally distributed on the cycle, the roof is adjustable not just for a heighted person but also to avail maximum light intensity. The novelty of this research is that studies on e-bicycle were exists but limited research on solar-powered e-bicycle and their influence on society, environment and cost were carried out. The analysis revealed that a solar e-bicycle is used as a sustainable way of transportation by meeting the requirements of a local peoples with its greater occupancy rate, speed, and travel distance.

Keywords*—Solar Assisted Hybrid bicycle, E-bike, Transportation, sustainability*

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Numerical Investigation of Dual Flow Integral Fin Mini channels using Nano Fluid

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***Abstract*—**To meet today's technological demand, performance of the electronic devices needs to increases at a faster rate. High performance electronic devices generate more heat which eventually becomes a bottle neck problem for the IT industry. The generated heat flux needs to be timely removed to maintain the temperature within a safe threshold range. Water cooled mini channels have gained significance because of better thermal conductivity as compared with air. In the current investigation, the thermal performance of the mini channels is enhanced using nano fluids. Results are discussed in terms of base temperature reduction, enhancement in heat transfer, decrement in the thermal resistance and increment in pressure drop.

Keywords*—Integral fins, Dual flow heat sinks, Nano fluids*

Thermal Investigation of Rectangular Header Normal Channel Facile Heat Sink using Hybrid Nano Fluids

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***Abstract*—**In today's era the thermal management of microelectronic devices has become a challenging task because of high flux generation. Hybrid nano fluid is the new class of nano fluids which is used as a coolant for better thermal performance. In the current work, numerical investigation of rectangular header normal channel facile heat sink is performed. Thermal performance of the heat sink is enhanced by using hybrid nano fluids (mixture of SiO_2-TiO_2 / H_2O). Effects of varying volumetric concentrations of the nano particles are also noted. It is observed that by increasing the volumetric concentration of silicon oxide nano particles thermal performance is enhanced. Results are reported in the form of reduction in base temperature, thermal resistance and pressure drop.

Keywords*—Hydrothermal performance, Facile heat sink, Hybrid Nano fluids*

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Energy, Exergy Analysis of PCM Based Solar Photovoltaic Panel.

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***Abstract*—**As the temperature increases, the efficiency of photovoltaic (PV) panels decreases, making thermal management of these modules of the utmost importance. Literature documents the use of a variety of fluids and materials to adjust the temperature of a module, including air, water, nanofluid, and phase change materials. This study is primarily focused on clarifying the effectiveness of PCM-based PV panels by analyzing the exergy generated from them. Based on the solar intensity, the module temperature, and the ambient temperature. Energy, Exergy, and power conversion efficiency were determined. In the present research, two kinds of PV configurations are being examined with the aim of cell efficiency improvement. A reference panel and a PV panel with a PCM are included in these two configurations. Phase change materials RT 42 were used in this experiment. It was conducted during October in Taxila, Pakistan. Experimental results indicate that use of RT44 reduces maximum temperatures by 11.21 degrees Celsius for PV panels with only PCM compared to the reference panel. In the hours 8:00 am to 5:00 pm, the efficiency of exergy and electrical conversion is characterized by the following values: exergy efficiency ranges from 2.11% to 11.24% and electrical conversion efficiency ranges from 10.2% to 11.45%, while energy efficiency varies from 5.12% to 14.9%.

Keywords*—Exergy, Energy, Photovoltaic Panel, Thermal Management, Phase Change Material*

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Gender Classification Using Novel Acoustics Deviated Local Ternary Patterns

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***Abstract*—**Speech plays an important role in human-computer interaction and can be used in many applications like automatic speech recognition, forensic voice verification, speaker recognition, mobile banking, and shopping. Gender identification through voice has been a challenging task in the field of speech recognition and is considered as one of the crucial tasks for such applications. The extraction of useful and optimal features, presence of background noise, signal distortion, and variation in pitch and frequency, makes gender classification through speech very difficult. To overcome such challenges, we proposed a novel acoustic deviated local ternary patterns (DLTP) to represent the audio signal. DLTP features have the capability to capture the distinct speech attributes (pitch and frequency) of the male and female voices. The extracted features are then employed to train the k-nearest neighbor algorithm (KNN) for the accurate classification of gender. The proposed approach is evaluated on fluent speech commands and common voice datasets. The classification accuracy of 97% on common voice and 98.3% on fluent speech commands dataset demonstrate the effectiveness of our proposed method.

***Keywords*—** *Automatic gender classification, acoustics deviated local ternary pattern, K-nearest neighbor.*

Analysis of 1-Tetradecene Production from Thermal Cracking of Castor Oil & Ethylene Oligomerization by Modified Ziegler Process

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***Abstract*—**One essential ingredient in the paint business is 1-tetradecene. Alkylated aromatics, amines, amine oxides, alpha olefin sulfonates, synthetic lubricants, epoxides, tanning oils, and drying oil are among the products that may be made from it. Currently, oligomers created using a modified Ziegler ethylene chain growth technique are used to produce 1-tetradecene. The pressures used for this procedure, however, range from 13.7 to 27.5 MPa. Thermal cracking is another method for making 1-tetradecene (from Ricinus Communis seeds), and it is acetylated by acetic anhydride when p-toluene sulphonic acid is present. This study provides a comparison of the two methods—ethylene oligomerization and castor oil thermal decomposition—that are utilized to make 1- tetradecene. Both processes' simulation models were contrasted. With a yield of 99% pure 1-tetradecene compared to 95% for the ethylene oligomerization process, the simulation results show that the castor oil method is more successful and

economical. Additionally, castor oil can undergo thermal cracking at lower pressures between 105 and 195 kPa. Additionally, the catalyst needed for the thermal cracking of castor oil (Ni-Sn) is less costly than the catalyst needed for the ethylene oligomerization process (Triethylaluminum). These discoveries are helpful to the resin, coating, and paint industries.

Keywords—*1-Tetradecene, Castor oil, Ethylene Oligomerization*

Performance Analysis of Fiber Reinforced Concrete using different Fiber Proportions.

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Abstract— Concrete structures experience physical and chemical changes when they interact with the natural environment under service load conditions which results in cracking. Cracking is a critical problem which actually lowers the long-term service life, strength, and durability of the concrete structures. Furthermore, if preventive measures are not taken on time, then these cracks will lead to the failure of structures. Fibers in different proportions when added into the concrete showed satisfactory performance in enhancing its mechanical properties. Carbon fibers and steel fibers have been introduced in concrete and behaviors of both the plain cement concrete (PCC) and fiber reinforced concrete (FRC) is evaluated based on the mechanical testing. The mechanical properties such as compressive, tensile, and modulus of rupture strength of steel and carbon fiber reinforced concrete have been compared with PCC. When slump values of PCC and FRC are compared, it is found that the slump of steel and carbon fiber reinforced concrete is reduced due to water thin film in comparison to that of PCC. The stress strain behavior PCC and FRC is also compared in this study. The optimum content of carbon fiber of 0.3% and steel fiber of 5% by weight of cement is added which after 28 days moist curing is subjected to mechanical testing.

Keywords—*Plain Cement Concrete, Compressive Strength, Flexural Strength, FRC, Cracking*

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Assessing the Chromium (VI) Removal Efficiency of Graphene Oxide Coated Sand Adsorption Unit for Water Treatment

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Abstract—Contamination of water bodies due to chromium is one of the major hazards to the ecosystem. Several methods have been adopted to tackle this issue including adsorption by graphene oxide coated sand. Graphene oxide coated sand has large number of pores on its surface and hence its adsorption capacity becomes large enough to up take heavy metals like arsenic, cadmium, lead, mercury, and chromium usually originates from human activities and industrial actions. The work that is presented here demonstrated the successful removal of hexavalent chromium from aqueous solutions using graphene oxide coated sand that was produced from graphite. The prepared Graphene Oxide was Synthesized in the lab by following modified Hummer's Method. The entire metal adsorption study was conducted through batch mode and designed by using Central composite design. Experimental Protocols were designed by using the central composite design in response surface model. ANOVA test has been performed to confirm the normality of data. For this purpose, software named Design Expert 7.0.0 has been used. The major parameters which were considered were pH, adsorbent concentration, and contact time. The specific ranges for operating variables have been selected i.e., pH (1.06–9), contact time (5–500 min), and initial concentration (0.50–500 mg L-1). The studied results ascertained that the maximum removal (88.09%) was achieved at acidic pH (1.50) and the maximum adsorption capacity found is 12.22 mg g-1. Therefore, it is concluded that graphene oxide could be an effective and efficient alternative for the removal of Cr (VI) from aqueous solution.

Keywords—*Central composite design, Chromium (VI), Graphene oxide coated sand, Hummer's Method, Response surface methodology*

Optimizing Melting Rate and Fuel Consumption of Rotary Furnace

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***Abstract* —** The extent to which a country's accidental consequences may be fully transformed into useful items and organizations determines how creatively advanced that nation is. Machine part manufacturing at foundries is becoming a common activity. This work directs the plan evaluation of a 500 kg rotating radiator got done with utilized motor oil. A plan evaluation of a 500kg turret warmer was completed to choose its viability. To this end gauges were made and how much motor oil was utilized, 170 liters were utilized to light the turning warmer

while mellowing 300 kg of strong metal and the related disintegration time was assessed to be 2 hours 30 minutes utilizing a stopwatch and the pour point was assessed to be 1260 ºC with information lumberjack with thermocouples type K 3 channel and temperature regulator. Arranging thermocouples associated with the temperature regulator recognizes the temperature climb in the radiator and accordingly exhibits a similar to the temperature regulator. Energy is still in the air not set in stone. The force created in the not set in stone to be 4179620 KJ and the effectiveness of the rotating still up in the air to be 85%. In particular, in this study, a rotating radiator was utilized to dissolve and the introduction of a 500 kg rotational warmer was assessed to figure out its efficiency and the time it takes to condense 300 kg of strong metal and liters of utilized motor oil utilized for mellowing. 300 kg of solids was not totally settled.

Keywords *— Rotary furnace, Thermal stability, Temperature Controller*

A Review on CO_2 Capturing from Air through Reactive Absorption Technique

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Abstract**—** Currently the world is facing the most hazardous climate altering scenarios due to the massive usage of the fossil fuels around various Industries which is one of the main causes of CO_2 emission. For this reason, scientists have researched for various techniques to removes the CO_2 present in the air which has the concentration of around 420ppm. Up till now there are basically 2 proposed methods to capture CO_2 from air i.e Solid Direct Air Capture-SDAC (uses solid sorbents e.g Zeolites or porous alumino-silicate solids) and LDAC (uses liquid solvents such as MEA based solvents or NH_3 solutions). In this review we are focused on MEA (mono-ethanol-amine) based CO_2 capture process. MEA is a colorless, viscous liquid, organic chemical compound with the special characteristic of absorbing CO_2 even if at low concentration. (Dugas et al, 2016) proposed this model & use MEA as a solvent to capture CO_2 is a chemical absorption process that includes the production of highly unstable product which is ultimately responsible for the CO_2 production.

Keywords**—***MEA, CO_2 Capture, Reactive Absorption, DAC*

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Comparison of Thermal Performance of PCM, TIM and Air based Double-Glazing Window

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***Abstract*—**The residential sector is one of the major consumers of energy in Pakistan out of which most amount is used to achieve thermal comfort. Reduction of energy consumption is one of the challenging issues in building load management. Windows are known as a weak thermal barrier in buildings and contributes most of the energy losses during winter and summer. One of the emerging methods is incorporation of materials having high thermal inertia such as translucent insulation materials (TIM) and phase change materials (PCM) in windows. In this study a comparison of three different types of windows was carried out and studied the effect of heat diffused from windows. A numerical investigation was carried out in ANSYS Fluent. The results obtained indicate that phase change material absorbs more than 90% of exposed heat during melting phase. The energy saving potential of PCM has great usage in building sector in Pakistan.

Keywords— PCM, TIM, Energy, Buildings, Fluent, Numerical simulation

Green synthesis of Propylene Glycol Via Hydrogenation of Biodiesel Production ByProduct Glycerol

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***Abstract*—** Glycerol supply is now rising significantly, mainly as a result of the increased biodiesel production on a global scale. One ton of glycerol is obtained as a by-product for every nine tones of biodiesel produced. Glycerol's economic value has been reduced due to the excess supply, making it possible to utilize it in a variety of other applications. Many studies have been performed to exploit this excess glycerol as a raw material for the manufacture of new products like propylene glycol. The main objective of this work is to evaluate the potential of the production of propylene glycol (PG) using glycerol that is derived from the biodiesel production process. Propylene glycol market in Pakistan consists almost entirely of imported product and there is no industrial manufacturing unit in the country. This project proposes the manufacture of propylene glycol by the ecofriendly process which will eventually lead Pakistan to be self-sufficient in its production. A process flow diagram (PFD) to produce propylene glycol via catalytic hydrogenation of glycerol is proposed along with reaction scheme.

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Keywords— *Propylene Glycol, Biodiesel, Glycerol as a byproduct, Pakistan, Hydrogenation*

Modelling of Socioeconomic and Cultural Discrepancies affecting Fertility Patterns in Pakistan: Evidence from 2017-2018 Pakistan Demographic and Health Survey

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***Abstract*—Objective**: A number of demographics, socioeconomic, and cultural factors may be accountable for discrepancies in timing to first birth across the cultures and regions. The current study aimed to determine the first-birth spacing behavior of women in Pakistan. **Methods:** This study uses a quantitative study design. Cox regression model was applied to analyze marriage to first birth interval to understand the first-birth spacing behaviors by using Pakistan Demographic and Health Survey (2017–18). **Results:** Women had primary & secondary (HR=1.242, 95%CI, 1.189–1.297) and high educational level (HR=1.256, 95% CI, 1.182–1.335) had longer marriage to first birth interval. Currently contraceptives user women (HR=1.135, 95% CI, 1.092–1.179) were more likely to have elongated birth interval. Breastfeeding mothers (HR=1.063, 95%, CI 1.026–1.101) and women belonged to rich wealth status (HR=1.187, 95% CI, 1.126–1.252) had longer marriage to first birth interval. Moreover, women resided in rural areas (HR=.950, 95% C.I, .912 –.990) and belonged to those family where head of family is male (HR=.940, 95% CI, .887–.998) had short birth interval. **Conclusion:** Our findings revealed that medical, socioeconomic and biological factors such as urban regions, user of contraceptive methods, women breastfeeding, rich economic status, higher level of education and female household head can elongate the marriage to first birth interval. It appears that women's education, as well as their socioeconomic situation, have a substantial impact on childbearing. As a result, paying attention to these elements in future planning by designing targeted public health policies and community-based education could prove beneficial to control population growth.

***Keywords*—** *fertility, birth interval, spacing behavior, children, Pakistan*

Comparatively Study Between Monocrystalline and Polycrystalline Photovoltaic Panel Based on PCM

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***Abstract*—**As part of this paper, we present a comparative examination of the performance of two commercial photovoltaic modules (monocrystalline and polycrystalline) in Taxila, Pakistan. We investigated the effects of

module temperature and solar irradiance on the power output, module efficiency, and performance ratio of each module. The parameters of the module appeared to be strongly dependent upon the solar irradiance and the module temperature. Compared with polycrystalline and monocrystalline modules, monocrystalline modules performed better in high irradiance conditions, while their performance decreased suddenly with a decrease in irradiance. This site exhibited a higher average monthly module efficiency for monocrystalline modules. ncreasing irradiance and photovoltaic module back surface temperature decreased module efficiency and performance ratio. The month of September was dedicated to conducting a series of experiments outdoors. The experiment was conducted using phase change materials RT31. The study was conducted in Taxila, Pakistan, during September. RT44HC has shown to reduce maximum temperatures by 11.21 degrees Celsius for PV panels with only PCM compared to the reference panel when used in experiments. Electric conversion efficiency between the hours of 8:00 am and 5:00 pm is characterized as following: efficiency ranges between 7.36% and 7.31%, and electrical conversion power ranges between 9.576% and 9.504%.

Keywords—*Photovoltaic panel, Phase Change Material, Thermal Energy Storage, Latent Heat Storage, Sensible Heat Storage*

Thermal analysis and the optimum pin fin configuration for a heat sink design for a central processor unit (CPU)

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Abstract — For electronic cooling the most remarkable gadget used is heatsink. Continuing to expand the thickness of the execution in the computer chip processor, acquiring the size of electronic things, fulfilled the importance of the issue of Heat connection in business. This issue will improve the presence of the hardware group while decreasing the responsiveness of the central processor. A drop-in intensity with a strong development force is necessary to prevent these outcomes. Choosing a sensible cooler consideration requires splitting the difference between space openness, weight, and cost as well as performance qualities when developing the surface of the cooler model. it gives an ideal heatsink configuration utilizing an unpredictable system that haphazardly creates the pin position by envisioning a Heat profile utilizing Ansys programming. The discoveries of this study suggest a new (great) pin balance plan that can give better Heat execution, which is 2.84 percent and 0.63 percent, independently, as opposed to the typical straight-line and staggered plans. Empowering a direct and proficient strategy with a sporadic methodology can be an imperative obligation to the movement of game plans and tackling present day issues.

Keywords — *heat sink, CPU, heat transfer, Ansys, thermal*

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Biogas Production from Fallen Leaves Using Physical and Chemical Pretreatment

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Abstract **—**The irrational intention of popular fuels and the effect of the greenhouse smokes impacting the climate have leveraged the investigation actions into renewable fuel generation derived from organic reserves and ruins. This research is based on biogas production from fallen leaves. Fallen leaves constitute disturbance in the atmosphere and gases as a destruction. From this explanation, the leaves that are burned and disposed of into the atmosphere are fatal for habitat because when leaves are burned freely it stimulates dangerous deadly fumes and heightens greenhouse fumes. Tons of leaves that are free at particular places in country, but another scientific analysis also should be performed. In this content this program has been put up with. Fallen leaves (poplar 75%, eucalyptus 15% and 10% shrubs) were collected from Wah Cantt, Punjab, Paki-stan. These leaves were dried and crushed into 2 mm size. Chemical pretreatment with different proportions (0.5%,1%,1.5%, 2%, 2.5% and 3%) of NaOH solution was done to break the lignin content of the leaves. The pretreated sample was characterized, and it was analyzed that substrate that was treated with 2.5% NaOH degraded the maximum lignin content, with expected outcome of 0.2 l/g VS-d. This survey, separated from promoting the effectiveness and limitations of the several pretreatment techniques will debate the policies to improve the carbon healing in the aspect of methane by path of amending pretreatments to reduce inhibitory consequences on microbial factions, also leading to the increase in method situations.

Keywords-*Anaerobic Digestion, Biogas, Sustainable Energy, Sustainable Environment, Pretreatment, Fallen Leaves, Renewable Energy*

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ABSTRACTS

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Charge Transport Investigation Through Grains and Grain Boundaries of $Sm_{0.3}Ca_{0.7}MnO_3$ Using Impedance Spectroscopy

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***Abstract*—**By employing synchrotron X-ray diffraction (XRD), impedance spectroscopy and magnetic measurements the Ca doped $Sm_{0.3}Ca_{0.7}MnO_3$ on A-site is explored for structural, electrical and magnetic properties. Through standard solid-state reactions technique, the sample $Sm_{0.3}Ca_{0.7}MnO_3$, with gradual increase of Ca doping at A-site are synthesized. A brief overview of experimental techniques employed for the structural, electrical and magnetic characterization, are presented and discussed. XRD are widely used non-destructive technique for structural study. Different structural parameters such as lattice parameters, bond lengths, bond angles, phase purity, atomic positions, Bragg's peaks, tolerance factor are probed by employing synchrotron XRD technique. To find electrical parameters of the probed sample at different temperatures, impedance spectroscopy technique is used. Different conduction models are employed to highlight the transport mechanism and phase competition in different phases of the sample in terms of the frequency. Electrical parameters of GBs which is achieved from experimental data by means of a corresponding circuit model indicates a deviation in electrical transport phenomena around 110K and 160K. Activation energies of the charge carriers and Relaxation frequencies belonging to the imaginary part of different electrical parameters are analyzed and discussed in the context of tremendous hopping of double exchange mechanism through Mn^{3+} and Mn^{4+}. Average normalized change (ANC) in the impedance is obtained from the electrical data indicates a deviation in electrical transport phenomena about 110K and 160K. To find the external magnetic field effect to the sample at different representative temperatures, field dependent magnetization and Hysteresis loop are studied. Around 275K, TCO is indicated by magnetization and the variational effect of electromagnetic field is studied below this temperature.

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Effect of temperature on the retention efficiency of HMTA IACs used for the removal of radiotoxic methyl iodide under NPP operation

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***Abstract*—**Nuclear power plants (NPPs) may produce radioactive isotopes of iodine as a byproduct of uranium fission, which has the potential to be dangerous for environment. Large amounts of gaseous radioactive iodine may be present in the exhaust gas that is released from a nuclear power plant. Radioactive iodine is known to be harmful for people and the environment. An important factor in the assessment of efficient radioactive waste treatment system is the effective trapping of radioactive iodine isotopes, that were released as gaseous effluents from nuclear power plants. Numerous methods have been studied for the retaining of CH_3I under different temperature conditions. To capture volatile iodine species, activated carbons (ACs) are frequently used in the air filtration systems of nuclear facilities. The main objective of this study, is to investigate the adsorption capacity of Hexamethylenetetramine (HMTA) impregnated activated carbons (HMTA IACs) which were prepared with the aim to develop a good retention efficiency for the control of radioactive methyl iodide. The standard ASTM-D3808 method was used to assess the removal efficiency of raw and impregnated activated carbons. HMTA IACs demonstrated a significantly higher retention efficiency for the capturing of methyl iodide gas as compared to raw AC. The characteristic properties of raw and impregnated adsorbents were analyzed by using different techniques such as AAS, XRD, SEM, EDX, TGA, Raman and BET. Saturated $NaOH$ solution was used to adsorb methyl iodide from the gas coming out of packed bed by using trap bottles. Concentration of the methyl iodide collected in trap bottles from the bed was analyzed by UV-Visible spectroscopy. Breakthrough studies of methyl iodide adsorption were used to obtain adsorption amount of the adsorbate and demonstrate the adsorption capacity of the novel HMTA IACs adsorbent.

Keywords*—Radioactive methyl iodide, Adsorption, HMTA, IACs*

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Synthesis of porous carbon and their application in energy storage devices

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***Abstract*—** Biomass in nature has diverse microstructures and abundant chemical compositions. There has been a surge of interest in biomass-derived carbon materials due to their adjustable physical and chemical properties, strong chemisorption, environmental friendliness, and low cost. In recent years, research on biomass-derived carbon in energy storage devices, especially lithium batteries, such as (lithium ion, lithium Sulphur, etc.) has emerged endlessly. Our work will introduce the synthesis and application of different types of biomasses in the host and separator of lithium-sulfur batteries. These biomass carbons have their characteristics in structure, composition, and design. In-depth discussion of the actual impact of these characteristics on battery performance. According to the actual industrial application conditions, the practical problems faced by lithium-sulfur batteries are emphasized, and the future application prospects of bio-derived carbon materials are discussed.

Keywords—*MOFs, COFs, Biomass, separator.*

Graphene Oxide based BaTiO3 Nanocomposite Films, Durable and Efficient Energy Harvesting Materials

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***Abstract*—**Graphene oxide-based Barium titinate (BaTiO3) composite films were prepared by applying in-situ modified Hummer and ex-situ one pot blending techniques. Comprehensive characterizations of the properties of the composites were conducted with special emphasis on the electrical behavior of GO and its induction in the composites. Fourier transform infrared (FT-IR) and Ultraviolet-visible (UV-Vis) spectroscopy have confirmed the synthesis and complex formation of GO and GO-BaTiO3 composites. The band gap energy for all the samples were found to decrease relatively in composites calculated from the optical response in the UV-Vis analysis. Thermal stability, glass transition (Tg) and crystallization temperature (Tc) values were obtained from thermogravimetric analysis. X-ray diffraction was performed for a preliminary phase and structural analysis. Extensive dielectric and conductivity data were analyzed in the frequency range from 1 MHz to 3GHz at ambient temperature. At high frequency range, the dielectric parameters demonstrate relaxation behavior. The charge storage capacity makes the prepared materials durable and efficient energy harvesting materials for applications in embedded capacitors.

***Keywords*—** *Composite films, Charge storage, Capacitor applications*

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Dielectric relaxaction and hopping mechanisms of charge transport in $La_{0.3}Ca_{0.7}MnO_3$

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***Abstract*—**In this research work the structural, electrical magnetic and basic properties of $La_{0.3}C_{a_{0.7}}M_nO_3$ has been explored through XRD, Impedance Spectroscopy and magnetic investigation. Polycrystalline sample of $La_{0.3}C_{a_{0.7}}M_nO_3$ is set up by conventional solid stare reaction rout. A newly synthesized $La_{0.3}C_{a_{0.7}}M_nO_3$ sample is examined for the basic properties through high resolution XRD technique for the recognizable proof of a polycrystalline sample phases that affirm its phase purity, space group, bond length, bond angles, different lattice parameter. Other structural data of their unit cell at atomic level is explored with the help of Fullprof program. The interaction of various electrical parameters under the variety of temperature and frequency are studied utilizing impedance spectroscopy. This is helpful and surely understood procedure is chosen and utilized as a devise to examine the conduction mechanism, dielectric constant, different relaxation processes, electrical conductivity and activation energies associated with conduction of charge carriers. The Apparatus Alpha-N high resolution dielectric analyzer is utilized for the estimating of impedance in this work. We utilized WINDETA programming (which is completely mechanized) for enlisting the information to get helpful electrical data of the sample at different temperature and frequency. Z-View software is utilized for getting the electrical information with the assistance of equivalent circuit model. Hopping Conduction model are utilized to test the conduction behavior, localization length and activation energies of charge carrier.

An overview of contemporary chalcone synthetic methodologies prevalent between 2015-2021

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***Abstract*—**In medicinal chemistry, privileged structures have been frequently exploited as a successful template for drug discovery. Common simple scaffolds like chalcone are present in a wide range of naturally occurring chemicals. Chalcone derivatives have also been synthesized in large quantities due to their simple synthesis. These organic and synthetic substances have demonstrated a range of intriguing biological behaviors with promise for use in treating several ailments. The objective of this review is to draw attention to synthetic procedures of highly preferred scaffold in medicinal chemistry. The synthesis of these bio active compounds has been highlighted using a variety of approaches. A substantial volume of review articles and research papers demonstrating the various routes for synthesis of variety of chalcone derivatives has been gathered from the literature in the recent years.

This current short review on chalcone techniques is given, which is the most fascinating and useful for selecting the required protocol for synthesizing suitable chalcone derivatives.

Keywords— *Chalcones, Flavonoids, Suzuki-Miyaura Coupling, Claisen-Schmidt Condensation*

A Systematic Review on Skin Cancer Segmentation and Classification

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Abstract—Skin cancer is caused by abnormal cell development and most commonly occurs on sun-exposed skin. These abnormal cells repeat themselves and damage the healthy cells. The analysis of skin lesions through manual examination and visual screening for the recognition of skin cancer is very cumbrous. The development of abnormal cell growth is caused by different pathological alterations and some genetic disorders. These alterations in skin cells are very dangerous and life-threatening so timely identification is essential for timely treatment and subsequently cured. Due to all these complexities, the diagnosis accuracy of skin cancer is less than 80%. On the annual basis, in the last 10 years, the ratio of skin cancer patients is increasing by 53% and in 2022 it increased by 6.5%. With the rapid progression in computational and technical recourses, a variety of methodologies are utilized for the examination of skin lesions. Therefore, this research work provides extensive literature for the segmentation and classification of skin lesions. The skin cancer detection methods consist of the four steps such as pre-processing, segmentation, feature extraction, selection, and classification. novel deep learning models are proposed for preprocessing, segmentation, feature extraction, and classification. The recent deep learning methods with challenges for the detection of skin lesions. These methods provide help to the researchers in the examination of skin lesions based on dermoscopic images.

Keywords— *Skin cancer detection, preprocessing, deep learning techniques, deep feature learning, Skin lesion detection, classification, Detection of cancer and non-cancer cells, Melanoma detection.*

A Real Time Application for Recognition of Brain Tumor Using Convolutional Neural Network

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Abstract—Brain tumor is caused due to the growth of abnormal cells in the brain. Based on the severity it might categorized into two types such as benign and malignant. Detection of the brain tumor at an early stage is a significant requirement because the tumor cells grow rapidly destroys the healthy brain cells.Magnetic resonance imaging (MRI) play vital role for brain tumor diagnosis as compared to other modalities such as computed

tomography (CT) and positron emission tomography (PET) because MRIdoes not used ionization radiation that provide harmful effect on the human body. Computerized methods play vital role for detection of the brain tumor at an initial stage that ultimately patient survival rate. In this project a method is developed for segmentation and classification of brain tumor at an initial stage. The median filter is used for image smoothing and Otsu's thresholding with morphological operations are applied to segment the tumor pixels. The brain tumor classification is performed using four pre-trained models such as Alex-Net, Res-Net-18, Res-Net-50 and Google-net. The results are computed using benchmark datasets such as BRATS-2020 datasets. The proposed method provide accuracy of 97.33% on ResNet18, 96.67% on ResNet18, 98.67% on AlexNet and 97.33% on GoogleNet. Therefore, main objective of this project to develop a method based on the convolution neural network using MRI for segmentation and classification of the different types of the brain anomalousat an initial stage.

Keywords*—*Brain tumor; MR image segmentation; Classification; AlexNet; GoogleNet; ResNet18, ResNet50

Overview of Chalcone-based Hybrids as Emerging Bio-Active Applicants

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***Abstract*—**Privileged chalcone scaffolds are pervasive and being a potent prototype in drug-discovery regime they are characterized as a key constitutional unit in surplus pharmaceutical and biologically-active compounds. Certain investigations regarding the chalcones as an effective and pharmaceutically active agent for treating various morbidities have been made. This review article summarizes the biological activity of recently developed chalcones and their derivatives observed as anti-cancer, anti-inflammatory anti-diabetic, anti-malarial, anti-Alzheimer and anti-bacterial agent. Recent literature review highlights efficacy of several chalcone derivatives in treating various ailment, moreover their chemical potential is enhanced by reacting them with different functional groups. Different strategies are being used for making chalcone derivatives as highly effective bio-medical applicant.

Keywords*—*Chalcone-Based Hybrids, medical applicants, biological agents, pharmaceutical importance

Mitochondrial Genome and Its Importance

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***Abstract*—**Mitochondrial DNA (mtDNA) is the DNA located in mitochondria, within eukaryotic cells that convert chemical energy from food into a form that cells can use, such as adenosine triphosphate (ATP). Mitochondrial DNA is only a small portion of the DNA in a eukaryotic cell; most of the DNA can be found in the

cell nucleus and, in plants and algae, also in plastids such as chloroplasts. Human mitochondrial DNA was the first significant part of the human genome to be sequenced. Since animal mtDNA evolves faster than nuclear genetic markers, it represents a mainstay of phylogenetics and evolutionary biology. It also permits an examination of the relatedness of populations, and so has become important in anthropology and biogeography.

Market value addition of storage Tomatoes using AI

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***Abstract*—**Tomatoes export play a vital role in Pakistan economy. Due to climate change, food spoiling is a significant issue because eating damaged food can be harmful to one's health and the spoilage of tomatoes heavily impact on our export. The total production of tomatoes in Pakistan is approximately 4.2 million tons. The quantity Pakistan exports is about $1205 per tons. The aims of this research are to detect the freshness and spoilage of tomatoes using IoT and Machine Learning. The data set will be acquired from sensors-based system and it will be used for machine learning model training. It will give us the best track of stored tomatoes in this regard we can save tomatoes from getting spoiled by the early detection using a proposed machine learning algorithm.

Structural and Electrical Characterization of $Pr_{0.5}Ca_{0.5}MnO_3$

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***Abstract*—**Synthesizing was done of doped manganite $Pr_{0.5}Ca_{0.5}MnO_3$ with the help of technique named as solid-state reaction while structural investigation was done through XRD method. Curves in impedance plots were noticed because of changing within relaxation progressions. Equivalent circuit model was implemented $(R_1C_1)(R_2C_2)$ to $(R_1C_1)(R_2Q_2)(R_3Q_3)$ for getting impedance values. These impedance values helped us for determining grain boundary's impedance. Using factors that was calculated from equivalent circuit confirmed the variation within conduction system as of small polaronic hopping model in the direction of Mott's variable range hopping model at T_c=148K. Using MVRH, it is also discussed that carriers would hop to large distance with the help of activation energy below T_c. From above T_c via SPH, these carriers begin facilitating by various trap centers. Dispersion around 148K in dielectric relaxation and one sort of polarization is close to relaxation calculated from grain boundaries.

***Keywords*—** *small polaronic hopping model, Mott's variable range hopping model, impedance*

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Characterization of partial Mitochondrial genome of the Freshwater Crab *Potamon fluviatile* (Brachyura: Potamidae)

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***Abstract*—**The complete mitochondrial genome (mitogenome) of animals is characterized by its conserved gene content (37 genes) and by its condensed small genome size. In addition, mitogenome gene order rearrangements can provide an independent dataset for studies of the evolutionary history of potamiscine crabs because it is unlikely that convergent evolution is responsible for the differences between taxa given the relatively low mitogenome gene order rearrangement rate compared to the DNA nucleotide base substitution rate.The freshwater crab, Potamon fluviatile inhabits fresh watercourses and some freshwater streams of Islamabad pakistan. In this study, P. fluviatile specimens (n = 20) were tissue sampled from different watercourses in Islamabad and were genetically analysed to investigate the population structure of the species within this small geographical area. The DNA sequences analysed included 622 nucleotides from cytochrome oxidase c subunit 1 gene, and 3160 nucleotides from the sequence between the NADH dehydrogenase subunit 6 gene and the 16S rRNA gene

Tailoring the Recent Facile Routes for Innovational, spectroscopic Investigation and Medicinal Applications of Indole Pharmacophore Derivatives

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***Abstract*—**In the search for new biologically active agents is the prime need of research world-wide. In this regard, surprising heterocyclic molecule with a wide spectrum of pharmaceutical actions resulting from several modes of action, such as Indole is an adaptable pharmacophore, a preferred scaffold. Indole is estimated as the widely studied compound, found in biological system and natural products. For so many years synthesis of Indole derivatives along their characterization is the potential topic in research because of their high potency and efficacy. To prepare novel productive agents for number of applications nuclei of this compound is the central core. Functionalization at various sites inflate its bioactivity due to the existence of aromatic heterocyclic ring. There are several biological and therapeutic uses for bioactive aromatic molecules with the Indole nucleus. Due to concurrence with many protein structures, it is an exceptional moiety for drug discovery. Compounds that were synthesized recently having potential inhibition activity for various agents will be investigated and lot of study has been conducted in recent years. Many consequential synthetic medicines containing indole scaffold, which provides a convenient treatment concept and cohere to relevant receptors with high affinity, empower you for the creation of novel, beneficial variants. Different methodologies have been mentioned in this review for the synthesis of novel indole moieties. The structure-activity relationship (SAR) of diverse indole correspondent has also been

featured in this research intending to identify the active pharmacophores liable for their anticancer, anticonvulsant, antibacterial, antitubercular, antimalarial, antiviral, and other diverse actions. This review will discuss the newly synthesized indole derivatives and indole-based hybrids along with their biological activity which will be useful in drug discovery and development.

Magentite-Siltstone-Biochar composite for heavy metal adsorption from aqueous solution

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***Abstract*—**In this work, the potential of a novel and highly efficient composite of *Eleocharis dulcis* biochar (EDB) with magnetite nanoparticles and siltstone was explored for removing notorious heavy metals i.e., chromium from water. Synthesized biochar composite was characterized by X-ray diffraction (XRD), Thermal gravimetric analysis (TGA), Scanning electron microscopy (SEM), X- ray photon spectroscopy (XPS), Fourier transform infrared spectroscopy (FTIR) and Transmission electron microscopy (TEM). XRD confirmed magnetite and quartz to be the main phases in biochar composite. Pseudo second order model was found to fit best to the kinetic data for chromium. High removal efficiency of chromium was recorded in the acidic pH range. The thermodynamic parameter $\Delta H°$ and negative but higher value of ($\Delta G°$) shows the endothermic and spontaneous nature of the adsorption process. Post adsorption FTIR and XPS confirmed the adsorption of chromium on the surface of the composite.

Keywords*—*Biochar, chromium, adsorption, siltstone

A Novel Estimator of Finite Population Variance

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***Abstract*—**A new alternate and calibrated estimator for finite population variance has been demonstrated in stratified sampling design. This has been done by employing knowledge of higherorder moments of an auxiliary variable. Both estimators satisfactorily compare with each other as well as (Kadilar and Cingi (2006)) estimator. The study concludes that both estimators are performing well in natural and artificial populations.

Keywords*—*auxiliary variable, calibration, efficiency, percent relative bias, stratified sampling, unbiased.

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Production of single cell protein from *rhizopus oligosporus* using agro-industrial waste product (nakku – broken rice) as substrate

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***Abstract*—**This study aims to utilize the Agro-industrial waste nakku as a substrate to produce Single Cell Protein using Rhizopus oligosporus (ABGC 1) through submerged fermentation. The SCP produced is a cost and eco-friendly protein alternative that can be utilized to overcome the global protein and feed shortage along with reduction of environmental impact caused by solid waste of rice milling. The primary objectives of the research are obtained through proximate analysis of nakku, grinding and hydrolysis of nakku as pre-treatment, submerged fermentation. The quantitative analysis of dry mass and supernatant that are produced at the end of process was also carried out to determine the maximum output. In this way all the beneficial components are used for SCP production without producing any waste material. The results obtained indicates that nakku has a moisture content of 13.4 %, ash content of 1.4 %%, fiber content of 0.525 %, fat content of 2.9 % and protein content of 6.5 %. The nakku shows maximum hydrolysis at 1 % acid concentration in ground form and produce 208.5 mg/ml reducing sugar content. The optimum incubation period for *Rhizopus oligosporus* (ABGC 1) is 5 days as it produced maximum dry cell mass and protein content of (13.02 mg/ml, 8.2142 mg/ml) and (11.8 mg/ml, 7.285 mg/ ml) in hydrolyzed and non-hydrolysed media respectively. The optimum incubation temperature, pH and substrate concentration are 300C, 5, and 5 % as it produces maximum dry cell mass and protein content of (12.3 mg/ml, 5.487%) (12.3 mg/ml, 5.487%) and (20. 74 mg/ml, 7.428%) respectively. The optimum nitrogen source was discovered to be ammonium nitrate with a dry cell mass and protein yield of 6.46 mg/ml and 4.928%. The quantitative analysis of *Rhizopus oligosporus* (ABGC 1) shows that it contains protein content of 32.96%, ash content 2.4%, fiber content 8.8 %, fat content 2.5 % and moisture content of 1.2 %. The dry cell mass produced can be directly utilize as feed due to its non-toxic nature and high nutritional content.

Highly Flexible Amino Functionalized Metal Organic Framework/rGO Composite Film for Advanced Anodes for Li-ion Batteries

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***Abstract*—**Advanced electrode design is crucial in the rapid development of flexible energy storage devices for emerging flexible electronics. Metal-organic frameworks (MOF) for lithium storage have gained intensive attention, but their key limitations are the low electronic conductivity and limited cycling stability under redox conditions. An introduction of functional group strategy to improve the cycling stabilities is explored, inspired by the study of the stability and structure of metal ions coordinated with the amino group. Herein, rational organization of redox active building block, 2-amino-1,4-benzenedicarboxylic acid-based metal-organic framework (MOF)

material, Ni (BDC-NH2)/rGO, was synthesized and applied as free-standing anode for the first time in lithium-ion batteries. Compared with Ni (BDC)/rGO and Ni (BPDC)/rGO composite films the Ni (BDC-NH2)/rGO electrode deliver high specific discharge capacity 2145 mAh g-1 based on mass of Ni (BDC-NH2), along with superior highrate capability and excellent cycling stability for 1000 cycles at 1 Ah g-1. Furthermore, electrochemical behaviors of Ni (BDC-NH2)/rGO anode material at different states of discharged and charged were carefully investigated through X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), and X-ray photoelectron spectroscopy (XPS). Discussing the electrochemical performances on the basis of capacity contributions from the central metal (Ni+2) and organic ligands (oxygen and nitrogen) proposes an alternative mechanism of enhanced capacity for the MOF materials used in lithium batteries. This improved understanding will shed light on the designing principle of MOF-based freestanding electrode for their practical application in battery sciences.

Keywords—*Chemical Synthesis, Metal Organic Framework, Anode, Electrochemical Performance, Flexible Lithium-ion Batteries.*

Coal desulfurization through synthesized imidazolium base ionic liquids to combat climate change

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***Abstract*—**This research is aimed to synthesize halogen free room temperature ionic liquids (RTILs) as agents for the extraction of sulfur compounds from coal. RTILs are 1-methyl dimethyl imidazolium sulfate [Mim^+][$MeSO_4^-$], 2-ethyl dimethyl imidazolium sulfate [Eim^+][$MeSO_4^-$], 1-methyl imidazolium perchlorate [Mim^+][$HClO_4^-$] and 2-ethyl imidazolium perchlorate [Eim^+][$HClO_4^-$]. These RTILs are synthesized by one pot greener route and characterized using Fourier Transform Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance Spectroscopy - Proton (H^1 NMR), and Dynamic Scattering Calorimetry (DSC) for detailed insight into structural and functional characteristics of RTILs. The synthesized RTILs were employed as extractive agents for the removal of organic and inorganic sulfur compounds from the coal. Coal, which is an extensively used fossil fuel for the energy generation from thermal power plants, is emitting noxious pollutants. Emitted SO_x and NO_x have detrimental effects on living and non-living environment. Considering these facts this research aims to design desulfurization system to study the effect of extractive, oxidative and catalytic extraction. Hydrogen peroxide (H_2O_2) as oxidants and synthesized metal oxide nanoparticles were used as a catalyst. Oxides of zinc, nickel, zirconium, iron, titanium were synthesized by biogenic and co-precipitation methods. Various operating parameters i.e. Extraction time, RTILs to coal and oxidant ratio were investigated. It is evident from X-Ray Photoelectron Spectroscopy (XPS) results that the extraction efficiency of sulfur compounds was mainly dependent on the dosage of H_2O_2, RTIL, and the catalyst. Moreover, the highest desulfurization efficiency i.e. 60% was obtained at 30℃ with optimized ratio of RTIL: Coal: H_2O_2 without significantly affecting the calorific values of coal. Furthermore, the experimental results are indorsed by Higher Performance Liquid Chromatography

(HPLC) and Gas Chromatography-Mass Spectrometry (GCMS) for studying the separation and fragmentation patterns of sulfur compounds. The synthesized materials were found very efficient for remediation of organic as well as inorganic sulfur content of coal as validated through XPS results in this research.

Keywords—*Coal desulfurization; Ionic liquids; climate adaptation.*

Forecasting GDP and exchange rate using ARIMA models: evidence from Pakistan

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***Abstract*—**Gross Domestic Product (GDP) and Exchange Rate are significant indicators to describe and evaluate economic activities and level of developments. The decision makers are also used to plan economic policy. The main objective of this study is to modeling and forecasting GDP and Exchange rate in Pakistan. To achieving prescribed objectives, this study used Box-Jenkin (JB) methodology. Yearly data is taken from World Development Indicator (WDI) from 1970 to 2017. The data is normal after taking log and data is stationary after taking first difference. For stationary test; ADF test is used. Based on the results, ARIMA (2, 1, 7) found to be the best model for GDP and ARIMA (5, 1, 7) was the best model for forecasting the exchange rate. The selection of ARIMA model is based on lowest AIC. Therefore, ARIMA based models gives suitable results for forecasting GDP and exchange rate in the evidence of Pakistan.

***Keywords*—** *Pakistan, GDP, WDI, ADF, ARIMA, JB, AIC, Forecasting*

Microbial transformation is a power tool for structural modification of progestin, dydrogesterone

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***Abstract*—**Microbial transformation is one of the well-known methods to obtain biologically active compounds in which pure enzymes, partially pure enzymes, whole cell cultures of plants, animals or microorganisms act as chemical reagents. The vast amount of work in this area has been stimulated by the medicinal importance of steroids, and the desire to develop new drugs with new or improved pharmacological properties. Various kinds of steroid modifications, such as hydroxylation, epoxidation, dehydrogenation, oxidation, reduction, hydrolysis and acetylation are now routinely performed on industrial level using a wide variety of microorganisms. Many of these reactions can not be achieved by means of conventional chemical synthesis. Through microbial reactions, many novel intermediates for the synthesis of new steroid pharmaceuticals have become available. Dydrogesterone (1) is a progestin, similar to the naturally occurring

sex hormone, progesterone. It is a familiar drug, used to treat premenstrual syndrome, infertility and endometriosis. Microbial transformation of dydrogesterone (1) by using fungal cultures afforded amazing derivatives. We obtained two derivatives by incubation of dydrogesterone (1) with *Gibberella fujikuroi* using standard two-stage fermentation protocol with interesting biological activities. Structures of these metabolites were deduced through modern spectroscopic techniques.

Keywords—*Microbial transformation, progestin, dydrogesterone, Gibberella fujikuroi*

Evolution and merger timescales of intermediate mass black hole binaries in non-nucleated dwarf galaxies

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Abstract—Intermediate mass black holes are the most elusive class of the black hole. After the launch of LISA, we will get a definite proof of IMBH existence by studying their mergers. One of the hot-spots for IMBH detection is the dwarf galaxies and as non-nucleated dwarf galaxies make up 71\% of the dwarf galaxy population, we find it prudent to question that whether or not non-nucleated dwarf galaxies are promising sources for IMBH merger detection for LISA in the future. We generated galaxy models with IMBH pair using scaling relations from various surveys and performed a set of ultra-high-resolution N-body simulations. We found that the IMBH pair takes hundreds of Myrs to shrink from 100 pc down to 10 pc. The binary usually forms at 10 pc in our cases and due to low central stellar density, the binary orbit shrinks down to 0.03-0.001 pc within Hubble Time which is much larger than their Schwarzschild radius. None of the IMBH binaries coalesced in our simulations. The eccentricities of our IMBH binaries are typically higher (0.6-0.9). In the case of very high eccentricity in high density models, the IMBH binary would coalesce in 5 Gyrs. We report that absence of a nuclear star cluster resulting in low central stellar density impedes the binary evolution. Given our results, we conclude that IMBHs binaries with comparable masses are unfavourable sources of gravitational waves for LISA as they do not coalesce in non-nucleated dwarf galaxies

Keywords— *black hole physics, kinematics and dynamics, Non-nucleated dwarf galaxies, gravitational waves, numerical method*

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Exploration of Metal Organic Frameworks for Batteries Application

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***Abstract*—**Metal-organic frameworks (MOFs) are constituting new classes of highly crystalline advanced permeable materials that have purchased significant courtesy due to their incredible characteristic such as large surface area, highly ordered pores/channels, and controllable crystalline structure. However, the main hurdles to their various applications in photocatalytic activity and novel energy storage/conversion devices are their low structural stability and electrical conductivities. Therefore, substantial research has been directed to maximize their advantages and mitigate the shortcomings of these fascinating materials. In our review article, we first introduced the background and brief timeline of MOF development and notable milestones followed by a systematic overview of the different synthetic procedures and recent achievements and milestones of their applications in lithium-ion batteries (LIBs). Finally, the challenges and future perspectives on further developing high-performance MOF materials for battery application are discussed.

Keywords*—Metal Organic Framework, History, Synthesis, Applications, Li-ion batteries.*

Fabrication of ZnO/Ag nanohybrid by green route for antimicrobial applications

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***Abstract*—**The purpose of the current study was to synthesize ZnO/Ag nanohybrid by green route that was eco-friendly and cost-effective approach due to less usage of chemical solvents. The date palm mucilage (*Phoenix dactylifera*) was used as a reducing and capping agent. The average hydrodynamic size of ZnO/Ag nanohybrid was 183.4 nm by DLS. The diffraction peaks at 31.5°,34.5°,36.2°,47.6°,63° and 68° 2-theta correspond to the hexagonal wurtzite crystalline phase of ZnO. An additional peak at 38° 2-theta that was corresponded to the face-centered cubic structure of Ag, confirmed the formation of ZnO/Ag nanohybrid. Scanning electron microscopy was used to determine the morphology. The particles were found in sphere like structure. Antibacterial activity of synthesized ZnO/Ag nanohybrid was determined by using agar well diffusion method. *S. aureus* and *B. subtilis* were used as bacterial strains, the ZnO/Ag composite resulted in 15.3±0.58 mm and 15.7±0.58 mm zone of inhibition respectively. The ZnO/Ag nanohybrid was found to have antibacterial potential that may be used to formulate antibacterial cotton bandages and hand sanitizer in future.

Keywords*—nanohybrid, date palm mucilage, antibacterial, ZnO/Ag*

HSK ENGINEERING

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Unveiling the dust properties at higher redshifts through depletions

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***Abstract*—**The best way to analyze the abundances of elements at high red shifts is using dampened Lyα absorbers. The Ultraviolet Visual Echelle Spectrograph (UVES) on the Very Large Telescope collected the data of the Damped Lyα absorbers in the spectra of background quasars (VLT). The abundances, depletion patterns, and trends in the metallicities of the elements (O, Si, S, Mg, Zn, and Fe) are investigated. Low abundances compared to solar abundances are caused by nucleosynthetic over- or under abundances or dust depletion effects. In our data sample, the nucleosynthetic impacts appear to be less pronounced than the dust depletion effects. In our data set, silicon is the element with the greatest depletion. The three data sets literature data set, our data set, and galactic data set are used to determine the depletion sequences for the elements. Comparing the two procedures after applying each to a different set of data reveals that both produce the same results. The two data sets can be compared to show that the depletion sequences for the different elements are nearly identical. According to the method, the elements' Pearson coefficient is as follows: For the first approach, the 'r' values are: δ_O =-0.73, δ_{Mg} =-0.89, δ_S =-0.48, δ_{Fe} =- 0.99, δ_{Si} =-0.84, δ_{CI} =-0.78 and for the second method, δ_O =-0.87, δ_{Mg} =-0.37, δ_S =-0.54, δ_{Fe} =-1, δ_{Si} =-0.72, δ_{CI} =-0.64. Iron, magnesium, oxygen, and silicon have nearly identical dust phase elemental abundances in our dataset and the literature dataset.

Keywords*—Damped Lyα absorbers, dust depletion, metallicities, comparison*

Assessment of Oxidative Stability of Various Commercial Oils Under Different Storage Conditions

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***Abstract*—**Edible oils are among the major source of energy, essential fatty acids and provides flavor to our food. The primary objective of this research work was to investigate oxidative stability of various commercial oils including, palm, soybean, canola, cottonseed and rapeseed oil. Refined bleached and deodorized samples of these edible oils were subjected to different storage conditions and their oxidation stability was determined. Samples of these edible oils were kept at different conditions including room temperature, 40◦C and 50◦C temperature each in the presence and absence of light for three-month duration. After every 10 days interval samples were collected from the stored oils under different conditions and their oxidative stability was checked by performing different tests including, free fatty acid value, peroxide value, para-anisidine value as well as dienes, trienes values. In addition to these chemical tests fatty acid composition of these selected oils was also analyzed with the help of

GC-FID. Tocopherol contents were determined by using HPLC chromatography. Metal ion analysis was also performed by using ICP-OES which determines percentage of ions which also contribute towards oxidative stability. Total phenolic as well as flavonoid contents were also determined by using UV-visible spectrophotometer. Overall more distinct oxidative changes were occurred in soybean oil which was clear from chemical test, composition analysis as well as other analysis: nevertheless, all other oils also revealed significant changes when were stored at 50◦C temperature in the presence of light as compare to other storage conditions. This research work was planned for developing storage plan for edible oils so that we can assess usefulness for cooking purpose as well as to check rancidity of oils occurred due to unsaturated fatty acids which are major part of edible oils.

Keywords—*Edible oils, Fatty acid composition, Tocopherols, metal ions, Storage conditions, oxidation parameter, titrations etc.*

Biocontrol rhizobacteria enhances growth and yield of wheat (*Triticum aestivum*) under field conditions against *Fusarium oxysporum*

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***Abstract*—**The current study aimed to identify the survival of bio-control bacteria with antifungal activity against *Fusarium oxysporum* and assess their growth promoting activity in wheat crop field conditions. To evaluate the fungicidal activities of isolated bacteria using the dual culture method, both qualitative and quantitative bioassays were performed. Plant Growth Promoting activities such as Indole 3-Acetic Acid, Phosphate solubilization, Hydrogen cyanide, and Siderophore production were assessed for three bacterial isolates (BCB 07, BCB16 and BCB 83) out of 180 with 70% antagonistic activity against *Fusarium oxysporum*. Chitinase, protease, and cellulase interaction in isolates was also tested. BCB16 was selected as it had 70% antagonist activity against *F. oxysporum* but also had the highest PGPR traits when compared to the other two isolates. BCB16 was also tested for survival in talc powder and in wheat crop field conditions. Even after 4 months in talc powder, the survival rate remained stable. 84.7% and 72.5% significance effectiveness were observed in wheat seed germination assay with positive and negative control respectively. In a wheat crop field, BCB16 reduced the disease incidence of *Fusarium oxysporum* by 57%. When compared to fungus alone treatment, BCB16 increased average yield by 20-30% either alone or in challenged conditions. BCB16 was identified molecularly using the 16s rRNA gene. *Bacillus amyloliquefaciens* shared 97% of the deduced sequence. The sequence was submitted to genebank and assigned

the accession number OM333889. *Bacillus amyloliquefaciens* has the potential to be used in the field as an alternative to synthetic fungicides against *Fusarium oxysporum*.

Keywords—*Biofungicide; Fusarium oxysporum; Bacillus amyloloquefaciens; PGPR; Wheat*

Synthesis and Characterization of Sulfonated Copolyimides for Lead Ions Adsorption from Aqueous Media

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Abstract—Thermally stable, high performance sulphonated co-polyimide adsorbents (OBM and FBM) having excellent adsorption ability were prepared via two-step thermal imidization reaction. By the introduction of hydrophilic sulphonic acid groups into the polyimide backbone material's hydrophilicity was improved. The anionic sulphonate group bears strong affinity towards heavy metal ions. Improvement in polymer hydrophilicity enhances the heavy metal ions adsorption capacity due to feasible access of adsorption sites. Atomic absorption spectroscopy (AAS) was employed for heavy metal ions adsorption studies. In addition, quantum chemistry calculations using Molecular Operating Environment (MOE) software were performed, to scrutinize the experimental results for molecular surface studies. A good correlation was observed between computational and experimental findings. OBM was demonstrated to be more effective for Pb (II) removal from aqueous media with higher qe and 99 % removal as compared to FBM. The synthesized sulphonated copolyimides are potential adsorbents for heavy metal ions.

Keywords—*sulfonated copolyimides, thermal imidization, lead ions adsorption*.

Screening of bacterial isolates from Potohar region for antimicrobial resistance and heavy metal tolerance in water and soil bacterial isolates

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Abstract—Discharge of effluents from the industrial area (including heavy metals and antibiotics) into the environment adversely affects the health of humans living in that surrounding area. This study was focused on the Bioremediation of effluents by using metal tolerant and antibiotic-resistant strains. A total twenty different isolates were isolated from the wastewater and four from the contaminated soil. Different biochemical tests were performed

for their characterization. Bacterial isolates were inoculated into different agar plates containing 50 ppm, 100 ppm, 200 ppm and 300 ppm concentrations of Lead. All isolates were grown in contaminated water to check their activity for lead removal. For antibiotic resistance, isolates were inoculated into agar plates along with standard antibiotic discs. Most of them were Gram-positive. All isolates were resistant to high concentration of Lead. In a consortium, most of the antibiotic resistance strains have ability to reduce the lead concentration. We conclude that these bacterial strains can be used in industrial areas for bioremediation purposes.

Keywords*—*Wastewater, Antibiotic resistance, Metal tolerance, Bacteria, Bioremediation

Deficiency of vitamin D in the adult population of the twin cities of Rawalpindi and Islamabad

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***Abstract*—**A worldwide prevalence of vitamin D deficiency has been observed. One of the leading causes of vitamin D insufficiency is malnourishment in growing children and adults in developing countries. Lack of balanced diet due to poor socioeconomic status of studied population was also the contributing factor along with reduced dietary intake of vitamin D and unhealthy diet consumption. Children with vitamin D insufficiency develop rickets, whereas adults with vitamin D deficiency develop osteopenia, osteoporosis and fractures. Without sufficient time spent in the sun, daily requirement of vitamin D3 intake ranges from 800 to 1000 IU for children and adults. This study determined the socio-demographic pattern of vitamin D insufficiency in Rawalpindi and Islamabad. Direct enzyme-linked immunosorbent assay method was used for assessment of vitamin D levels in the studied population. Data was statistically examined. The results revealed that 65.0% of males and 62.5% of females had vitamin D deficiency. Therefore, intake of proper balanced diet along with supplementary administration of vitamins and adequate exposure to sunlight is recommended.

Keywords*—*Vitamin D, Deficiency, Malnutrition, Hypervitaminosis, Rickets

Biowaste-derived thermally activated carbon for bio-adsorption/chelation of heavy metals

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***Abstract*—**Heavy metal-contaminated wastewater (lead and copper) discharge is the leading source of global water contamination. Activated carbon from bio-waste (spent black tea waste) has controllable pore size, good thermal stability, large surface area and high adsorption capacity which makes it useful in heavy metals removal from wastewater. Thermal treatment of spent black tea waste produces activated carbon as a bio-adsorbent. This

activated carbon was treated with bio-waste to remove heavy metals. The spent black tea waste was washed, acid-treated, and then heated to produce carbonaceous material. Characterization of activated carbon was done by Fourier transform infrared spectroscopy, scanning electron microscopy and X-ray diffraction analysis. Optimizing of bio-adsorbent efficiency was done on standard solutions of water contaminated with heavy metals. Our results indicated that activated carbon prepared from spent black tea waste can be used effectively for removal of heavy metals from wastewater.

Keywords—*Activated carbon, Bio-adsorbent, Contamination, Bio-waste, Tea*

Comparative Analysis for Phytoaccumulation Potential of Native Macrophyte Species of Pakistan to Develop a Small Integrated Ecosystem Design for Cleaning of Rivers

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***Abstract*—**It is very difficult to use expensive technology on large scale to decontaminate rivers, therefore use of plants can efficiently cut the cost of this process. Plants are well known for their properties for decontamination of water, air and soil. This study was done to check Water hyacinth, Salvinia and Water lettuce for their maximum tolerance against heavy metals and whether these plants can be use as fodder for cattle. These objectives were achieved by growing these plants in water with different concentrations of heavy metals. The results showed that the plants can tolerate very high concentration of heavy metals like Lead, Cadmium, Chromium, Copper and Iron. Higher accumulation in plant parts means that these plants cannot be used as a fodder but vegetative growth was still enough to be considered as a good biomass for making biofuels.

Keywords—*Heavy metals, Plants, Bioremediation, Fodder, Biofuels*

Efficiency of locally isolated bacteria to remove heavy metals from industrial effluents

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***Abstract*—**Heavy metal toxicity is a global problem for the mankind and has major threat to human health and the environment. Among these heavy metals lead and cadmium are considered as widespread environmental contaminants. The aim of this study was to isolate bacterial strains which can remove or reduce the heavy metal

toxicity from the contaminated water bodies. The bacteria were isolated from the heavy metal contaminated sites and were characterized morphologically and biochemically. The bacterial isolates were tested for their bioremediation potential. The growth curve was variable for all the bacteria and showed resistance with the metals. Selected bacterial strains showed maximum removal efficiency of 97% and 90% against 2 ppm Cd and 5 ppm Cd respectively. Maximum removal efficiency of bacterial strains was 98% and 94% at 10 and 50 ppm lead concentration. Minimum removal efficiency (28.3%) was noted at 5 ppm cadmium in some of the bacterial strains. These bacterial strains possess excellent potential and capability to biodegrade the heavy metal and to utilize this research in future for the waste and pollution treatment.

Keywords— *Bacterial strains, Bioremediation, Biodegrade, Lead, Contaminants*

Nutritional Analysis Of Arisaema Species Used By Local Communities Of Murree

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Abstract—Nutritive values of two members of genus Arisaema (Araceae or Arum family) has been investigated, viz. *Arisaema flavum* and *Arisaema jacquemontii*, those are also known as very poisonous wild plants locally. By using standard techniques for proximate analysis, protein content, crude fat content, carbohydrate, ash content and moisture content (both wet and dry) were assayed using AOAC methods. The species showed variable results in proximate analysis as the nutritive values of these plants were compared with other conventional vegetables and edible plants. The results clearly revealed that these wild plants species have imperative nutritional properties. Thus, these wild plants could serve as good & cheap sources in human diet. These species can be used by local peoples in emergency i.e. during famine or scarcity of food. According to customary knowledge, about its medicinal use, of local inhabitants of study area these both species are used with edible oil to form a mush. This mixture is applicable on skin for massage in order to relief pain of knees and muscular fatigue.

Keywords— *Arisaema, nutritional, conventional, medicinal use.*

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A Quick and Comparative Analysis of Genome-Wide Association Studies (GWAS) and Next Generation Sequencing (NGS)

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***Abstract*—**Improvements in different approaches, especially those associated with genome analysis, e.g., GWAS and NGS, have enabled researchers to explore and understand different factors responsible for disease and develop the phenotypic-genotypic association. This work compares GWAS and NGS in terms of their efficiency in developing phenotypic-genotypic associations. In order to find out phenotypic associations with genotype, Genome-Wide Association Studies (GWAS) usually employ the involvement of genetic analysis of variants by targeting genomes of many individuals, followed by their statistical analysis to determine their association with specific diseases or traits. At the same time, Next Generation Sequencing (NGS) usually involves fragmenting Nucleic acids (DNA/RNA), adding adapters, then sequencing and reassembling the libraries to form a genomic sequence. In the case of novelty and association of variants with their traits, GWAS has successfully identified novel variant-trait associations with modest risk factors, while NGS deals with rare variants associated with conclusive risk factors. Casual variants are generally not identified by GWAS, while NGS is comparatively specific as it is involved in detecting not only known polymorphisms but the novel sequence variants too. GWAS comprises dry lab steps, while NGS is based on dry and wet lab experiments. GWAS poses limitations as it depends on sample size and grows with the increase in sample size, while NGS starts from a small amount of total DNA for gene sequencing relevant to a given phenotype, thus independent of gene size. Single Nucleotide Polymorphisms (SNP), especially those associated with economically important traits, have been identified primarily in crops using GWAS through genotyping. In contrast, high-throughput sequencing of new influenza viruses for the detection of viral genome variation and evolution investigated by NGS, e.g., Human Immunodeficiency Virus (HIV) and hepatitis C virus, along with monitoring of low-abundance antiviral drug resistance mutations. In conclusion, the advances in quality levels of sequences could enable researchers to address biological phenomenon based on sequence diversity and accurately explore phenotypes.

***Keywords*—** *SNP, phenotype, genotype, sequence, variants*

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Efficiency of Molecular Markers to Study various cultivated lines of *Brassica napus*

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Abstract*—Brassica napus*** is a bright-yellow flowering member of the family Brassicaceae, cultivated mainly for its oil-rich seed, which naturally contains appreciable amounts of erucic acid and glucosinolates which gave the oil an unpleasant bitter taste to the crops. *B. napus* is an allopolyploid crop derived from interspecific crosses between *Brassica rapa* and *Brassica oleracea*e. *B. napus* and its subspecies are commonly known as annual rape, canola, oilseed rape, rape, rapeseed, summer rape and winter rape. It is the most important oilseed crop in Europe and the second one over the world after soybean. Traditionally different morphological, phenological and agronomical traits have been employed as criteria for the introgression of new variation into plant breeding lines. In recent years, different molecular genetic techniques like Restriction fragment length polymorphism (RFLP), Simple sequence repeat polymorphism (SSR), Amplified fragment length polymorphism (AFLP) and Randomly amplified polymorphic DNA (RAPD) have been increasingly used to characterize and identify novel germplasm for use in crop breeding. These markers provide good reproducibility and increased resolution by the concurrent incidence of dominant and co-dominant bands. These molecular markers are not regulated through the environment and conditions have no effects in which the crop plants are grown and observable in the stages of growth of plants. Among all, one of most efficient marker techniques is Randomly Amplified polymorphic DNA (RAPD) that gained importance due to its simplicity, efficiency, relative ease to perform and non-requirement of sequence information RAPD markers generated by the polymerase chain reaction (PCR) has widely been used since 1990s to assess intra specific genetic variation at molecular level. RAPD is basically DNA based marker that target different portions of the genome which are subjected to different mechanisms generating genetic variation. Polymorphic bands of a RAPD primers may bind to many parts of the genome, so each primer may give information on the polymorphism of several chromosome regions. The current study reports genetic diversity within plant germplasm collection of brassica crops by using molecular markers.

Keywords*—*Genetic diversity, Molecular Markers, RAPD.

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Evaluation of Heavy Metal Status in Lung Disease Patients of Different Cities of Pakistan

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***Abstract*—**Human exposure to toxic heavy metals in the air is steadily increasing, especially in developing countries due to industries. Oxidative stress is one mechanism through which heavy metals cause detrimental effects on human health. The development of lung diseases, which has emerged as one of the most significant global risks to the health of a population, is directly influenced by heavy metal exposure. This study aims to determine the concentration of toxic heavy metals (Cd, Pb, Cu, SO_x, and Zn) in the whole blood of lung disease patients and in the control group from different cities in Pakistan. Sixty-five patients (30–60 y) and 50 healthy subjects of the same age groups were included. Both controlled and lung patients were of the same socio-economic status, localities, and dietary habits. The whole blood samples were oxidized by a mixture of 65% nitric acid: 30% hydrogen peroxide (2:1) ratio in a microwave oven. All digested samples were analyzed for different heavy metal concentrations using flame atomic absorption spectrometry (FAAS). The concentration of heavy metals is more in lung patients of the industrial site because those people become more susceptible to exposure to that atmosphere. So, these heavy metals become one of the risk factors for Lung diseases. Understanding potential risk factors in industrial regions that contribute to Lung illnesses and their complications aids in developing effective regional patient preventive and care strategies.

Keywords*—Heavy metals, lung diseases, oxidative stress, Whole blood and FAAS*

Prevalence of Diabetes type-II in Attock District

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***Abstract*—**Diabetes mellitus is a major health issue in Pakistan. The prevalence of diabetes has increased over the last few decades along with obesity. The main aim of my study is to investigate the prevalence of type II diabetes and pre-diabetes and its risk factors in the Attock District Pakistan. This study was a population based cross-sectional analysis of 1650 individuals of age 20-80 years, using cluster random sampling technique. After an overnight fast, diabetes and pre-diabetes were analyzed according to the World Health Organization recommendation. The prevalence of diabetes and prediabetes was 11.1% and 16.0%, respectively. Type II diabetes was found 11.0% in female and 11.2% in male subjects. Stepwise multiple logistic regression showed that growing age, positive family history, body mass index (obesity), hypertension, exercise (less physical activates), education, monthly income, are statistically significant risk factors with type II diabetes. Our results suggest that type II

diabetes has become a main health problem in Attock District and better strategies are required to handle this problem.

Keywords*—*BMI, Cross-sectional analysis, Hypertension, Type II diabetes.

Impacts of plant growth promoting rhizobacteria, Salicylic acid and Zinc sulphate on the isolation and characterization of the essential oil from leaves of *Rosa gruss-an-teplitz*

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***Abstract*—**The present investigation was aimed to determine the Impacts of plant growth promoting rhizobacteria (PGPR), Salicylic acid (SA) and 1% Zn $(SO_4)_2$ on the content and composition of essential oil from leaves of *Rosa gruss-an-teplitz* was extracted by using solvent extraction method and subjected to GC MS analysis. The maximum yield of crude oil and absolute oil (10.85% and 160% higher than the control) was obtained by the combined treatment of *pseudomonas putida* + salicylic acid. Leaves of Plants grown in pots showed (15.35% crude oil and 370% absolute oil percentage then the control). All the treatments induced the synthesis of Eucalyptol of varying Concentration in addition to different bioactive compounds used in perfumery and also have bio control potential. In the field grown plants, absolute oil of *pseudomonas putida* + salicylic acid, *Bacillus Cereus* + salicylic acid treated plant Leaves revealed Eucalyptol as the main constituent with Camphene, Caryophyllene and Fenchol. Salicylic acid treatment yielded Trimethyl bicyclo heptane, D-limonene and O-cymene. Combined treatment of 1% Zn $(SO_4)_2$ + *pseudomonas putida* and 1% Zn $(SO_4)_2$ + *Bacillus cereus* identified Trimethyl bicycle heptane, Camphene, Caryophyllene oxide and Fenchol respectively. Combined treatment of salicylic acid + *pseudomonas putida* and salicylic acid + *Bacillus cereus* also produced α-pinene, camphene and Methyl isocyanides respectively. In potted plants, treatments with *pseudomonas putida* and *Bacillus cereus* in addition to Eucalyptus yielded endo-Borneol, Isopulegol acetate, Fenchol, Caryophyllene and Caryophyllene oxide. It is inferred that PGPR, Salicylic acid and Zn $(SO_4)_2$ can induce the synthesis of bioactive compounds in leaf oil which have pharmacological applications.

Keywords*—*Rosa gruss-an-teplitz, Essential oil, Plant growth Promoting Rhizobacteria, Salicylic acid.

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Protonated Polyanilines as potential adsorbents for Removal of Dyes

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***Abstract*—**Potential adsorbents play a significant role for the removal of conventional and hazardous micropollutants from wastewater. The current study reports the synthesis, characterization and application of polyaniline (PANI) and its two derivatives by selecting pre-substituted monomers at ring (poly 4-amino phenol; PpAP) and Nitrogen atom (poly N-methyl aniline; PNMA) prior to polymerization. The synthesized polymers were characterized by FTIR, XRD, TGA, SEM, TEM, BET and UV–Vis techniques. Meanwhile, these polymers were used to eliminate textile dyes. Initially, the batch mode study was applied to investigate the adsorption capability of adsorbents towards the removal of the methylene blue (MB) dye by varying the effect of parameters as contact time, initial MB dye concentration, amount of adsorbent, and pH. For PNMA, PpAP, and PANI, the maximum dye adsorption capacities were determined to be 320, 311, and 299 mg/g, respectively. These results were further verified by the computational studies. Thermodynamics of adsorption studies were best described by Langmuir adsorption isotherm whereas kinetic studies revealed that pseudo second order model is best fitted. The polymers adsorption capacity was restored without any significant reduction after washing simply with water and ethanol. On the other hand, FTIR study of the MB before and after adsorption explains that a number of interactions are involved in the adsorption of MB. Overall, this study explores the potentiality of conducting polymer adsorbents for model dye Methylene Blue removal under optimized condition with 98% efficiency and for real sample taken from Faisalabad textile industry up to 96% dye removal efficiency. Based on the above results the polymer adsorbents may be recommended for practical use in wastewater.

Production and characterization of biodiesel from duckweed (Lemna sp.), *Eichhornia crassipes*, and *Pistia stratiotes*.

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***Abstract*—**Some of the most invasive aquatic weeds include *Eichhornia crassipes*, *Pistia stratiotes*, and Lemna minor. These aquatic weeds have a high potential to become an ideal feedstock to make biodiesel by extracting their lipids and using them by direct FAME (fatty acid methyl ester) by the trans-esterification process. Samples were collected from the pond and botanical garden and then processes in an oven and grind and stored. The proximate analysis showed that *L. minor, P. stratiotes, and E. crassipes* contain 3.6%,18.6%, 60.0%, and 18.8%; 5.3%, 21.7%, 47.0%, and 24.6%; 4.5%, 25.1%, 47.0% and 26.9% moisture, ash, volatile matter, and fixed carbon respectively. Total lipid content determination in dry weight showed that *L. minor, P. stratiotes, and E. crassipes* contain 12%. 4.11 %, and 16.79 % lipids in dry-weight biomass respectively. *P. stratiotes* contained the highest acid value and FFA. Extraction of lipids from the Soxhlet apparatus is preferred over Bligh and Dyer method because of its cost-effectiveness. Trans-esterification with HCL and methanolic NaOH give yields of 90%,

82%, and 89% for *L. minor, P. stratiotes, and E. crassipes* respectively. H2SO4 and methanolic KOH give yields of 91%, 83%, and 85% for *L. minor, P. stratiotes*, and *E. crassipes* respectively. Physiochemical properties like acid value, free fatty acids content, moisture, saponification value, and densities of the biodiesels were analyzed. Acid values and FFA were higher in P. stratiotes biodiesel. The density and viscosity of L. minor biodiesel were the highest. Emission monitoring of biodiesels was done with a testo flue gas analyzer. Emission monitoring of biodiesel showed a significant reduction in SO_2 and NO and no emissions of NO2 were detected in all three samples. There was an increase in CO and CO_2 due to increasing oxygen content in all three samples of biodiesel. The smoke significantly 40% decreased for L. minor and *E. crassipes* while 20% for *P. stratiotes* as compared to diesel. GCMS analysis showed that the fatty acid content of biodiesel of three samples is significantly related to others in the literature. Among the three weeds, Lemna minor has all the good properties of the other two weeds which makes it desirable and favorable for biofuel production.

Keywords—*FAME (fatty acid methyl ester), biofuel production, Eichhornia crassipes, Pistia stratiotes, Lemna minor*

Production, characterization and emission monitoring of biodiesel produced from fish waste

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Abstract—Biodiesel provides an alternative source of energy fuel, which is sustainable, eco-friendly, clean, non-toxic and biodegradable. It helps to get rid of fossil fuels that are not only depleting due to immense using but also causing health issues for humans and environment. The objectives of present study were to produce biodiesel from fish waste. Then characterization and emission monitoring of produced biodiesel by blending in different ratio's with petro-diesel. Fish waste used as oil source for biodiesel production. As the fish, waste is of no use and mostly dumped to landfill site where it causes various environmental problems so we can convert it into valuable product as circular economy. Fish waste of mixed fresh water fishes in present study contain 33% of lipid content showing high potential to be use as biodiesel feedstock. Biodiesel was prepared by single step and two-step transesterification methods. Single step transesterification was carried out by homogeneous base NaOH catalyst but this was not converted into biodiesel because of high acid value of WFO. On other hand two-Step transesterication done by using different homogeneous acid catalyst like H_2SO_4, HCl, HNO_3 and H_3PO_4 in first step in order to reduce acid value and FFA%. Then each of them treated with KOH base catalyst. The biodiesel yield of two-step transesterification by H_2SO_4, HCl, HNO_3 and H_3PO_4 were 91%, 81%, 85% and 74% respectively. Highest biodiesel yield was obtained using H_2SO_4 catalyst and physicochemical properties like kinematic viscosity 3.9 cSt, density 0.8 g/ml, acid value 0.6 mg KOH/g and refractive index 1.33 RIU were with in ASTM standards as compared to other catalyst therefore further GCMS analysis was done for confirmation. Total 17 peaks were obtained in chromatogram proving successful conversion into fatty acids methyl esters. Present fatty acids were Palmitic acid, palmitoleic acid, oleic acid, linoleic acid, myristic acid, margaric acid, caproic acid, stearic acid,

cyclopropaneoctanoic acid and azelaic acid. Majorly present fatty acids were palmitic acid 31.84%, oleic acids 31.38%, palmitoleic acid 6.61%, linoleic acid 5.73% and stearic acid 5.51%. Emission characteristics have showed positive results in percentage reduction of CO, NO_x, SO_2, and smoke. Percentage reduction of emissions calculated were 15-26%, 40-100%, 63-70% and 25% respectively than petro-diesel. Moreover, biodiesel have more oxygen content that make the complete combustion of fuel possible and reduces carbon monoxide emissions as well. Thus, fish waste biodiesel can be adopted as an alternative fuel.

Keywords**—***Biodiesel, fish waste oil, transesterification, homogeneous catalyst, emissions monitoring, gas chromarography mass- spectrometry*

Utilization of targeted next-generation sequencing for quick identification of causative mutations to resolve dystrophic epidermolysis bullosa phenotypes

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Abstract**—**Dystrophic epidermolysis bullosa (DEB) is recognized as an unusual, hereditary blistering condition arising from defects in the COL7A1 gene encoding the type VII collagen anchoring fibrils, one of the most significant protein found at the dermal- epidermal junction. It can be inherited in either dominant or recessive patterns however, the autosomal recessive form is prominent and frequently severe. In this study, four patients with clinical presentation of EB were genetically resolved via Next Generation Sequencing (NGS). Clinical features included the presence of extreme blisters on body parts such as hands, feet, legs, mouth, tongue and mucosal lining, elbows and knees. For genetic analysis, blood samples from the affected individuals were collected and all eighteen EB susceptible genes were screened via NGS. Genetic analysis discovered two homozygous mutations in the COL7A1 gene consistent with DEB. The first pathogenic mutation was a novel frame shift mutation c.7315delC (p.L2439Wfs27*) on exon 95 leading to premature termination of the protein. Whereas, the second one was an already reported missense mutation c.520G>A (p.G174R) on exon 4 which lead to the replacement of Glycine to Arginine resulting in the premature protein corresponding the mutant phenotype. Parents of both families were segregating for the respective mutations and were asymptomatic. The study emphasizes the importance of targeted NGS for quick resolution of EB phenotypes and also adds to the previously reported DEB mutations along with contributing to the understanding of allelic heterogeneity spectrum of COL7A1 regarding

DEB in Pakistan. The allelic heterogeneity of mutations suggests an immediate need of prenatal and premarital screening regarding EB susceptibility in families to provide suitable management and treatment strategies.

Keywords: *Dystrophic Epidermolysis Bullosa, RDEB, type VII collagen, COL7A1*

Genome-wide identification and evolutionary analysis of CNGC gene families in sixteen Brassicaceae plant genomes

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***Abstract*—**Cyclic nucleotide-gated channels (CNGCs) are ligand-gated calcium signaling channels, play vital biological functions. Nonetheless, the *CNGC* gene families have not been well studied in Brassicaceae which includes commercially important and evolutionary model crops. Here, using in silico approaches, 414 *CNGC* genes recognized in sixteen sequenced genomes of Brassicaceae species, which represent 10 genera of 8 tribes, ranging between 10–51 genes. These CNGCs can be classified into four main groups (I-IV) and two subgroups (IV-A and IV-B), of which, Group-II CNGC is the oldest that has gradually disappeared from the *Arabis alpina* L. genome. These results present a comprehensive overview of Brassicaceae CNGC families. and provide a foundation to futuristic genomic studies for assessing and validating functions of CNGCs in plant growth, development and stress responses.

***Keywords*—** *Brassicaceae; Cyclic nucleotide-gated ion channels; Evolutionary model crops*





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