MIR CHAKAR KHAN RIND UNIVERSITY OF TECHNOLOGY DERA GHAZI KHAN

ABSTRACT BOOK

1st International Conference ON Science, Engineering & Technology

18 MARCH 2021

ICSET 2021

International Conference on Science, Engineering & Technology

Organized by
MIR CHAKAR KHAN RIND UNIVERSITY OF TECHNOLOGY (MCKRUT)
DG KHAN, PAKISTAN

1st International Conference on Science, Engineering and Technology 2021 (ICSET-2021)

Organized by

Mir Chakar Khan Rind University of Technology D.G. Khan, Pakistan

ABSTRACT BOOK OF

International Conference on

Science Engineering and Technology

MARCH 18, 2021

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Engr. Mansoor Shafiq Durrani

Engr. Dr. Waqas Aleem

AIMS & OBJECTIVES

This conference intends to engage different experts and researchers in various fields of science, engineering and technology from all across the globe to promote research activities. It will also provide a platform to students to learn about entrepreneurship and knowledge-based economy during this economic down fall of our country.

SCOPE OF CONFERENCE

The International Conference on Science Engineering and Technology aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Science, Engineering and Technology.

CHIEF GUEST

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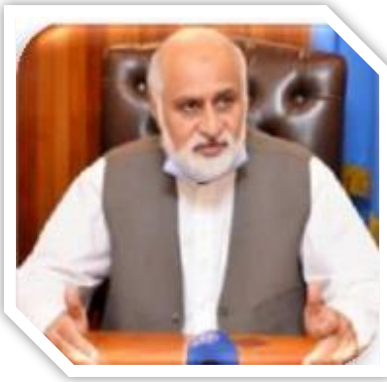

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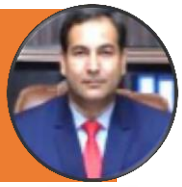

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KFUEIT, Pakistan.

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DERA GHAZI KHAN, PAKISTAN.

Sincere Greetings to all,

I would like to first of all welcome all of you to the First International Conference on Science, Engineering and Technology (ICSET-2021). It gives me great pleasure to officiate this Conference.

It is a matter of immense pleasure that MIR CHAKAR KHAN RIND UNIVERSITY OF TECHNOLOGY is organizing the 1st International Conference on Science, Engineering and Technology (ICSET-2021). This conference is organized in collaboration with the MNS-UET, KFUEIT, GHAZI UNIVERSITY, PICHE and PHEC. The conference will have a variety of lectures which will be given by eminent scientists, who will present the recent trends in basic and applied research in different fields of science, engineering and technology. ICSET aspires to be a platform that enhances the exchange of research knowledge through the cooperation between local and international universities as well as cooperation with industries in the field of Science, Engineering and Technology.

I am also grateful to the Chief Guest, Guests of Honors and Guest Speakers for their precious time. Heartfelt appreciations are due to the organizing committee members who have worked tirelessly around the clock to ensure the realization of the conference. It is our fervent hope that this interesting event will benefit participants and may this be the first of the many ICSET to come. I hope that all participants will take this opportunity to establish networking and build bridges rather than barriers in order to progress in various fields of science, engineering and Technology.

ABSTRACTS OF GUEST SPEAKERS

ICSET-101

Synthesis and characterization of Bi_2WO_6/ZnO/PANI for the complete degradation of clothianidin and arsenic in waste water

Muhammad Suleman Tahir
Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Rahim Yar Khan, Pakistan
Corresponding Author: Email: vc@kfueit.edu.pk

Water pollution has become one of the most serious threat to human beings. To overcome water pollution a heterojunction photocatalyst /Bi_2WO_6/ZnO/PANI will be synthesized by using hydrothermal method. Both Bi_2WO_6 and PANI has small band gap and porous structure. Both these materials will help to modify the band gap of pure ZnO and will enhance the photocatalytic properties of the material. Further the conjugated structure of PANI will effectively reduce the recombination of charge carriers. The structure, morphology, crystallize size, surface area and optical properties will be analyzed by using SEM, XRD, BET, UV and PL characterizations. The photocatalytic activity will be performed by using the most toxic water pollutants clothianidin and arsenic. The heterogeneous photocatalyst will effectively degrade the pollutants and will show excellent stability. This heterojunction photocatalyst will show good efficiency in future applications.

About Authors

Prof. Dr. Muhammad Suleman Tahir

Vice Chancellor, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Rahim Yar Khan, Pakistan.

Specialization: Chemical Engineering and Environmental Technology (Off-gas and Wastewater Treatment through Corona Discharge).

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ICSET-102

Adaptive Deep Brain Stimulation for Essential Tremor

Dr. Shenghong He
University of Oxford, United Kingdom.

High-frequency thalamic stimulation is an effective therapy for essential tremor, which mainly affects voluntary movements and/or sustained postures. However, continuous stimulation may deliver unnecessary current to the brain due to the intermittent nature of the tremor. We proposed to close the loop of thalamic stimulation by detecting tremor-provoking movement states using local field potentials recorded from the same electrodes implanted for stimulation, so that the stimulation is only delivered when necessary. Eight patients with essential tremor participated in this study. Patient-specific support vector machine classifiers were first trained using data recorded while the patient performed tremor-provoking movements. Then, the trained models were applied in real-time to detect these movements and triggered the delivery of stimulation. Our results suggest that responsive thalamic stimulation for essential tremor based on tremor-provoking movement detection can be achieved without any requirement for external sensors or additional electrocorticography strips. Further research is required to investigate whether the decoding model is stable across time and generalizable to the variety of activities patients may engage with in everyday life.

About Authors

Dr. Shenghong He

Nuffield Department of Clinical Neurosciences. University of Oxford, United Kingdom

Specialization: Brain Machine Interface and their applications using bioelectric signals.

ICSET-103

Current Status & Future Direction of Waste to Energy Conversion to Achieve New Balance

Dr Aqsha Aqsha
CM Technologies, Canada

The pandemic and new normal has create a new lifestyle that increasing global consumerism and population that led to an increase in the levels of waste produced (food, agricultural, MSW and medical related waste). Proper management, recycling and conversion of enormous volumes of municipal solid waste and other waste are required to reduce its environmental burdens and to minimize risks to human health. Waste to energy (WTE) conversion technologies is one of the technologies that can be employed to convert many types of waste into clean energy, rather than sending these wastes directly to landfill. Waste to energy conversion technology explores the systems, technology and impacts of waste to energy conversion. In this webinar, we will review and learn about the technology available for WTE including biochemical process such as biogas production via anaerobic digestion thermochemical conversion using torrefaction, pyrolysis, gasification and incineration. We will discuss how to properly choose the right technology for certain types of waste and what are the important parameters to optimize the result.

About Authors

Dr Aqsha Aqsha

Technology Advisor CM Technologies, Canada

Specialization: Waste to Energy Conversion, Bio-based Product, Bioenergy, Catalyst & catalysis.

ICSET-104

The use of hydrogen to separate and recycle neodymium–iron–boron-type magnets from end-of-life electric and electronic waste

Dr Allan Waltan
University of Birmingham, United Kingdom

Rare earth metals have been identified by the EU as being at greatest supply risk of all materials for clean energy technologies. Neodymium and dysprosium, which are both employed in neodymium iron boron magnets (NdFeB) , have been highlighted in particular. NdFeB magnets are used in a diverse range of electrical devices from consumer electronics to wind turbines. At end of life, if the magnets could be recycled then this would provide an additional and secure supply of these materials. In this work the challenges for recycling of NdFeB magnets will be highlighted for a range of products. One of the key issues with regard to recycling of NdFeB is how to cost effectively separate the magnets from the waste stream, coating materials and glues. In this work hydrogen has been used break down and demagnetize NdFeB magnets into a friable hydrogenated powder. The powder is then extracted mechanically from the electrical devices and is processed further to produce a powder with <330ppm of Ni contamination. The extracted powder can be re-processed in a number of ways, either directly from the magnet alloy by re-sintering, by the Hydrogenation, Disproportionation, Desorption, Recombination process (HDDR or by re-melting; or by chemical extraction of the rare earth elements from the alloy. The advantages and disadvantages of these processes will be discussed in this presentation.

About Authors

Prof. Dr Allan Waltan

School of Metallurgy and Materials. University of Birmingham, United Kingdom.

Specialization: Processing of permanent magnetic materials, solid state hydrogen storage materials, coating technologies.

ICSET-105

Bringing Intelligence to IoT Devices and Edge gateway provisioning: Health-care domain scenario in real-time analytics for simulated and virtually emulated devices.

Dr Mohamad Khairi Ishak
School of Electrical & Electronic Engineering, Universiti Sains Malaysia.

The advent of internet enabled small form factor computational devices have already revolutionized the way we fetch information, envision intelligent systems by inferencing real-time analytics from these IoT devices. The current trend is focused towards enabling IoT edge gateways as intermediary computational resources contrary to the cloud model that performs all the heavy lifting in the cloud. It is estimated that billions of IoT devices will be deployed by year 2022, however, very little to no information is present on ease of device provisioning. Similarly, the IoT Edge based vertical markets concepts has begun to surface, however, very little information is available that discusses the merits and demerits of this newly envisioned network architecture. This work aims to implement a Health-care domain scenario by provisioning and connecting real-time device data from simulated as well as emulated virtual IoT devices on industry leading IoT platforms. The results provide a deeper understanding of system performance by evaluating network latencies with increased payloads which further signifies the role and need for deploying Edge IoT gateways within the network. Device provisioning, service profiling and the ease of group resource management is also presented which helps to build larger scalable networks on these IoT platforms.

About Authors

Dr Mohamad Khairi Ishak

School of Electrical & Electronic Engineering, Universiti Sains Malaysia.

Specialization: IoT, Robotics, Arduino, FPGA.

ICSET-106

In Situ Construction of CuS/PANI Heterojunction for efficient degradation of Azo dyes under solar light irradiation

Muhammad Bilal Tahir
Department of Physics, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Rahim Yar Khan, Pakistan
Corresponding Author: Email: m.bilaltahir@kfueit.edu.pk

The occurrence of azo dyes in water has raised serious threats to human beings. In this work a novel CuS/PANI will be synthesized by using simple hydrothermal method for the degradation of tetracycline. The properties of the material will be analyzed by using SEM, XRD, BET, UV and PL results. The photocatalytic activity of CuS, CuS/PANI will be analyzed under visible light irradiation. The composite CuS/PANI will show excellent photocatalytic degradation of tetracycline. The enhancement in the efficiency of CuS will be due to the large surface area of PANI, conjugated structure and due to porosity of the PANI. In this process PANI will effectively increase the transfer of charge carriers and reduce the recombination of charge carriers due to its conjugated structure. The stability of this material will be analyzed and this composite will show excellent performance in the future applications for the degradation of azo dyes.

About Authors

DR. Muhammad Bilal Tahir

Department of Physics, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Rahim Yar Khan, Pakistan.

Specialization: Nanomaterials, Material Science, Photocatalytic Hydrogen Applications, Nano-fabrication and nano characterization, Laser Matter Interaction, Energy harvesting Applications.

ICSET-107

Visible light photocatalytic hydrogen energy production through PANI/TiO_2/CuS under visible light irradiation

Muhammad Sagir
Department of Chemical Engineering, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Rahim Yar Khan, Pakistan
Corresponding Author: Email: dr.msagir@kfueit.edu.pk

The demand of energy is increasing with the passage of time. The present energy sources are not enough to fulfil the increasing demand of energy and also, they are reducing. To overcome the energy crisis there is need to produce green energy which is reusable. Hydrogen energy is considered as a most promising source of energy carrier and can fulfill the increasing demand of people. In this research work a novel heterojunction based PANI/TiO_2/CuS photocatalyst will be synthesized by using hydrothermal method. Multiple techniques including SEM, XRD, BET, UV-vis and PL will be performed to investigate the structure, morphology, surface area and optical properties of the materials. Then hydrogen energy will be produced through photocatalytic water splitting process and the efficiency of TiO_2, TiO_2/CuS and PANI/TiO_2/CuS will be compared. The addition of CuS and PANI will effectively enhance the photocatalytic efficiency of the material by reducing the recombination rate of charge carriers, increasing the surface area, and increasing the absorption region of the material. This work will show significant advantages in the construction of heterojunction photocatalyst for hydrogen energy production.

About Authors

Dr. Sagir has over 15 years of research experience in the field of “Chemical Sciences”. In this period, he has been working in Malaysia & Pakistan. He is involved in 4 different Research projects as PI, Co-PI & collaborator and has also been a part of a number of research projects completed in various capacities. Dr. Sagir has supervised a number of MPhil students’ thesis and a few number of MPhil students are currently under his supervision. He has published “89-90 Journal papers” in International Peer Reviewed Journals with high impact factors. Also others, over 40 abstracts in International Conferences. Dr Sagir has a total impact factor of over“140” and his research works have been cited over 1000 times in peer review press with an H-Index of “19”. He is also editor of many impact factor journals.

ICSET-108

Knowledge-based Economy Stands on the Shoulders of Internet of Things (IoT), Big Data, and Deep Learning?

Shahzad Sarwar
Punjab University College of Information Technology (PUCIT), University of the Punjab
Corresponding Author: Email: s.sarwar@pucit.edu.pk

Evolving from wireless sensor networks the paradigm of IoT offers enormous growth opportunities to academia, industry, and the public sector. In these sectors, novel IoT applications would be developed, using a bunch of communication technologies such as low-data rate short- and long-range technologies. Such IoT applications are meant for global connectivity and control of remote devices and sensors. Further, these applications yielding huge amount of data that offers us a super exciting opportunity for data-driven decision and policy making, both in the private and public sector. Doing so, our country Pakistan can tap the potential fiscal benefits and can have a knowledge-based economy. But, strictly speaking, before this vision becomes reality, this calls for having a harmonious and strategically synchronized policy for academia, industry, and public sector. In this work, the sketch of such policy and cooperation-based framework has been presented.

About Authors

Prof. Dr. Shahzad Sarwar

Chairman, Department of Computer Science, University of the Punjab, Lahore.

Specialization: Internet of Things (IoT), M2M Communications.

ICSET-109

Metal Based Chemotherapeutics: Current Status and Future Prospects

Prof. Dr. Muhammad Ashraf Shaheen
University of Sargodha, Sargodha-40100

The metal ions, especially of transition metals, play essential roles in biological systems. Metal complexes have been used not only as pharmaceuticals but also as diagnostic tools and chemotherapeutic drugs mainly against cancer[1]. Research in this field has been stimulated by the worldwide success of cisplatin, *cis*-diamminedichloroplatinum(II), in curing various types of cancers. Cisplatin is one of the bestselling anticancer drugs. In addition to cisplatin, its direct derivatives carboplatin, c*is*-diammine(1,1 cyclobutanedicarboxylato) platinum(II) and oxaliplatin, (*trans*-*R*,*R*-cyclohexane-1,2-diamine)oxalatoplatinum(II), (Fig.**1**) [2] are currently in clinical use as anticancer drugs.

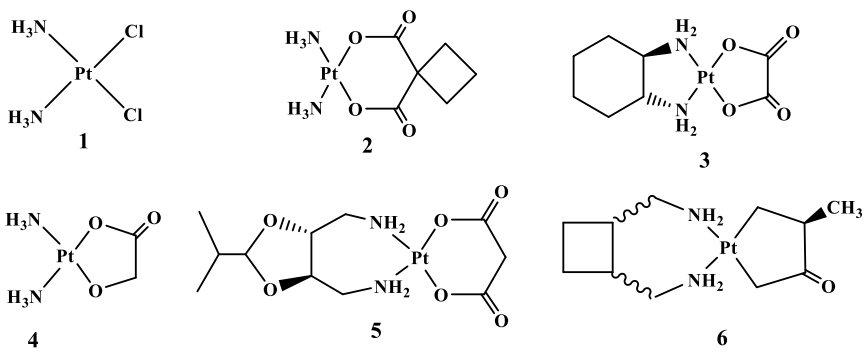


Fig. 1: Worldwide (cisplatin **1**, carboplatin **2**, oxaliplatin **3**) and regionally approved (nedaplatin **4**, heptaplatin **5**, lobaplatin **6**) anticancer platinum complexes.

About Authors

Prof. Dr. Muhammad Ashraf Shaheen

Department of Chemistry University of Sargodha, Sarghoda.

Specialization: Studies on antitumor metal complexes, Catalysis by transition metal complexes / organometallics, Medicinal chemistry, Bioinorganic chemistry, Study of medicinal plants, Analysis of soil/ water samples, Estimation of metal in biological samples.

ABSTRACTS OF PARTICIPANTS

E&T-101

Effect of Unmodified and Modified Silica Particles on Morphology and Performance of Mixed Matrix Membranes

Hafiz Abdul Mannan[1,2,], Hilmi Mukhtar[2], Muhammad Latif[3], Sohaib Ahmad[1], Ihtisham Ul Haq[4], Atif Islam[1]*

1Institute of Polymer and Textile Engineering, University of the Punjab, 54590, Lahore, Pakistan

2Chemical Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar, 32610, Perak, Malaysia

3Institute of Energy and Environmental Engineering, University of the Punjab, 54590, Lahore, Pakistan

4School of Chemistry and Chemical Engineering, Beijing Institute of Technology, Beijing 102488, PR China

Polyether sulfone (PES) based mixed matrix membranes were synthesized by incorporating unmodified and modified silica at a fixed loading of 2 wt. %. Neat PES membrane was also synthesized as a reference. The membranes were characterized by Scanning Electron Microscope (SEM) and Energy Dispersive X-ray (EDX) mapping and elemental analysis. The membranes were tested for the permeation of CO_2 and CH_4 gases at 5 bar pressure and 25^{o}C temperature. Interfacial defects were observed with unmodified silica particles whereas these defects were cured after surface modification of silica particles with silane coupling agent. The permeation results revealed that unmodified silica based mixed matrix membrane has higher permeability and lower selectivity as compared to both neat PES membrane and modified silica MMM. Conversely, moderate permeability and superior selectivity was achieved with modified silica MMM due to removal of the interfacial defects. Thus, modified silica based MMM can be considered as a promising candidate for CO_2 capture applications

E&T-102

Synthesis and characterization of Co_3O_4/ZSM-5 as catalyst for thermal decomposition of hexamethylene-1,6-dicarbamate to hexamethylene-1,6-diisocyanate

Muhammad Ammar,[a,b,c,] Muhammad Waqas,d Yan Cao,[b] Liguo Wang,[b] Huiquan Li,[b]*
[a] Department of Chemical Engineering Technology, Government College University, Faisalabad, 38000, Pakistan.
[b] Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, 100190, China.
[c] University of Chinese Academy of Sciences, Beijing, 100049, China.
[d] Department of Mechanical Engineering, University of Engineering and Technology, Lahore, Narowal Campus, Narowal 51600, Pakistan.
**Corresponding author: mammar@gcuf.edu.pk*

The utilization of CO_2 as raw material for chemical synthesis has the potential of substantial economic and green benefits. Thermal decomposition of hexamethylene-1,6-dicarbamate (HDC) is a promising approach for indirect utilization of CO_2 to produce hexamethylene-1,6-diisocyanate (HDI). In this work, a green route was developed for the synthesis of HDI by thermal decomposition of HDC over Co/ZSM-5 catalyst, using chlorobenzene as low boiling point solvent. Different metal-supported catalysts were prepared by incipient wetness impregnation (IWI), PEG additive (PEG) and deposition precipitation with ammonia evaporation (DP) methods. Their catalytic performances for the thermal decomposition of HDC were also tested. The results showed that Co/ZSM-5_{25} catalysts prepared by different methods showed different performances in the order of Co/ZSM-$5_{25(PEG)}$ > Co/ZSM-$5_{25(IWI}$ > Co/ZSM-$5_{25(DP)}$. Under the optimized reaction conditions: 6.5% HDC concentration in chlorobenzene, 1 wt% Co/ZSM-$5_{25(PEG)}$ catalyst, 250 °C temperature, 2.5 h time, 800 ml/min nitrogen flow rate and 1.0 MPa pressure, the HDC conversion and HDI yield could reach 100% and 92.8% respectively. The Co/ZSM-$5_{25(PEG)}$ catalyst could be facilely separated from the reaction mixture, and reused without degradation in catalytic performance. Furthermore, a possible reaction mechanism was purposed based on the physiochemical properties of the Co/ZSM-5_{25} catalysts.

About Author

Muhammad Ammar is an Assistant Professor of the Department of Chemical Engineering Technology, Government College University, Faisalabad, Pakistan. He received his Ph.D. in Chemical Engineering from University of Chinese Academy of Sciences, Beijing, China. His research interests include metallic materials for heat transfer, energy storage and heterogeneous catalysis.

E&T 103

Comparison of ultrasonic waves and hydrogen peroxide for the degradation of Partially Hydrolyzed Polyacrylamide solution

Nasir Khan[1], Allah Bakhsh[1], Qazi Adnan Ahmad[2], Rooh Ullah[3], Javid Hussain[4], Zeeshan Khan[1]*

[1]Department of Petroleum and Gas Engineering, Baluchistan University of Information Technology, Engineering & Management Sciences (BUITEMS) Quetta-Pakistan

[2]Bacha Khan University, Charsadda Khyber Pakhtunkhwa, P.O Box#20, Pakistan

[3]Department of Natural and Basic Sciences, University of Turbat-9260, Balochistan, Pakistan

[4]Department of Environmental Sciences, Balochistan University of Information Technology, Engineering & Management Sciences (BUITEMS) Quetta-Pakistan

**Correspoinding Email: E-mail: n.kh55@yahoo.com*

Partially Hydrolyzed Polyacrylamide (HPAM) has tremendous applications in oil and gas industry, particularly in polymer flooding. Specifically, polymer flooding can reduce the fingering effect that is caused by the water injection in subterranean zone for pushing the remaining oil towards the production well. In order to increase the water injection efficiency in the second stage of water flooding, the HPAM remnants need to remove. Prior to applying the ultrasonic waves in deplugging of HPAM plugs, it is necessary to understand the behavior of ultrasonic waves in the context of HPAM solution in laboratory. Hydrogen peroxide (H2O2) is an excellent agent traditionally used to degrade the HPAM solution. Results show that 1 vol. % H2O2 solution mitigates the viscosity of original sample (61.2 mPa.s) to 22.3 mPa.s after 10 hours exposure. On the contrary, the environmental concern, associated cost and extensive labor work has attracted the researchers' attention towards acoustic application in this field. Ultrasonic waves (20 KHz) degraded the HPAM solution and decreased its original viscosity to 6.36 mPa.s after 10 mins exposure, while ultrasonic waves with 18 KHz and 25 KHz frequencies broke the HPAM layers and decreased the viscosity to 7.32 Pa.s and 8.16 mPa.s respectively. This decrease in viscosity is owing to the cavitation and thermal energy that is produced during ultrasonic waves propagation. However, the viscosity began to increase to 7.8 mPa.s (18 KHz), 7.68 mPa.s (20 KHz) and 8.18 mPa.s (25 KHz) when exposure time exceeded to 12 mins. This increase is attributed to the annihilation of hydroxyl group. These research findings open novel avenues in the application of ultrasonic waves in the petroleum industry.

E&T 106

PARAMETRIC STUDY OF THE DESULPHURIZATION OF LOWGRADE COAL IN CIRCULATING FLUIDIZED BED COMBUSTOR

*Faiz-ul-Hassan[1], Maham Hussain[*1], Waqas Aleem[2], Sadiq Hussain[1], Um-e-habiba[1]*
[1]Department of Chemical Engineering NFC institute of Engineering and Technology, Multan. Pakistan
[2]Mir Chakar Khan Rind University, D.G Khan, Pakistan
**Corresponding author:maham.hussain@gmail.com, waqas.aleem@mcut.edu.pk*

As the world is moving towards the cleaner environment, the emissions are the focus that needed to be controlled. In this study, the characterization of feedstock is done using Thermogravimetric analysis, Bomb calorimeter, and C.H.N.S. analysis (for coal) and X-Ray Florescence spectroscopy (for lime). The lime is used along with the coal in the gasification to improve the composition of the flue gases. Effect of the process parameters i.e. particle size and ratio of the coal to lime blends are considered in the study that showed quiet satisfactory results. By decreasing the size of the lime particle, the sulfur removal can be improved. Similar results are seen by changing the ratio of lime in coal to lime blends. The results of the study are compared and validated with the simulation and modelling using the Aspen Plus, that showed about 4-5% error between the experimental and simulation results due to uncertainties in the experimental results.

About Authors

Dr. Maham Hussain received her PhD in Modelling and simulation studies of Biomass Gasification from the Universiti Teknologi PETRONAS, Malaysia. Her research interest is in the area of development of biomass gasification for biofuel production. She has published several research articles in ISI/Scopus indexed journals. She has 13 years of research and teaching experience. She is currently affiliated with NFC Institute of Engineering and technology, Multan Pakistan.

E&T 107

Investigation of Reaction Kinetics of Municipal Wastewater in Batch Reactor using aerobic technique

Um-e-habiba[1], Maham Hussain[1], Waqas Aleem[2], Shaista javed, Sadiq Hussain[1]*
[1]Department of Chemical Engineering NFC institute of Engineering and Technology, Multan. Pakistan
[2]Mir Chakar Khan Rind University, D.G Khan, Pakistan
Corresponding author: maham.hussain@gmail.com

The municipal wastewater in general is characterized by high Biochemical Oxygen Demand and Chemical Oxygen Demand. In the present investigation thorough biological treatment study was carried out on municipal wastewater using powdered activated charcoal as adsorbent. Activated sludge process is the most widely used technology in the wastewater treatment. In this process, secondary settling tank (SST), as the final treatment unit, separates the suspended biomass from the treated water to produce a clear effluent through gravity sedimentation. The main intention of this study is focused on evaluation of kinetic parameters of activated sludge process for municipal wastewater. The kinetic parameters is calculated by experimental studies on pilot scale batch reactor using activated sludge system technique. In this research the composition of wastewater is also determined by all the three ways mean by physically chemically and by biologically. In this project composition is also studied to find out the different types of bacteria was present in the waste water. The calculation of kinetic coefficients is based on COD value. The maximum degradation of the substrate is 0.54 day^{-1} was observed due to CRE (COD removal efficiency) of 99.31% during 13 days.

About Authors

Dr Waqas Aleem received his PhD. in Chemical Engineering from Universiti Teknologi PETRONAS, Malaysia in 2018. He obtained his M.Sc. Petroleum Technology and B. Sc Chemical Engineering from University of TEESSIDE, UK and Bahauddin Zakariya University, Pakistan, respectively. He has vast experience in teaching and research. He is currently serving at the Department of Chemical Engineering Technology, Mir Chakar Khan Ring University of Technology, Dera Ghazi Khan. Previously he worked as an Assistant Professor at MNS-University of Engineering and Technology, Pakistan. Dr Aleem has extensive teaching and research experience in Malaysia and Pakistan.

He can reached at: aleem.waqas@gmail.com, waqas.aleem@mcut.edu.pk.

E&T 108

Parametric Study Of Gasification of Coal-Biomass Blends In Circulating Fluidized Bed Combustor (C.F.B.C.)

Muzaffar Riaz[1], Maham Hussain[1], Waqas Aleem[2], Sadiq Hussain[1], Um-e-habiba[1]*
[1]Department of Chemical Engineering NFC institute of Engineering and Technology, Multan. Pakistan
[2]Mir Chakar Khan Rind University, D.G Khan, Pakistan
Corresponding author:maham.hussain@gmail.com

Pakistan has an enormous potential for biomass and is the most significant wheat straw producer in the world. In this study, characterization of coal and wheat straw is done using thermogravimetric, bomb calorimeter, and CHNS analysis to know its fuel potential to be used in gasification process. The coal-biomass blends at different ratios are co-gasified in the circulating fluidized bed combustor and effect of parameters i.e. air velocities and temperature are investigated. The results show that the pressure-drop across the riser increases with the increase in air velocity. It was also noticed that the change in pressure drop along the riser height was not significant at lower velocities. On the other hand, the pressure drop at higher velocities was in appreciable limits. Emissions are measured during the co-combustion over the bed temperature range of 800°C to 920°C. NO_x emissions proportionally increased with the increase in bed temperature and decreased with the increased fraction of straw. With an increase in bed temperature, SO_2 emission decreased. However, after 900°C, a slight increase in SO_2 concentration was observed. The CO emission decreased with the increase in bed temperature as well as with increased wheat straw proportion.

E&T 109

Physicochemical characterization, kinetic and thermodynamic analysis of dried cattle manure for pyrolysis and combustion processes.

Muhammad Ashraf [a, b], Zaheern Aslan[c], Rafi Ullah Khan [a], Naveed Ramzan [c], Abdullah Khan Durrani[a], Umair Aslam

[a] *Institute of Chemical Engineering and Technology, University of the Punjab, 54590, Lahore, Pakistan*

[b] *Institute of Chemical Sciences, Bahauddin Zakariya University, 60800, Multan, Pakistan*

[c] *Department of Chemical Engineering, University of Engineering and Technology, 54890, Lahore, Pakistan*

**Corresponding author: E-mail: ashraf_ce@bzu.edu.pk (Muhammad Ashraf)*

Cattle manure is a certain derivative of cattle feedlots and considered one of the most typical second-generation biofuels because of its lignocellulosic composition. However, the management of cattle manure is a serious problem, as its traditional use as a fertilizer has been confined by the synthetic fertilizer, consequently its dumping around the farms is producing atmospheric, sanitary and social complications. The thermochemical processes, such as combustion and pyrolysis, offer a promising alternative solution as they can transform cattle manure into valuable solid, liquid and gaseous fuels or direct energy. These thermal transformations of cattle manure have numerous paybacks: (a) Effectively reduce the larger volume of cattle manure (b) Effectively kill pathogens and reduce odor and (c) the potential energy is generated for domestic cooking, space heating, steam generation and electricity. In this context, the current study investigates the non-isothermal thermogravimetric analysis of cattle manure at varied heating rates to compare the kinetic and thermodynamic behaviors of cattle manure in N_2 and air atmospheres. Exclusive of stage I (dehydration), the Ea values of stage II (devolatilization) for all model-free methods varied between 144 - 270 and 32 - 227 kJ/mol in pyrolysis and combustion respectively. While in stage III, Ea values varied in ranges of 49 - 336 kJ/mol and 71 - 136 kJ/mol for pyrolysis (carbonation) and combustion (char burning), respectively. The overall average Ea for the pyrolysis (≈ 146 kJ/mol) is higher than the combustion process (≈ 127 kJ/mol). Pyrolysis followed overall D_2 reaction models, while combustion followed P_3 and O_1 in stage II and III respectively. The thermodynamic study was also conducted to evaluate pre-exponential factor *A*, ΔH, ΔG, and ΔS.

About Author

Enrolled Ph.D. scholar in Chemical Engineering at Punjab University Lahore. Completed his M.Sc. & B.Sc. Chemical Engineering from Institute of Chemical Engineering & Technology, Punjab University, Lahore.

E&T 111

The effect of different cross-linker in the preparation anion exchange membrane

Naeem Akhtar Qaisrania,b, , Fengxiang Zhangb*
a Department of Chemical Engineering, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Abu Dhabi Rd, Rahim Yar Khan, 64200, Pakistan.
b School of Chemical Engineering, Dalian University of Technology, Panjin 124221, China.
** Corresponding author Email: naeemakhtar134@gmail.com ; Cell: 0321-7381201*

For the practical implementation of anion exchange membranes (AEMs) fuel cells, the production of high hydroxide conductivity AEMs with good alkaline and dimensional stability remains a challenge. Cross-linked AEMs are prepared for this high performance study. To build the hydrophilic ionic regions, a series of chloromethylated polysulfone cross-linked AEMs were synthesised using DABDA cation and cross-linked with two separate cross-linkers (with ether and without ether). The cross-linking reaction not only improved the dimensional stability of the AEMs, but also improved the aggregation of the ion cluster, leading to the formation of hydrophilic/hydrophobic phase-separated morphology and ion-conductive channels. As a result, changes in both ion conductivity and dimensional stability can be achieved. The prepared AEMs showed elevated conductivity between 25 and 70 o C in the range of 20 to 47 mS/cm and strong relative conductivity compared to the swelling ratio at 70 o C. Furthermore, the cross-linked AEMs demonstrated excellent mechanical thermal and alkaline stability as well. This study offers a promising approach to the synthesization of high-performance fuel cell AEMs.

About Author

Engr. Dr. Naeem Akhtar Qaisrani did his Bachelors in Chemical Engineering from COMSATS, Lahore, and M.Sc. Chemical Engineering from the University of the Punjab, Pakistan. He got a fully-funded Chinese Government scholarship and went to the Dalian University of Technology, China for his Ph.D. His research focus was on the development of a High-Performance Anion Exchange membrane for fuel cell application. He has worked on various projects at the Dalian University of Technology. He carried out the Synthesis and characterization of the anion exchange membrane for the fuel cell. Similarly, Synthesis of membranes for vanadium flow battery application. He has published a number of reputed international journal papers.

E&T 112

Arsenic presence in ground water has appeared as alarming health issue in Pakistan.

Waseem Abbas
Correspoinding E-mail: waseemabbas4414@gmail.com

Majority of Pakistani people (nearly 60%) living beneath the poverty line so that they don't approach clean and safe drinking water supplies. Arsenic is one of the perilous metals presents not only in different areas of Pakistan but also in different areas of the world, above 20% inhabitants of Punjab Province of Pakistan are under the exposure of Arsenic with elevated level of above 10ppb in groundwater whereas 3% of people are under the effect of 50ppb. The condition is worse in Sindh province with 36% and 16% of inhabitants drink arsenic containing drinking water with above 10ppb and 50ppb respectively. Both narrow and profound sources partake arsenic contamination. Various arsenic removal technologies have been developed for arsenic removal from contaminated water sources, including precipitation, membrane processes, ion exchange, and adsorption. Because of its simplicity, potential for regeneration, and sludge free operation, adsorption technique is attracting and mostly used because of its simplicity, designing, operation and low cost. Polyacrylicnitrile and its copolymers are one of them, which are studied for its commercial and technological exploitations This column adsorption study focuses on the arsenic exclusion from drinking water by using low cost adsorbent called "Polyacronitrile Fiber (PAN)". This method being more beneficial and effectual as compared to other treatments to remove arsenic from ground water. Polyacronitrile Fiber (PAN) was used and it was found an effective and efficient adsorbent for the expulsion of arsenic from ground water. This study indicated that PAN is widely available at low cost and can be used as an efficient adsorbent material for the removal of arsenic from water.

About Author

"An enthusiastic, adaptive, and fast-learning person with a broad and acute interest in chemical Engineering, I particularly enjoy collaborating with scientists from different disciplines to develop new skills and solve new challenges".

E&T 113

Design and Development of Four-Bar Dynamics Testing Machine

Muhammad Maarij
Department of Mechanical Engineering, UET Taxila.
Corresponding Email: Muhammad.Maarij@students.uettaxila.edu.pk

The core purpose of this research is to design and fabricate a dynamic testing machine incorporating a four- bar mechanism for academic laboratories and commercial purposes by providing a cost-effective testing solution. The kinematic design of the four-bar mechanism is following Grashof's rotatability criteria, andthe dynamic design required factoring in the forces acting on various links. This is used to select the materialrequired for the fabrication of the linkages. The balancing components in the form of counterweights areintroduced to reduce the unbalance created due to the rotation and cyclic motion of linkages, shaking forces,and torques induced at the ground pivots. The flywheel is designed to minimize the fluctuations in thetorque required to drive the mechanism. This is followed by shaft design using DE-ASME Elliptic criteriaand selection of bearing. For transmitting power from the AC motor to the crankshaft, a V belt along witha pulley is used as the belt helps in damping out the vibration effects in the mechanism. The linkages arefabricated, and the mechanism is assembled. ADXL335 accelerometer sensor is mounted on the apparatusto measure the acceleration of a point on the coupler. Data acquisition is implemented through amicrocontroller connected to a computer. This acceleration data is then integrated using numericaltechniques to obtain an estimation of velocity and displacement. Due to the inherent offset in the sensor, aminor error is included in the data. However, the results obtained using such methods are satisfactory tovisualize the behavior of data representing the motion of the system under running conditions. The errorsin the result can be minimized by using more advanced techniques of integration and the use of moresensitive sensors for measurement and instrumentation.

E&T 114

A Review on Development of Li-Ion Batteries Materials, Progress and Future Challenges

Asad Mohi ud Din[1], Hafiz Miqdad Masood[1], Najaf Ali[1],
Department of Chemical Engineering, NFC Institute of Engineering and Fertilizer Research, Faisalabad
Corresponding Email: miqdad_masood@outlook.com

The problems are facing with foregoing fuels and energy saving materials. However, the alternative fuel (Lithium-ion battery) also having its drawbacks, the recent work on the chemistry of lithium-ion battery. When we compare the lithium-ion battery the energy density of the lithium-ion battery is much higher as compared to the other batteries. The lithium insertion and extraction can be diverted by morphology the loss in the electrical contact of isolated products, life cycle, and performance of the battery can be affected by it. High energy density obtained when anode of carbon nano-tubes is utilized on the surface of anode that's improved the hysteresis. The efficiency of cathode material give maximum specific capacity because of high charge dominant capacity and stability raised with potential of LiMnO3 that is 285/140 having layered structured, but recently under research consideration to obtained promising results at commercial level and high temperature withstand material especially ceramic.

About Author

Student of M.Sc. Chemical Engineering under the supervision of **Prof. Dr. Najaf Ali**

B.Sc. (Chem. Engr.) from NFC Institute of Engineering and Fertilizer Research, Faisalabad. Recently working on different projects collaborating with NTU and industrial units to develop a prototype model for Energy, fuel and membrane separation techniques

E&T 115

Design and Fabrication of Bio-Hybrid Electric Vehicle

Samina Jamil, Mubashir Shah, Ali Hamza Waris, M Usman Malik, Hamza Sabir, Hazique Malik, Muhammad Hamza, Umer Farooq*
Department of Mechatronics Engineering, Air University, Islamabad
**Corresponding author: samina.jamil@mail.au.edu.pk*

Conventional road transport is largely based on Internal Combustion Engines (ICE). Despite its mature technology that has led to long range and reliable performance, ICE is now termed as the biggest source of environmental pollution. Depleting petroleum resources demand for searching the alternative means of vehicle traction mechanisms. Electric Vehicles (EV) and Hybrid Electric Vehicles (HEV) technologies are the prospect solutions to these problems. This abstract presents a brief description of Bio-Hybrid Electric Vehicle (BHEV) developed at Mechatronics Department of Air University Islamabad. The basic design features an electric vehicle based on battery powered dual DC hub motors and is its traction is supplemented by human power applied through bicycle pedals. In this way the vehicle can be operated in either electric mode or pedaling mode. A set of hub motors, with 350W output power each, are installed in the rear axle as primary traction mechanism to be powered up by a 36V Li ion battery. This vehicle also incorporates regenerative braking system to conserve power and prolong the range. Due to inherent slow speed, the regenerative braking is only adding 8% of the total charge to the battery and its energy contribution is only meant for auxiliary loads like font lights and fan. In future the vehicle will be modified with motor assisted pedaling for ease of use. The vehicle will be further analyzed for energy management/optimization using drive-cycle test based on SimScape driveline modeling and simulation.

About Author

Samina Jamil

Lecturer at Mechatronics Department of Air University Islamabad, Pakistan and a PhD Scholar at EE Department of Bahria University Islamabad. I have 5 conference and 4 journal publications. I have served both civil and PAF academic institutes for over 14 years.

E&T 116

Arterial Flow Control System for Kidneys

Hamza Saleem, Syed Irtiza Ali Shah, Junaid Ayaz Kiani, Ahmad Jamil
Department of Mechanical and Aerospace Engineering, Air University, Islamabad, Pakistan.
Corresponding author: email: 180706@students.au.edu.pk

This study was conducted to understand the normal arterial flow rate through kidneys and factors that make the kidney behave in a certain way under abnormal circumstances. If those conditions prolong for a while, they can cause damage and lead to ultimate kidney failure. These failures then need to be removed by either dialysis or kidney transplant. The renal sympathetic nervous system plays a key role in the regulation of renal blood flow; hence study tries to investigate rhythmic patterns of Renal sympathetic nerve activity and functional response in glomerular filtration rate, sodium extraction, and urinal excretion. A feedback control system can be used to auto-regulate renal blood flow and this is only possible if we know the proper physiology and response behavior of the kidney. Special attention is given to hypertension. The hemodialysis mechanism is discussed in detail which almost mimics internal organ physiology. The system not only regulates blood flow through the kidney of patients that have shown symptoms of hypersensitivity but also acts as a device for blood regulation and filtration for patients who have lost one or both kidneys. Currently, patients in Pakistan with chronic kidney disease are not getting any attention. The main goal is to design a control system for continuous monitoring of cleansing of blood. Firstly, a detailed model is made and components are finalized which should be included in this model. Then, a detailed analysis is made on each component. An equivalent transfer function of the whole model is calculated which is then used for calculating other important parameters. The stability of the system is checked via Routh table as well as MATLAB. Then, the steady state errors for different inputs are calculated. After all this, a PID controller is used to remove the steady state error. The final model is also shown at the end. Furthermore, this model can be improved by making some changes in design specifications.

About Author

Dr Syed Irtiza Ali Shah is a Professor of Mechanical and Aerospace Engineering and is also working as Director International Cooperation at Air University Islamabad. He carries 29 years of work experience, out of which 12 years are field work as an Engineering Manager and 17 years at academia and R&D both in Pakistan and USA.

E&T 117

Voltage control systems for MOEMS

Amna Sarfraz, Syed Irtiza Ali Shah, Muhammad Talha Shaheer, Ahmad Jamil
Dept of Mechanical & Aerospace Engineering, Air University, Islamabad, Pakistan.
180670@students.au.edu.pk, irtiza@mail.au.edu.pk, 180682@students.au.edu.pk,

The main purpose of doing this project is to study "the voltage control systems for micro-optical electro-mechanical systems". As we live in the era of technology, numerous applications of micro-optical electromechanical systems can be found. So, it is necessary to devise ways for better working of micro-optical electro-mechanical systems. The approach opted to solve the problem was the study of micro-optical electro-mechanical systems first and then the voltage control systems. Then by combining both the topics, the application of voltage control system for micro-optical electro-mechanical systems were figured out. The suitable way to control the voltage for micro-optical electro-mechanical systems has been studied i.e. a voltage control system for micro optical electromechanical systems has been reviewed in this paper. To control the voltage for micro-optical electro-mechanical systems, implanted on a device, a suitable control system would be required in order to provide the voltage according to the requirement of the system. But the voltage control system selected to use with micro optical electro-mechanical systems is an attenuator. So there must be a control system to regulate the voltage supply to micro optical electro-mechanical systems. Based on different working principles, attenuators are used to lower the power supplies. An option of variable power attenuation is provided by a variable optical attenuator. According to the requirement of the system, the variable optical attenuators reduce the power supply. Using a micro optical electro-mechanical systems based attenuator, the power supply to the micro optical electro-mechanical systems could be regulated. The voltage could be reduced as per the requirements of the micro optical electro-mechanical systems. It is necessary to use a voltage control system to maintain a constant supply of voltage and to make the micro optical electro-mechanical systems compatible to work with any device.

About Author

Dr Syed Irtiza Ali Shah is a Professor of Mechanical and Aerospace Engineering and is also working as Director International Cooperation at Air University Islamabad. He carries 29 years of work experience, out of which 12 years are field work as an Engineering Manager and 17 years at academia and R&D both in Pakistan and USA. He has successfully completed and delivered 21 research projects whereas another five are in hand.

E&T 118

Automatic flow control system for mixing cistern of a painting plant

Obaid Ur Rehman Abid[*], *Syed Irtiza Ali Shah*[*], *Adeel Ahmad Talha, Ahmad Jamil*
Dep.t Of Mechanical & Aerospace Engineering, Air University, Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

Colors have a huge impact in modern days as compared to back then when technology was not as usual as it is now. Hundreds of shades are available for a simple looking color that is absolutely due to the help of modern technology. The fundamental target of businesses is to improve the effectiveness, increment the efficiency rate, decrease mistakes and take out human endeavors. The main focus of the project that is the automatic mixing of colors is to improve the level of productivity by achieving maximum efficiency and as a result increase human comfort. In today era infinite number of inventions are continuously made for the mankind and at the end humans mostly prefer those inventions which include high level of comfort and accuracy' that is why the project is easy to understand user-friendly and is easy to handle even for a lay man. In future we will be making our project using (P L C) which stands for Programmable Logic Control and SCADA(Supervisory control and data acquisition) which is a user friendly system, making the system as an open loop system in which output is controlled by color sensors certified internationally for industries and is accepted globally. As we will further increase our knowledge about our project we will come to know about other devices and controllers better for the project and will introduce them in our system. As the experiments and projects are done in future which are previously done in history its evaluability and accuracy increases because many of the mistakes done in the past are highlighted to the inventor which are then neglected. So, our model which will be produced in the end will be useful and will work in almost any area of the Industry such as utensils, automotive, locomotive, automobiles and so on.

About Author

Dr Syed Irtiza Ali Shah is a Professor of Mechanical and Aerospace Engineering and is also working as Director International Cooperation at Air University Islamabad. He carries 29 years of work experience, out of which 12 years are field work as an Engineering Manager and 17 years at academia and R&D both in Pakistan and USA. He has successfully completed and delivered 21 research projects whereas another five are in hand. He has over 140 publications to his credit, and has supervised 28 PhD and MS students as primary advisor.

E&T 119

Automatic pharmaceutical drug level concentration control in humans

Kashif Mushtaq, Syed Irtiza Ali Shah, Umair Munir, Ahmad Jamil
Dept. of Mechanical & Aerospace Engineering, Air University Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

Currently, there are thousands of models of automatic sensitivity to drug abuse in humans in various diseases. The effect of a drug is often related to its concentration in the process, so it may be helpful to monitor this drug combination with different models developed by different people in different areas. we have taken the model of HIV / AIDS infection control. In our work we are analyzing resources and controlling drug overdose. Acquired Immune Deficiency Syndrome (AIDS) is a disease or progressive disease caused by Human Immunodeficiency Virus (HIV) infection This need can be addressed by the control system engineering which uses control theory to estimate and design a system. Since Stability is the most significant requirement of the system, and a system of instability cannot be expected for a particular transient reaction or steady state error specification then objective which is needed to be achieved by working on this research is to design a stabilized model of a patient having AIDS. In this research feedback controllers, Root locus technique and Routh Hurwitz method have been adopted to design such an advanced transformative controller which robustly regulates RTIs infusion dosages considering the amount of HIV viruses in infected human body. We want to study the use of an automatic feedback control system to adjust the end-tidal anaesthetic concentration. The end-tidal controller uses input signals (the end-tidal and inspiratory concentrations) to control the drug level concentration in the body systems, using a model-based algorithm. A drug's effect is often related to its concentration at the site of action, so it would be useful to monitor this concentration. Receptor sites of drugs are generally inaccessible to our observations or are widely distributed in the body, and therefore direct measurement of drug concentrations at these sites is not practical. For example, the receptor sites for digoxin are thought to be within the myocardium. We cannot directly sample drug concentration in this tissue. However, we can measure drug concentration in the blood or plasma, urine, saliva, and other easily sampled fluid by using control systems. Primary goals of control systems include enhancing efficacy and decreasing toxicity of a patient's drug therapy. The development of strong correlations between drug concentrations and their pharmacologic responses has enabled clinicians to apply pharmacokinetic (control systems) principles to actual patient situations.

E&T 120

Automatic control system for solar panels pivoting to maximize captured energy (September 2020)

Muhmmad Ahmed Khan, Syed Irtiza Ali Shah, Mehmood Ul Hassan, Ahmad Jamil
Department of Mechanical and Aerospace Engineering Air University Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

The main purpose of this project is to improve the efficiency of solar panels. This is done by using control systems to move the solar panels with respect to the sun in order to generate maximum electricity. It deals with ways by which the system can be improved and to cut down costs. A microcomputer is used which controls drivers and in some cases sensors for sun tracking. An innovative alignment procedure for accurate and precise alignment is used so that maximum energy is extracted. The performance of qualities of the mapping device are experimentally analyzed. The importance of such work will encourage the use of solar panels. They are a good alternative to the old-fashioned fossil fuels which is ruining the environment. Fossil fuels cause many problems such as air pollution, water pollution, soil contamination and the release of greenhouse gases. Sun tracking is a very complex system compared to outdated fixed solar panels. They are also more expensive compared to their counterparts. Maintenance is always a big but in the whole process. The desired approach would be to cut down costs and make cheap tracking device which needs little or no maintenance at all. Proper homework would be done in order to analyze the numbers and complexity of the panel with respect to the size of the job and decide what should be installed for that particular place. The main goal is to stop burning of fossil fuels to produce energy. It will not only produce energy but it will also save the environment. The best thing being that it can never run out. Their use in households and large-scale firms would be a great achievement. The final results of this research is make or break. They will help in deciding whether solar tracking is really worth the hassle or not. Advantages and disadvantages of different trackers will also be discussed. A comparison would be drawn between sensor and sensor less tracking.

About Author

Muhammad Ahmed Khan is a student of BE Mechanical Engineering at the Dept. of Mechanical and Aerospace Engineer at Air University Islamabad. He has a keen interest in solid mechanics and is actively involved in design and analysis projects

E&T 121

Automatic temperature sensitive fluid flow control for a parabolic trough collector

Mustabin Intsam Afzal, Syed Irtiza Ali Shah, Mughees Ahmed, Ahmad Jamil
Department of Mechanical and Aerospace Engineering, Air University Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

This paper presents the automatic temperature sensitive fluid flow control for a parabolic trough collector or PTC. Solar energy is one of the most common renewable energy resources now a days. Parabolic trough collectors work on the same functionality with a little bit of modification to enhance its solar energy capturing properties. It is a line concentrating collector that collects incident beam of solar radiations and concentrate it on a focal point where a Pipe/tube is present with working fluid in it. The best working fluid for our system was liquid sodium which shall be discussed later on in the paper. Fluid flow is influenced by environment, season of working, optical properties of the plates usually referred as reflective properties of the material being used, another major factor that affects the fluid flow rate is the ability of the fluid being used to heat up. Different fluids have different heating and boiling temperatures, and they work according to them, Liquid sodium being optimum for the system was proved by stability of the transfer function later discussed. The system is created which has the ability to control the fluid flow rate within the tube with respect to the overall temperature being produced within the tube. The system is divided into its components in order to compute the transfer function and then check its stability and performance according to it generating different plots and tables along the way to ensure its performance when being implemented in the field. There was a significant increase in the performance of the system overall when compared to normal parabolic trough collector with normal fluid flow rate. The methodology of controlling the fluid flow through temperature is quite credible and it could be employed in parabolic trough collector farms for improved solar thermal energy harvesting.

E&T 122

Control system for tumor growth using Gompertz Mode Usama Najam Butt, Syed Irtiza Ali Shah, Moazam Ameer, Ahmad Jamil

Dept of Mechanical & Aerospace Engineering Air University Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

This study contains information about the analysis of the tumor growth using Gompertzian approach. Our main objective was to understand what research has been done in the field of tumor growth. The converted Gompertz function is used as the basis for calculating the factors that are associated to tumor growth and treatment response. Calculations can be conveniently performed by using a computer program that performs the necessary calculations and displays the growth data in graphical form. As we have observed, all individual tumors initially grow in the same Gompertzian model, but then develop dynamic heterogeneity through a random time-dependent process. If it is assumed that the treatment of the tumor (chemotherapy, surgery, X-ray irradiation) causes cell death in a relatively short interval, and the surviving cells immediately start to multiply and generate tumor growth according to the Gompertz function before treatment, then the time between growth curves may be quantitatively related to the amount of tumor cells killed. Predicated on states of the reference model, the designed stabilizer for the nonlinear reference model is then habituated for the nonlinear plant dynamics with an opportune adaptation mechanism, again by utilizing the SDRE methodology. The proposed technique is illustrated to develop an optimal chemotherapy drug administration for cancer treatment utilizing a tumor magnification mathematical model. We withal show that for seven standard biological models' local stability imperatively insinuates enveloping and hence ecumenical Stability. The discrete model conserves the characteristics of the Gompertz model because the difference equation has an exact solution. Theoretical analysis has been fortified by simulation results utilizing MATLAB/Simulink. Under the proposed controllers, the system deports very nicely even in the presence of un-modeled perturbances and noise.

About Author

Usama Najam Butt is a student of BE Mechanical Engineering at the Dept. of Mechanical and Aerospace Engineer at Air University Islamabad. He has a keen interest in Fluid Mechanics and in Machine design and is actively involved in design and analysis projects.

E&T 125

Fluid filled catheter pressure-based control system for cardiovascular applications

Haseeb Sajid, Syed Irtiza Ali Shah, Ashfaq Mahmood, Ahmad Jamil
Department of Mechanical and Aerospace Engineering, Air University, Islamabad, Pakistan
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

This study focuses on the information on the fluid filled catheter that are being used in cardiovascular applications. The main objective of this document is to study the work that has been done in this field and what improvements can be made in them. The most important is to first understand what is meant by catheterization and the working of a catheter. The diagnosis and examination of how well the heart is working fall under the category of cardiac catheterization. A catheter is a small hollow flexible tube used in the medical field to treat different diseases of the heart. The small hollow tube is inserted through the blood vessels into the heart to measure the blood pressure and other important parameters. These parameters can then be used to diagnose various heart diseases. This project has much significance in the medical field. Progress in this field can help in the treatment and diagnosis of various heart diseases. During the pressure measurement much errors arise which are a result of the different inputs that are applied to the system. Up till now much of the work has been done on improving the errors that occur in the values obtained numerically and practically. As compared to work done till now the main approach will be to focus on improving the other important aspects such as imaging, oxygen delivery, oxygen consumption, and making development in the equipment used for measuring the various parameters. The devices should be able to easily investigate and generate a report on the diseases that the patient is suffering from. The main goal of this research is to develop a user-friendly device that can provide all of the necessary output required for the diagnosis of the diseases. This can help in saving time and can allow the medical staff to focus more on how to interpret the data in a useful way. Because the heart diseases are a much crucial problem nowadays and its treatment requires a lot of concentration. The expected results obtained are valuable according to the research that has been made so far. With time much concentration on this field can surely bring many revolutionary changes into it.

About Author

Haseeb Sajid is a student of BE Mechanical Engineering at the Dept. of Mechanical and Aerospace Engineering at Air University Islamabad. He has a keen interest in control engineering and is actively involved in design and analysis projects.

E&T 127

Robotic Manipulator Control System

Saad Ahmed, Syed Irtiza Ali Shah, Fakher Abbas, Ahmad Jamil
Department of Mechanical and Aerospace Engineering Air University Islamabad, Pakistan.
**Corresponding Email: 180718@students.au.edu.pk, irtiza@students.au.edu.pk*

The purpose of this project is to control the robot manipulator system that can be designed and created to perform some specific function. Control system basically control and allows moment to specific parts. The hand of robotic manipulator is control digitally to perform work smoothly. Control system for a robot manipulator can be classified as open loop closed system and closed system. The robotic manipulators which has more than one degree of freedom, each degree of freedom is controlled by a separate control system. The increased demand on robotic manipulator performance leads to the use of advanced control structures. The general task of a robot control system is to enable the manipulator end-effector to follow prescribed motion trajectories, planned in suitable coordinate frame related to the manipulator task space. During last years, several control schemes have been proposed in the literature, such as pure force control, compliance control, impedance control, and hybrid control. Firstly, hybrid control is the only control strategy which allows simultaneous control of motion and force; the structure of this control system is modified by means of opportune selection matrices which are defined according to the task requirement. This paper presents s new force control method which may be thought as logically derived from compliance control and impedance control for which only a reference position is usually assigned. The attractive feature of the proposed control is that it also allows for a reference force to be assigned. In this way one may obtain analogous performance to hybrid control without adopting selection matrices. The advantage gamed with this choice lies in the achievement of a degree of robustness of the control scheme to inaccurate environment modeling. The parallel control approach has been developed starting from the analysis of the different components of the interaction. Each component has been characterized in terms of its function and relation to the others. This led to distinguish two different aspects in the overall control strategy: the control of the manipulator motion itself and the control of the interaction with the environment. The latter suitably converts manipulation goals into motion commands accounting information from the actual task.

E&T 129

Subthreshold Amplifier Design Topologies for Delta-Sigma Modulator

Mr. Saeed Ullah, Dr. Arshad Hussain
Quaid-i-Azam University, Islamabad,45320, Pakistan.
Corresponding Email: arshad@qau.edu.pk

All real-world parameters such as sound, temperature, pressure light etc, exist in analog form in nature. These real-world parameters need to be converted into digital form to recognize and processed by the various systems. There must be an interface between the real world and machine to make communication possible. Analog to digital converter (ADC) meet this requirement. Different systems related to biomedical, signal processing, microprocessor based, circuits and communications e.t.c, use ADC as the critical component. With evolution of modern technologies, the Delta-sigma modulator ADC has got very much importance in low power applications and the low power portable devices that need a reduced supply voltage. Being the basic building block of Delta sigma modulator, the operational transconductance amplifier (OTA) is the main bottleneck for the reduction of power dissipation and supply voltage. low voltage OTAs have been introduced but are tightly limited by the input common mode voltage as the supply voltage of OTA is bound and have reached the limits of further scaling.. The self-bias inverter-based subthreshold amplifiers with modest gain and output swings are discussed with results. A continuous time common mood feedback circuitry is used with a proposed differential difference amplifier (DDA) to obtain a high common mode rejection ratio CMRR and output swing stability. The subthreshold inverter-based integrator is implemented as two and three stage amplifiers. The 2nd stage amplifier achieves a dc gain of 35dB having GBW of 33.33kHz with phase margin of 62 degrees and consumes total power of 5.75nW. The 3 rd stage has a DC gain of 60dB and GBW 7.35kHz while phase margin of 61 degrees. This topology consumes a total power 8.9nW. Input signal bandwidth for this design is 5kHz and the design has been carried out in 180nm CMOS technology.

About Author

I received the BS degree in Electronics from the Islamia College University Peshawar in 2017. Currently pursuing my M.Phil from the department of Electronics Quaid-i-Azam University Islamabad under the supervision of Dr. Arshad Hussain. I have worked on Analog to digital converters (ADCs) and low Power Delta-Sigma modulators during the research work.

E&T 130

A High-Resolution Pipelined ADC Design for Wideband Applications

Mr. Ghayur, Asad Fakhri, Dr. Arshad Hussain
Quaid-i-Azam University, Islamabad,45320, Pakistan.
Email: arshad@qau.edu.pk

Analog-to-digital converter (ADC) are the basic key of analog and mixed signal processing, that link the natural world of analog signal and the digital world processing. Demand for high-performance analog-to-digital converter (ADC) integrated circuit (ICs) with optimal combined specification of resolution, sampling rate and power consumption becomes dominant due to emerging applications in wireless communications. This paper dedicated to developing a 12-bit pipeline ADC design methodology with minimum power dissipation, while keeping relatively high speed and high resolution. The proposed pipeline ADCs consist of nine consecutive stages with 1.5-bit per stage with last stage of 3-bit flash ADC, each stage containing a sample/hold (S&H), a low-resolution ADC, DAC, and a summing circuit that includes an interstage amplifier to provide gain. Different stages are cascaded and the number of stages to be cascaded depends on the number of bits needed at the output. The best thing about a pipeline ADC is that it can provide high throughput rates and occupy small die area. Most of the power in conventional pipeline ADC stages is consumed by the operational amplifiers that generate the stage residue. The proposed ADC operates at 160 MS/s with input frequency of 58.6133MHz can achieve SNDR of 72 dB, SNR of 73 dB , SFDR of 82 dB and THD of -81 dB .

About Author

Mr. Ghayur Hussain (Member, SoC Design Lab) received the B.S degree in Electronics from the Islamia College University Peshawar, Pakistan, in 2018, and the MPHIL degree in Electronics from the Quaid-i-Azam University Islamabad, Pakistan in 2021. His current research interests include data converters, Analog and mixed signals, and analog circuit techniques.

E&T 131

Low-Power 10-Bit SAR ADC Design for Image Sensor Applications

*Mr. Zahid Naveed, Dr. Naeem Bhatti, Dr. Arshad Hussain**
Quaid-i-Azam University, Islamabad,45320, Pakistan.
**Corresponding Email: arshad@qau.edu.pk*

Low-power and moderate resolution Analog-to-Digital Converters (ADC) play an important role in signal processing especially in image sensors. Also, low power ADC is required for the longer battery life due to battery-operated applications. Low-power and small-area implementations are essential in the CMOS image sensor market to achieve high-accuracy ADC. This paper discusses the complete transistor level circuit design of 1 0-bit Successive approximation Register (SAR) ADC in 180 nm CMOS Technology for image sensor application. The proposed design implements the digital-to-analog converter (DAC) using binary weighted capacitor array for 10- bit resolution. A dynamic comparator is designed at the transistor level to meet the requirement of desired resolution. The SAR control logic is optimized with minimum size transistor considering the constraints of achieving required resolution. The bootstrap switches are used at the front end to ensure the linearity. Due to architecture of the SAR, digital circuit is simple to design and consumes less power. While the analog front-end linearity is ensured by bootstrap switches. The switching power is also optimized with minimum size transistor switches. The transmission gatebased switches are used for the wider swing and nmos and pmos switches are used for smaller size depending upon the requirement of the switches. The proposed SAR ADC has sampling frequency of 20kS/s with input signal frequency of 9.68kHz with full scale amplitude of 1Vp-p can achieve THD of 53 dB with total power consumption of 133µW in 180 nm CMOS Technology at supply voltage of 1 V.

About Author

Mr. Muhammad Zahid Naveed (Member, SoC Design Lab Quaid-i-Azam University Islamabad) received the B.S.degree in Electronics from the Gomal University Dera Ismail Khan, Pakistan, and currently doing an M-Phil degree in Electronics from the Quaid-i-Azam University Islamabad, Pakistan and his research interests include data converters, analog & mixed signals, analog circuit design.

E&T 132

Development of access control models using fuzzy expert system in cloud computing

Tahir Alyas[1], Nadia Tabassum[2], Raheel Iqbal[3]*
Department of Computer, Lahore Garrison University
Department of Computer, Virtual University of Pakistan
Department of Computer, National College of Business Administration & Economics,

Cloud computing is the largest part of the information technology (IT) manufacturing. They offer a number of effective cost on-demand facility, such as Infrastructure as a Service (IAAS), and Platform as a Service (PAAS) Software as a service (SAAS). These services offer many benefits. There are many challenges with the uses of cloud computing such as the data security, piracy, miss use of the cloud services, cyber-attacks, and so on. In all security necessities of the cloud computing, a prerequisite for the access control to prevent unauthorized access to the system and to protect the organization's data. Several control models including mandatory access control and role-based access control [2], have been developed for different environments, but these models may not meet control requirements. Option from the cloud. This is because cloud computing imposes different security requirements on different users. There are also special security challenges, such as the policies of many tenants and the greatness of the industry. This White Paper provides a detailed overview of access control requirements for the cloud computing and identifies the main flaws that traditional control models have not addressed. This White Paper also includes a viable model to meet the specific needs of cloud-based access control. The model not only ensures the secure sharing of resources among potentially unreliable tenants, but also allows cloud users to accept unlike permissions and access multiple services.

E&T 133

Role of Agile Methodologies and impact on Software Development Process

Muhammad Abrar Ashraf[1], *Nadia Tabassum**[1], *Tahir Alyas*[2]
[1]*Department of computer science, Virtual University of Pakistan,*
[2]*Department of computer science, Lahore Garrison University*

Agile methodology which uses repetitive expansion and prototyping are mostly utilized as part of mixture of manufacturing extends as light weight enhancement policy which can fulfill progressions of requirements. Dumpy emphases are applied that are compulsory for skillful item conveyance. Customary encoding improvement forms are very little proficient to deal with rapid modification in necessities. Regardless of preferences of agile method and feedback about agile Process expresses that it neglects to emphasis on structural and configuration issues and in this manner it will certainly deliver tiny outline selections. Here, in this paper we identify effects that agile system has on programming advancement forms regarding quality inside structural, systematic, and social structure.

E&T 134

Analysis of Dielectric Relaxation in Mn/Cr co-doped ZnO Nanoparticles for Energy Storage Applications

Ameer Hussain
Centre of Excellence in Solid State Physics University of the Punjab, Quaid-e-Azam Campus, Lahore, Pakistan
Corresponding Email: ssprameerhussain@gmail.com

In this work, pure ZnO and Zn0.95-xCrxMn0.05O with concentration (x = 0, 0.025, 0.05) were prepared using sol-gel auto combustion method. Afterwards, structural, surface morphological, elemental composition and dielectric properties of the samples were analyzed in detail. Wurtzite hexagonal structure of the ZnO and Zn0.95-xCrxMn0.05O with concentration (x = 0, 0.025, 0.05) was confirmed by the X-ray diffraction analysis obtained from Bruker D8 advance diffractometer with Cu *Kα* radiation of wavelength 1.5405 Å. Surface morphology of the samples was analyzed by the field emission scanning electron microscope with different magnification that exhibited well-shaped spherical grains with distinct grain boundaries. Energy dispersive spectroscopy was used for the analysis of elemental composition of the samples. Precision impedance analyzer was used to calculate all dielectric parameters of the samples. By increasing the doping concentration, the crystallite size, bulk density and X-ray density was decreased which had significant effect on the dielectric parameters of the samples.

E&T 135

A 164 µW, 10-bit SAR ADC for Biomedical Applications at 1-V

Musharaf Raza, Arshad Hussain**
System-on-Chip (SoC) Design Laboratory, Department of Electronics Faculty of Natural Sciences, Quaid-i-Azam University, Islamabad
**Correspoinding Email: Musharafraza0@gmail.com, arshad@qau.edu.pk*

This paper presents a low-power front-end Analog-to-Digital Converter (ADC) for biomedical applications. The mostly biomedical signals are low frequency range and have a limited dynamic range. A complete transistor level design oflow-power 10-bit ADC at supply voltage of 1-V. The SAR ADC is preferred for biomedical applications due to it simple architecture and low power consumption. The ADC uses Nyquist architecture of Start-Of-The-Art successive-approximation register (SAR) in 180nm CMOS technology at the sampling frequency of 2k/samples. The proposed design utilizes sample-and-hold for input signal, while binary weighted capacitive digital-to-analog converter (DAC) as charge distribution for feedback DAC. A detailed study of binary weighted DAC and split array DAC also presented to consider the linearity of the higher resolution for SAR ADC. The SAR digital control logic is also carefully designed to meet the requirement of 10-bit resolution. The proper design of D flip-flop is also important to avoid any issue in digital circuit. To improve performance of the SAR control logic, the transistor in the digital circuit with minimum double length are used. The critical paths with high threshold voltage transistor reduced. The control logic includes a ring counter and a code register. A shift register is a ring counter. While the End-of-Conversion (EOC) is also high at the starting clock cycle, all flip-flops are reset for the reminder of the EOC cycles. The comparator is also designed considering the low power constraints with few buffers at the output. The SAR ADC with sampling frequency of 2kS/s can achieve effectivenumber of bit (ENOB) of 9-bit by achieving THD of 56dB at the supply voltage of 1-V in 180nm CMOS Technology with power consumption of 168 µW. The ADC is also simulated at the supply voltage of 0.5-V with power consumption of 73nW.

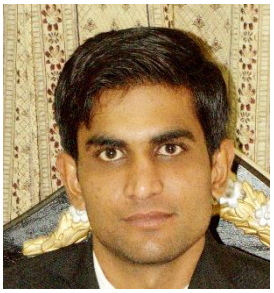
E&T 138

A Unified Framework for Encryption and Decryption of Images Based on Autoencoder

Muhammad Azeem[1], Dr. Shazia Saqib[1], Farrukh Sadiq[1], Ayesha Nasir[1]
[1]The Department of Computer Science, Lahore Garrison University (LGU), Lahore, Pakistan
**Email: azeemzulfiqarcs@gmail.com*

Over the last decade, many disciplines have made great strides in deep learning technologies, especially in computer vision and image processing. However, video coding based on deep training is still in its initial stage. This research work discusses the representative's work on deep learning for image/video coding, a research area since 2015. With the number of devices increasing on the internet, we face low-cost transmission over a network and security and safety. We can't determine the accurate data size with encryption and decryption cost and amount of noise in communication. Our proposed unified framework for encryption and decryption of images based on an autoencoder (UFED) can control the cost during encryption and decryption using modern techniques like deep learning and neural network. The autoencoder is worked as close to CNN and is trained on images and video frames to extract the image's feature. In this framework, the encoder changes the image into latent space or compressed form in a small size. We achieved the best image-compression ratio with autoencoder over JPEG; JPEG typically achieves 10:1 compression with little perceptible loss in image quality. This research observed the accuracy of image reshaping from latent space as well. We have achieved over 97.8% accuracy on the standard quantity evaluation measure in our proposed deep learning technique, far better than previously implemented models.

About Author



Muhammad Azeem received the B.Sc. degree in Mathematics and Physics from Bahauddin Zakariya University' Multan, Pakistan, in 2014 and the MCS.degree in Computer Science from COMSATS University, Islamabad, Pakistan in 2016, Now studying MS. degree in Computer Science from Lahore Garrison University, Lahore, Pakistan. From 2016 to on-ward, He is a Lecturer and Computer coordinator in Army Public Schools and Colleges System, Okara Cantt, Pakistan.

E&T 139

Locomotive Gaits for Rough-Terrain WhegRoach Robot

Muhammad Rafi Faisal, Kabisha Anwar and Dr Jameel Ahmed Khan
BUITEMS University, Quetta.
Correspoinding Email: rkfypfall17@gmail.com

Animals have been an inspiration for many mobile robots (legged based) to traverse through rough terrain, where wheel robots cannot perform well. WhegRoach is also a bioinspired robot, from cockroach's walking and running style, with C-shaped legs (Wheg) providing it great stability, stable Centre of Mass (COM), on rough terrains. It is capable of assisting humans and performing perilous tasks such as search and rescue. In this paper, we will present the different locomotive gaits (Tripod, Stair Ascending and Descending) of WhegRoach and to provide the internal view to the user, a camera has been placed on it. For simulating and testing, a physics-engine for robotics, CoppeliaSim is used. To observe the performance of the robot a mock environment is designed, and its different locomotive gaits robustness is tested along with the successful extraction of images.

About Author

Muhammad Rafi Faisal, Balochistan University of Information Technology, Engineering and Management Sciences, Quetta , Electronic Engineering, Undergraduate Student. 2021 - My name is Muhammad Rafi Faisal and I am an Undergrad student of Electronic Engineering. I am an accomplished coder and have great interest in Robotics and vision. To enhance and make my basics strong in my interest areas, I have completed multiple E-courses and have taken part in many competitions and won Innovation Fair 2018, Innovation Summit 2019, Huawei Seeds for the Future Program 2020.

E&T 140

Optical sensor technology for Power systems: A comprehensive review

Mahnoor Shahzadi[1], Sheraz Ahmad[2]
[1] Sichuan Provincial Key Lab of Power System Wide-Area Measurement and Control, School of Mechanical and Electrical Engineering, University of Electronic Science and Technology of China, Chengdu 611731, China.
[2] Department of Petroleum Engineering Technology, Mir Chakar Khan Rind University of Technology Dera Gazi Khan, Pakistan.
Correspoinding Email: engr.sherazahmad@gmail.com

The intrinsic advantages of optical sensor technology are very appealing for high voltage applications and can become a valuable asset in a new generation of smart grids. Due to the massive growth in the use of electric equipment in developed countries and the worldwide increase of the electrical distribution/consumption, the interest in sensors for electrical current metering, particularly in high voltage levels, has increased significantly over the last decade. In this paper the authors present a review of optical sensors technologies for electrical current metering in high voltage applications. A brief historical overview is given together with a more detailed focus on recent developments. Technologies addressed include all fiber sensors, bulk magneto-optical sensors, piezoelectric transducers, magnetic force sensors and hybrid sensors. The physical principles and main advantages and disadvantages are discussed. Configurations and strategies to overcome common problems, such as interference from external currents and magnetic fields induced linear birefringence and others are discussed. A review about the state-of-the-art work is presented including commercially available systems.

About Authors

The presenter has completed her PhD in December 2020, major in **Communication and Information Engineering** at UESTC Chengdu Sichuan China and currently working as Post-Doctoral Researcher at UESTC Chengdu Sichuan China from January,2021. In article publications for getting PhD degree, she published 2 SCI articles and 2 international conferences. Two articles are in review. The presenter is also an author of a book. She also has more than 4 years teaching experience in different institutions. The presenter completed her MSc in Telecommunication Engineering from UET Peshawar in 2014 and BSc Electrical Engineering from UET Lahore in 2010.

E&T 142

CAD/CAM AND NEW DESIGN TECHNOLOGIES IN HIGH ENERGY PHYSICS ELECTRONICS APPLICATIONS

Usman Habib
Department of Electrical & Electronics Engineering System, The University of Lahore , Pakistan
Corresponding Email: usman.habib.ch@gmail.com

In the past some years, several significant new technologies related to electronics design, fabrication and testing, appear to have reached a level of maturity which make them fully developed for ex-palliation by high energy physics laboratories. This paper will be review recent developments and trends, and will draw particularly from few examples at Stanford Linear Accelerator center. Cost Advantages as well as difficulties of implementing new technologies into relatively small Laboratories will be examined. The development of basic science of Innovative high energy physics over the past two decades has greatly aided by spectacular modernization in the state of the art of electronics. These developments are most marked in the development of progressively modern and strong electronics particle detectors in circle a variety of traditional techniques measurement, time of flight, carpology radiation, and multi wire tracking chambers. Where's twenty years ago all most high energy physics experiments involved fixed targets and limited solid angle coverage of the experimental region by possibly some hundred channels radiance hoodoo-scope and or photographic flare chamber or bubble apparatus, the newest detectors under construction today achieve close to 100% solid angle coverage of a crash beam interaction region by detection and data acquisition systems contain more than 100, 000 electronics channels. As the Institute of Electrical and Electronics Engineers, principal sponsors of this convention, enters its 101 st year survival, it is applicable to focus on the contribution of Electronics technologies to the field of high energy physics, and to look to future developments which promise to be at least as exciting and productive as those of the past two decades. In this brief descriptive, we describe few developments which are particular to SLAC, but which are planned to be figurative of development in the field all in all.

E&T 143

Supervised Learning based Classification of Cardiovascular Diseases

Arif Hussain[1], Hassaan Malik[1, 2,] , Mui-zzud-din[3], Syed Muhammad Ali Imran[4]*
1Department of Computer Science, National College of Business Administration & Economics Lahore, Multan, Pakistan
2Department of Computer Science, University of Management and Technology, Lahore, Pakistan
3Department of CS, Khawaja Fareed University of Engineering & Information Technology, Rahim Yar Khan 64200, Pakistan
4 Mir Chakar Khan Rind University of Technology DG Khan (MCKRUT), Pakistan
**Corresponding Author: f2019288004@umt.edu.pk*

Cardiovascular diseases (CVDs) are one of the critical human disease which affects myocardial infarction and the vasculature. However, detection of CVD in the early stages is one of the most difficult and crucial process. Machine learning (ML) methods may be appropriate to characterize the cardiovascular risk and predict outcomes. The objective of this study is to test the capability of machine learning methods, to accurately diagnose the CVD outcomes. We compute efficiency and effectiveness of four well renowned ML classifiers such as Support Vector Machine (SVM), Logistics Regression (LR), Naïve Bayes (NB) and Decision Tree (J48) in terms of many parameters like precision, sensitivity, specificity, accuracy, MCC, correctly and incorrectly classified instances and time to build model. These ML classifiers have been applied on publically available CVD dataset. The dataset contains sample of 70 thousand patients with twelve different features including one target value. In accordance with the measured results, J48 classifier is performed better than its other competitor classifiers, thus provides significant assistant to the cardiologists.

About Author

ARIF HUSSAIN has doing his MS in Computer Science Degree from National College of Business Administration & Economics, Lahore. and working as web developer in Learner's Castle School, Multan. He has two years of professional experience in software industry. His research interests include Machine Learning, Deep Learning, transfer learning, blockchain technology and diseases diagnosis from medical imaging.

E&T 146

Phenomenological working of Holographic Technology: A Comprehensive Study

Syed Muhammad Ali Imran,[12,], Hamza Zahid [3]*
[1] Department of Computer Information Technology, Mir Chakar Khan Rind University of Technology, Dera Ghazi Khan, Pakistan
[2]Department of Computer Sciences, Superior University, Lahore, Pakistan
[3] Department of Computer Science, University of Agriculture Faisalabad, Faisalabad, Pakistan
**Corresponding Author: ali.imran@mcut.edu.pk*

We investigate numerous exposures of the hypothesize duality between curve ADS5 geometries with edges branes and strongly coupled theoretical conformal field coupled to dynamical gravity. We also investigate commodification gauge field 5D, in which CFT weakly coupled has broken by dynamical gauge field. Picture of holographic clarify immensely phenomenological issues in these as well as concern affiliated model, including query of black hole production, radius, early cosmology universal and gauge coupling unification. Holography allows for a global evaluation which is both qualitative, through the simple visualization of the fringes which encode the displacement of the image and quantitative through the clearing of the fringes.

About Author

ENGR. SYED MUHAMMAD ALI IMRAN has received his MS in Computer Science Degree from National College of Business Administration & Economics, Lahore. He is working as Lecturer in Department of Computer Science; Mir Chakar Khan Rind University of Technology Dear Ghazi Khan .He is PhD scholar. He has eight years of professional experience in education and industry. His research interests include Image Processing, Machine Learning and Deep Learning.

E&T 147

EXPERIMENTAL STUDIES OF MASS TRANSFER COEFFICIENT FOR A PILOT SCALE WETTED WALL ABSORPTION COLUMN

Maham Hussain[*1], Waqas Aleem[2], Sadiq Hussain[1], Um-e-habiba[1], Mujtaba Ashraf[1]*
[1]*Department of Chemical Engineering NFC institute of Engineering and Technology, Multan. Pakistan*
[2]*Mir Chakar Khan Rind University, D.G Khan, Pakistan*
**Corresponding author:maham.hussain@gmail.com*

The mass transfer coefficient (K) for a pilot scale wetted wall absorption column with CO_2 gas used in absorption column were determined experimentally. The objective of this work is to Investigate the mass transfer coefficient particularly, for wetted wall absorption column. A number of experiments were performed at gas flow rates ranging from 5 to 20 (liters/min) and liquid flowrate scale at 0.2 (liters/min) covers the wetted wall absorption column operation conditions. Furthermore, the gas-liquid mass transfer coefficient (k) for wetted wall absorption column was presented. The effect of gas flow rate on the mass transfer coefficient have been calculated experimentally.

About Authors

Dr. Maham Hussain received her PhD in Modelling and simulation studies of Biomass Gasification from the Universiti Teknologi PETRONAS, Malaysia. Her research interest is in the area of development of biomass gasification for biofuel production. She has published several research articles in ISI/Scopus indexed journals. She has 13 years of research and teaching experience. She is currently affiliated with NFC Institute of Engineering and technology, Multan Pakistan.

E&T 148

Investigation of the Efficiency of CO_2 Foam Flooding to Enhance Oil Recovery in Sandstone Reservoir with Strong Aquifer Drive

Mian Umer Shafiq[1], Khizer Abid[1]*
[1]NFC Institute of Engineering and Technology, Multan, Pakistan
**Corresponding author: umer.shafiq@nfciet.edu.pk*

CO_2 foam is proposed in response to the problem regarding poor sweep efficiency of CO_2 gas itself, through which a significant amount of oil recovery can be obtained, where almost 100% displacement efficiency can be achieved. CO_2 foam effectiveness in the reservoir to eliminate the poor effects of the gas has yet to be explained. In this paper, the strong water drive reservoir (Sarir Oil Field) was analyzed which was gone through CO_2 foam flooding. The primary oil production is first optimized by adjusting the reservoir model parameters. Water and oil production rate analysis was performed for the history matching of the primary oil recovery with the past production of the reservoir. The oil production which is simulated exactly matches the real field data though little variations were observed in the case of water production when primary recovery nearly ends. CMG STARS™ was utilized to investigate the effect of different foam injection parameters like foaming agent concentration, injection timing, and injection slug size on the efficiency of oil recovery. The local-equilibrium model is applied in this paper by maintaining the major role of foam in gas mobility. The reservoir achieved an oil recovery factor of 9.19% implying that the oil production during the stage of natural depletion is at its optimum. The results from the simulation denote that CO_2 foam flooding has the optimum capability to enhance the recovery of oil in the reservoir with a strong aquifer drive with high foaming agent concentration, small slug size, and early injection start time.

About Author

Dr. Mian Umer Shafiq currently working as a Head of Petroleum and Gas Engineering Department, NFC-IET, Multan. He got his Ph.D. in Petroleum Engineering Degree in 2019 from Curtin University Australia, MSc in Petroleum Engineering from UTP Malaysia in 2013 while BSc in Petroleum & Gas Engineering in 2009 from UET Lahore. He also served Curtin University as a lecturer for three years. He got a Professional Engineer title from Pakistan Engineering Council in 2020 with a specialization in Reservoir Engineering. He is an active researcher having around 20 publications in international journals and conferences.

E&T 150

Treatment of Industrial Wastewater by Electro-assisted Coagulation: Evaluation of Control Variables and Process Optimization

*Junaid Ahmad [a], Adnan Akhtar *[,b], Zaheer Aslam [a], Malik Shoaib Suleman [b]*
[a] Department of Chemical Engineering, University of Engineering and Technology, Lahore,54000, Pakistan
[b] Department of Chemical Engineering, Sharif College of Engineering & Technology, Lahore, 55150,Pakistan
**Corresponding Author: Adnan.akhtar@sharif.edu.pk*

Wastewater disposal from textile industries imparts daunting effects on the ecological environment, resulting in unavoidable trade-off between rapid industrialization and environmental degradation. According to statistics, textile sector produces approximately 7000-8000 gallons of wastewater after a ton of finished product that comprises of high COD ranging from 300-10000 mg/L. There are numerous Advanced Oxidation Processes (AOPs) that are used for abatement of contaminants from recalcitrant wastewater. However, high chemical consumption and production of toxic intermediate species limits their industrial application. Thus, in order to trade-off chemical consumption and energy equipment, electrocoagulation is acknowledged as feasible and promising method. In this study, performance of electrocoagulation was assessed by using scrap iron as an electrode. Industrial textile wastewater was treated by considering initial pH of the solution, interelectrode spacing, electrolyte (Na_2SO_4) concentration and current density as operating parameters whereas Electrical Conductivity, COD removal and Turbidity were selected as prime responses. In order to investigate the effect of control factors and process optimization, Response Surface Methodology(RSM) was employed and Central Composite Design (CCD) method was implemented under RSM for designing of experiments. According to experimental results, initial pH of the solution and current density were considered as most substantial factors with maximum %COD, %Turbidity and %decolorization were measured as 91%, 98% and 87% respectively under optimum parameters. Furthermore, the results exhibited that further process optimization may increase the viability of this technique due to the possibility of zero water discharge that may provide a reasonable alternative for ongoing water scarcity.

E&T 151

A 164 µW, 10-bit SAR ADC for Biomedical Applications at 1-V

Musharaf Raza, Arshad Hussain*
System-on-Chip (SoC) Design Laboratory, Department of Electronics, Faculty of Natural Sciences, Quaid-i-Azam University, Islamabad, Pakistan.
**Corresponding Email: Musharafraza0@gmail.com, arshad@qau.edu.pk*

This paper presents a low-power front-end Analog-to-Digital Converter (ADC) for biomedical applications. The mostly biomedical signals are low frequency range and have a limited dynamic range. A complete transistor level design of low-power 10-bit ADC at supply voltage of 1-V. The SAR ADC is preferred for biomedical applications due to it simple architecture and low power consumption. The ADC uses Nyquist architecture of Start-Of-The-Art successive-approximation register (SAR) in 180nm CMOS technology at the sampling frequency of 2k/samples. The proposed design utilizes sample-and-hold for input signal, while binary weighted capacitive digital-to-analog converter (DAC) as charge distribution for feedback DAC. A detailed study of binary weighted DAC and split array DAC also presented to consider the linearity of the higher resolution for SAR ADC. The SAR digital control logic is also carefully designed to meet the requirement of 10-bit resolution. The proper design of D flip-flop is also important to avoid any issue in digital circuit. To improve performance of the SAR control logic, the transistor in the digital circuit with minimum double length are used. The critical paths with high threshold voltage transistor reduced. The control logic includes a ring counter and a code register. A shift register is a ring counter. While the End-of-Conversion (EOC) is also high at the starting clock cycle, all flip-flops are reset for the reminder of the EOC cycles. The comparator is also designed considering the low power constraints with few buffers at the output. The SAR ADC with sampling frequency of 2kS/s can achieve effective-number of bit (ENOB) of 9-bit by achieving THD of 56dB at the supply voltage of 1-V in 180nm CMOS Technology with power consumption of 168 µW. The ADC is also simulated at the supply voltage of 0.5-V with power consumption of 73nW.

E&T 152

Wastewater Treatment by Adsorption with Electrochemical Regeneration using Reactive Brown 9 as Adsorbate.

Mansoor Shafiq Durrani[1,2,] , Waqas Aleem[1] , Sheraz Ahmad[2]*
[1]Institute of Chemical Engineering and Technology Department, University of the Punjab, Lahore, Pakistan.
[2]Department of Chemical Engineering and Technology, Mir Chakar Khan Rind University of Technology Dera Ghazi Khan.
[3]Department of Petroleum Engineering and Technology, Mir Chakar Khan Rind University of Technology Dera Gazi Khan, Pakistan
**Corresponding Email: mrkdurrani@gmail.com*

Textile industries are producing huge amount of wastewater which contains harmful pollutants. The main pollutants in textile wastewater are dyes. Keeping this in mind work is done on water treatment to remove dye from waste water of textile industry. In this research, adsorption and electrochemical regeneration of adsorbent Nyex 1000 has been studied using Reactive Brown 9 dye as adsorbate. Nyex 1000 successfully removed the dye from water and then adsorbent was regenerated electrochemically. Regenerated adsorbent was re-treated several times to check change its regeneration efficiency. Regeneration efficiency remained more than 90% each time. To find more effective method of finding adsorbent capacity, kinetics was studied. It was found that Pseudo first order kinetic was more effective than pseudo second order kinetic.

About Author

Engr. Mansoor Shafiq Durrani is a PhD Scholar at Institute of Chemical Engineering and Technology, University of the Punjab Lahore, Pakistan. He has obtained his M.Sc. Chemical Engineering and B.Sc Chemical Engineering from University of the Punjab, Lahore, Pakistan. He has vast experience in teaching and research. He is currently serving at the Department of Chemical Engineering Technology, Mir Chakar Khan Ring University of Technology, Dera Ghazi Khan. Previously he worked in SNGPL as Transmission Engineer on RLNG Power Plants. He can be reached at: mrkdurrani@gmail.com.

E&T 153

Heuristic Rule based Energy management scheme using PV

Zunaira Waseer
Department of Electrical Engineering Technology, Mir Chakar Khan Rind University of Technology, Dera Ghazi Khan.

The working of the photovoltaic based system for charging electric vehicle (EV) is somehow difficult due to the discontinuous PV power and irregular EV power demands. In a PV-based system, if an energy storage unit (ESU) is included, its state of charge must be kept to ensure its survival. Surely, a systematic energy management is needed to optimize the use of these renewable energy sources such that their interactions with EV result in the desired charging objectives. To realize these aims, the proposed work developed an improved rule-based energy management scheme (REMS) that fulfills continuous load demand of EV with a reduction in the charging prices without imposing the vehicle-to-grid or vehicle-to-vehicle operations. So I implement my research for the city of Bahawalpur and analyze the working of whole system with proper functioning of the energy management scheme. The functionality of REMS was simulated in MATLAB. Its resiliency was observed for a single day charging. The present research compare its performance against the standard EV charging using the generator set only. The results shows that by applying REMS the charging price decreased by 58% while the burden on the EV charging power on the grid reduces by 100 %. Based on the findings, the approach to develop REMS can be used by energy planners to optimize the usage of renewable sources for EV charging.

E&T 154

Natural gas hydrate an unconventional reliable source of energy and CCS potential site in Pakistan: A comprehensive Review

Sheraz Ahmad[1,] , Mahnoor Shahzadi[2] , Mansoor Shafiq Durrani[3,4,*]*
[1]Department of Petroleum Engineering Technology, Mir Chakar Khan Rind University of Technology Dera Gazi Khan, Pakistan
[2]Sichuan Provincial Key Lab of Power System Wide-Area Measurement and Control, School of Mechanical and Electrical Engineering, University of Electronic Science and Technology of China, Chengdu 611731, China
[3]Department of Chemical Engineering and Technology, Mir Chakar Khan Rind University of Technology Dera Ghazi Khan.
[4]Institute of Chemical Enigneering and Technology, University of the Punjab, Lahore, Pakistan.
**Corresponding Email: engr.sherazahmad@gmail.com, mrkdurrani@gmail.com*

Natural gas is the cleanest source of energy as compared to other sources of fossil fuels. In Pakistan, the only area that grasps any attention about natural gas hydrates presence is along the Makran coastal region. For overcoming the energy crisis in Pakistan, the gas hydrates have to be produced on commercial scale but there are also some challenges which need to be addressed. In this paper, the geographical existence of NGHs reserves in offshore sedimentary basins of Pakistan has been discussed. A brief historical overview is given about the fruitful efforts by different organizations in terms of seismic interpretation in the Makran accretionary Margin recognized as the natural gas hydrate stability zone. The importance of NGHs as a commercial source while, comparing with other existed unconventional resources in Pakistan has been outlined. The various physical, chemical and thermal properties of gas hydrates have also been addressed to understand the mechanism and potential issues concerning NGHs production and CO2 storage in the same reservoir formation. To achieve this goal, a novel technique is proposed to produce NGHs and CO2 injection and storage simultaneously on huge scale.

About Authors

The presenter has completed his PhD in July 2020, major in **Oil and Gas Field Development Engineering** at China University of Petroleum-Beijing and currently working as Faculty Member at Mir Chakar Khan Rind University of Technology Dera Ghazi Khan from November,2020. In article publications for getting PhD degree, he went well beyond the degree requirements and already published 2 good quality SCI paper, 2 SCI Papers are in Review and 2 SPE Conference papers have been accepted and he is also the co-founder of 2 patients.

E&T 155

Applications of wireline formation testing (WFT) and downhole fluid analysis (DFA): Reviewing the importance of this technology in reservoir evaluation

Nasir Alshmlh [1], Muhammad Villayat Abbas[1], Arshad Shehzad Ahmad Shahid[2,3]
[1]DIATI, Politecnico di Torino, Italy
[2]Department of Petroleum and Gas Engineering, University of Engineering and Technology, Lahore, Pakistan
[3]Department of Energy and Mineral Resources Engineering, Sejong University, Seoul, South Korea.

Wireline formation testing (WFT) is an important aspect in both exploration and production phases for reservoir evaluation. WFT tools can directly measure the formation pore pressures. Then the pressure profile used to identify type of pore fluid, fluid density, fluid contact estimation, depletion and overpressure quantification, detect continuity and connectivity of reservoir in the lateral and vertical direction. WFT is usually used to evaluate formation permeability and taking fluid sampling. The new generation wireline formation sampling tool includes a downhole fluid analyzer (DFA), which can analyze the composition of fluids in real time and under bottom-hole conditions and measure the spectra of crude oil. So, it is possible to identify fluid compositional variation and reservoir vertical compartmentalization. The analysis of fluid composition depends on the optical absorption, and the mass fraction estimation for the three groups of hydrocarbons: methane (C1), C2-5 and C6 + and CO2. Also providing formation fluid properties like GOR, density, viscosity and resistivity. The DFA results are subsequently validated and modified by laboratory analysis. The potential advantage of early measurements demonstrates technology of DFA as a good decision-making solution in early stage without waiting the lab result for months. In addition, early DFA measurements are important in completion designing and well testing, the establishment of fluid gradients in reservoirs and connectivity, identify and validate fluid distribution and reservoir structures.

E&T 156

Inevitability of VOC (Volatile Organic Compounds) detection in waste bin: A Step Towards Environmental Sustainability

Muhammad Ibrahim[1,], Maryam Zaffar[1], KS Quraishi[2], Raja Habib[1]*
[1]Department of Computer and Information Technology University of Lahore, Pakistan
[2]Department of Process Engineering, Pakistan Institute of Engineering & Applied Sciences Nilore Islamabad Pakistan
**Correspoinding Email: maryam.zaffar@cs.uol.edu.pk*

Volatile organic compound (VOC) is very dangerous for human health, causes skin diseases and cancer. VOC emissions causes changes in quality of air, which in return causes difficulty in breathing. In sum the disease which come from VOC is directly effect the public health and environment, that may cause risks of living things. Presence of VOC in waste is large in number, The prevailing traditional technology is neither optimized not efficient. Internet of Things (IoT) plays vital role in detecting the VOC. This paper will propose a real time sensor monitoring to wastebin for detection of VOC for environmental sustainability.

About Authors

Dr. Maryam Zaffar is working as assistant professor at university of Lahore. She has 14 years of teaching experience. Her area of research is data analytics, Feature Selection and Educational data mining. She is also working on different Machine learning and deep learning algorithms in the different areas like autism, education and renewable energy resources.

E&T 157

Improved Autism Spectrum Disorder (ASD) Classification using Feature Selection Algorithms: An Analysis on Recent approaches.

Maryam Zaffar[1], KS Quraishi[2], Shunaila jabeen[3]
[1]Department of Computer and Information Technology University of Lahore, Pakistan
[2]Department of Process Engineering, Pakistan Institute of Engineering & Applied Sciences Nilore Islamabad Pakistan
[3]Karakurom International University Diamer Campus, Chilas GB
**Correspoinding Email: maryam.zaffar@cs.uol.edu.pk*

Autism Spectrum Disorder (ASD) is a neurodevelopmental syndrome that causes autistic children difficult in social interactions and communications. Children with ASD have tries to live in isolation and faces difficulty in keeping eye contact with others. Autistic children have variety of behavioral abnormalities, which leads difficulties in learning activities of such patients. Unfortunately, there is not a proper cure of this disease. However according to different researchers, the negative effects of autism can be reduced if it is early identified. Different machine learning approaches are already integrated with different methods of autism diagnosis. Variety of classifiers including SVM, Naïve Bayes, Random forest are utilized for predicting autism in children. Feature selection algorithm improves the accuracy of machine learning algorithm. Improvement in accuracy of machine learning model for autism prediction can play vital role identifying the important features effecting the autistic patients. Different feature selection algorithms including chi-square, CFS, wrapper feature selection and hybrid feature selection algorithms are utilized my different researchers to improve the performance of machine learning model for autism prediction. This paper correlates with the existing work on autism diagnosis techniques by using feature selection algorithms. It further provides the summary of the relevant techniques to substantiate the existence of autism disorder and strategies used for identification.

About Authors

Dr Khurram Shehzad Quraishi is working as Assistant Professor Chemical Engineering Department at Pakistan institute of engineering & Applied Sciences He have multidisciplinary experiences from industry to academia spread over the time span of 13 years. His expertise are energy management power systems environment toxicity bioreactor sustainable life cycle and related interdisciplinary industrial research.

E&T 158

Analysis of Machine Learning Models Prediction for Liver Cancer Disease

Sehrish Zaffar: sehrishzaffar9@gmail.com
Dr. Abu Bakar Siddique:abubakar.ahmadani@gmail.com (Assistant Professor at KFUEIT)
Humaira Anwer: humaira.anwer@kfueit.edu.pk (Lecturer at KFUEIT)

The human liver is one of the body's main organs, and liver disease can lead to a variety of issues. The diagnosis of this disorder is both expensive and time-consuming. As a result, the aim of this research is to assess the performance of various Machine Learning Algorithms in terms of decreasing cost of liver disease diagnosis by predicting and removing errors rate in the biomedical field, with the goal of achieving Zero False Positive and False Negative cases. Random Forest, Decision Tree, K Nearest Neighbors, Support Vector Machine, GB, MLP, Guassian NB, and Logistic Regression are being used in this study. The performance of various classification models was assessed using a variety of metrics, including accuracy, recall, f1 ranking, and precision. The findings of the study showed that Random Forest had the highest accuracy of 100 percent. Furthermore, the current research primarily focused on the use of clinical data for liver disease prediction, and we used our analysis to investigate various ways of representing such data.

E&T 159

Finite Element Analysis of Axial Response of GFRP Reinforced Hollow Concrete Columns

Tanwir Ullah
MS Student, University of Engineering and Technology, Taxila, 47080, Pakistan;
Email: tanwir.ullah@students.uettaxila.edu.pk

Glass-fiber-reinforced-polymer (GFRP) reinforcements are useful alternative to traditional steel bars in concrete structures particularly in vertical structural elements such as columns, due to lesser corrosion. However, lesser studies are available, on the compressive response of concrete hollow columns reinforced with GFRP bars and spirals. This paper aim to explore the axial behavior of GFRP reinforced concrete hollow columns. Four circular hollow columns reinforced with 15.9 mm diameter six GFRP bars, were cast and tested under concentric axial loading. The columns had a constant external 250 mm diameter but variable inner diameter of 0, 40, 65, and 90 mm. ABAQUS software was used to construct FEA models of the columns, using the same geometry, loading and boundary conditions. After initial calibration using a control sample, FEA analysis of the models was performed. The numerical study showed that hollow columns provide greater confinement efficiency than the solid columns. Moreover, GFRP reinforced hollow columns possess greater axial strength and deformation capacity than the traditional steel reinforced columns. The numerical analysis showed a good agreement with the already conducted experimental work.

E&T 160

BAGGASE ASH AS A CEMENT REPLACEMENT MATERIAL IN MORTAR

ABDULLAH FARRUKH
Department of chemical engineering technology
Mir chakar khan rind university of technology , d.g. khan
Corresponding email: abdullah.farrukh.p114@gmail.com

Industrial waste is the chief source for environmental dilemma, which causes not only ecological effects but has deprived economical effects too. We have to bring into play different methods by which the industrial waste should be used economical, environmental friendly and helps in producing useful product. Baggase, the waste produce from sugar industry causing serious environmental effects, so this industrial waste should be handled on priority basis, so as to make our planet free of pollution. As in Pakistan there is a huge amount of construction activities are going on so due to which erection item prices are mounting day by day particularly that of cement, the center of attention of this research work is to find out the potential to use Baggase Ash of Sugar Cane as cement replacement material within mortar. In this research, Sugar Cane Baggase Ash is replaced with cement in the ratio Zero, Five, Ten, Fifteen, Twenty, Twenty-Five, Thirty, Thirty-Five, Forty, Forty-Five and Fifty percentage by weight, keeping the amount of sand and water constant. The sample solution of different ratio of Sugar Cane Baggase Ash is placed in British standard blocks to shape the cubes, Performing Compressive Strength Test, Scanning Electron Microscopy (SEM) Test and X-Ray Diffractometry (XRD) Test on Mortars Cubes at different ages of Mortar Cubes. Finally by compiling the results shows that the Baggase Ash of Sugar Cane is capable of to be exploit as a cement replacement substance in mortar up to 20% by weight, and above that till 40% it can be used by compromising the compressive strength of the mortar.

E&T161

Cloud application importance and challenges: A Systematic Review

Muhammad Zulkifl Hasan
NCBAE DHA Campus Lahore
Corresponding E-mail: engrrhasan@gmail.com

To enhance agility in the digital age, operators are using digital telecommunications methods that are changing both the front and back of the business. This study examines the application of Business Architecture (EA) principles that provide excellent support for this business, and outlines six key steps that help Entrepreneurs Bridge the gap between IT businesses and networks. He can be sure that the changes are effective.

E&T 162

Analytical models for gas production in a shale reservoir: A review focusing on pore network system

Muhammad Villayat Abbas[1)], Muhammad Shoaib[1)], Nasir Atallah Houady Alshmlh[1),] and Arshad Shehzad Ahmad Shahid [2,3)]
1) DIATI, Politecnico di Torino, Italy
2) Department of Petroleum and Gas Engineering, University of Engineering and Technology, Lahore, Pakistan
3) Department of Energy and Mineral Resources Engineering, Sejong University, Seoul, South Korea

Shale gas reservoirs may contain pores with different origins (; natural or induced) and scales. They can be divided into four groups, inorganic porosity, organic porosity, natural micro-fractures porosity and artificially created fractures porosity. The inorganic porosity is the void spaces within matrix of clay, pyrite, silica and other non-organic minerals. The organic porosity is the void space that remains in organic matter after conversion the kerogen to gas and oil. Organic matter in the form of kerogen is finely dispersed within inorganic matrix and contain void spaces (organic porosity). Micro-fractures network contains void spaces (natural micro-fractures porosity) and pore network system is also formed after creation of hydraulically induced fractures (artificially created fractures porosity). Simulating gas production from shale gas is a complex process due to interaction of fluid with various pore scales. In the current research work, shale gas transport through complex porous network is reviewed. Transport mechanism for free and adsorbed gas in dispersed organic nano-pores is combination of both Darcy and non-Darcy phenomena. Slippage of gas molecules occurs in organic pores and desorption of gas molecules occurs as the reservoir pressure depletes. The combined flux from organic pores is transported into inorganic pores then transported into micro-fractures network which can be exploited if hydraulically induced fractures are created in the vicinity of wellbore. It is a huge challenge to model gas production from shales due to presence of multi-scaled porosities. Slippage effects and desorption further add to the complexity in shale gas reservoirs. Analytical models, presented in the current review paper, incorporate complexities in shale gas reservoirs so that production from shale gas can be modeled precisely.

BAS-201

Big Data Use in Manufacturing Firms: A Dynamic Capabilities Perspective

Zulqurnain Ali
Department of Economics and Business Administration, Division of Arts and Social Sciences, University of Education, Lahore.
corresponding author zulqurnain.ali@ue.edu.pk ORCID: 0000-0002-2133-7409

Due to globalization and the emergence of technological development, firms are adopting new ways in their manufacturing system to produce innovative cum sustainable goods & services. Currently, firms are generating a large amount of data, under the umbrella of E-commerce, from their daily business operations which can be used to enhance firm efficiency and effectiveness. Using the tenets of the dynamic capability perspective, this study aims to investigate how big data use improves manufacturing firm performance and to explore the moderating role of firm flexibility in the association between big data use and manufacturing firm performance. Using the survey method, we recruited 580 textile managers and executives in the region of Punjab, Pakistan. Moreover, our research runs covariance-based structural equational modeling (CO-SEM) in Mplus 7.3 to validate the study's proposed measurement model and structural relationships. Furthermore, this study offers deeper insights into how big data is beneficial for textile firms to realize their objectives. Managers can improve firm operations, overcome potential issues of forecasting and create a competitive edge over rivals. In this way, big data use enables the manufacturing firms to minimize production cost, reduce manufacturing risk, and meet customer demands. Organizations always need new methods to enhance their productivity using their capabilities. This is the first study that contributes to the existing literature of big data management by examining the direct influence of big data use on manufacturing firm performance and the moderating role of firm flexibility in this association using the theoretical base of dynamic capability perspective. **Key Words:** Big Data Use, Manufacturing Firms, Firm Flexibility, Textile

About Author

Dr. **Zulqurnain Ali** is Assistant Professor of Business Administration (Big data and Supply Chain) at Department of Economics & Business Administration, Division of Arts and Social Sciences, University of Education, Lahore. Dr. Ali has joined as Post Doctorate Fellow of Business Administration at School of Management, University of Science and Technology of China. He is currently serving as Academic Editor (social sciences) at PLOS one.

BAS-202

CT Dose Optimization in Pediatric PET/CT Hybrid Imaging

Afshan Ashfaq[1], Muhammad Meesum Bilal[1], Masooma Riaz[2], and Dr Abubaker Shahid[1]
1. PET/CT center, Institute of Nuclear Medicine and Oncology (INMOL), Lahore
2. Center for high Energy Physics, The University Of Punjab, Lahore
Correspoinding E-mail: afshan.arslan@gmail.com, meesum@mail.ustc.edu.cn

Positron Emission Tomography/Computed Tomography (PET/CT) using 18FFDG is an indispensable imaging modality for oncology patients. Cancer patients undergo multiple essential PET/CT scans during treatment for staging, post-therapy for treatment of response and for reoccurrence evaluation. The various PET/CT scan amplifies radiation exposure particularly to pediatric patients. The key intention is to be optimizing the pediatric CT scan procedure to minimize radiation dose in PET/CT hybrid imaging. A group of40Patients (each < 25.0 kg) were acquired on Discovery STE PET/CT scanner that comprises a combined PET system with a fully diagnostic 16 slice CT scanner. For major reductions in radiation doses from PET/CT scan, following CT parameters were studied e.g. kVp, mAs, pitch, Slice thickness and noise index. All patients were scanned with alike technique with only variation for CT dose optimization. The dose length product (DLP) and volume CT dose index (CTDIvol) were recorded for effective dose. The studies were blinded by consultant radiologists and PET reporting consultants by grading the imaging quality of anatomic structures. A decrease of 60% from 8.8 mSv to 3.3 mSv ($p < 0.05$) achieved in mean effective dose. The consultant graded that all studies were diagnostically sufficient. By optimizing CT Parameter substantial radiation dose reduction can be accomplished.

BAS-203

Utilization trend of computed tomography in an "Institute of nuclear medicine oncology Lahore" (INMOL) from 2012 to 2016

Muhammad Meesum Bilal • Afshan Ashfaq • Mamona Mumtaz • Abrar Husain • Zamir Ali • Zeeshan Rashid Mirza • Mumtaz ul Haq • Masooma Riaz*
M.M.Bilal • M.Mumtaz
Department of Physics, The University of Lahore, Raiwand Road Lahore, Pakistan
** e.mail: meesumjafri512@gmail.com*
A.Ashfaq • M. u. Haq • Z.R.Mirza • M.Riaz
Institute of Nuclear Medicine Oncology Lahore New Campus Road P.O.Box No.10068, Lahore, Pakistan
A.Hussain
Hefei National Laboratory for Physical Sciences at Micro scale, Department ofPhysics, University of Science and Technology of P.R China
Z.Ali
NJUST, Nanjing, Jiangsu, RP .China

The objective of this study is to analyze the changes in computed tomography (CT) utilization in Radiology department of "Institute of Nuclear Medicine Oncology Lahore" (INMOL) over a 5 -year period. This study will be helpful for hospital administration, clinicians and health planning. CT scans ordered for all type of age from 2012 to 2016 for five organs: head and neck, chest, abdomen and pelvis. During the study period 23,388 patients were evaluated in Oncology department through which 8,215 patients came in the Radiology department. There were 12,874 CT scans performed during this study period. SPSS 19 used for statistical analysis. Head CT scan increased by 50/ 1000 patients, neck increased 116/1000 patients, chest CT scan increased 260/1 000 patients, CT scan of pelvis increased 269/1000 patient and CT scan of abdomen increased 303/1000 patients. This increase has occurred despite considerable discussion in the medical literature about the radiation risks of CT in the population and may reflect increased availability of CT; improvements in CT diagnose capabilities, and increased desire on the part of physicians and patients for diagnostic certainty. Most CT scan was done for age group of more than 46 year that is energetic period of life. A good number of female patients were examined during the study period. The utilization trend of Computed Tomography increased 39% from 2012 to 2016. This percentage increased due to the increasin g number of patients at INMOL and also to Radiology department which came for CT scan.

BAS-204

Developing Low-Carbon and Resource Efficient Urban Food Systems

Khurshied Ahmed khan , Muhammad Salman Hameed, Tahira Batool Qasrani ,M. Ikram ul Haq, Nisar Hussain, Matlob Ahmad, Ali Bakash , Shahbaz Ali, Muhamamd Shaid Nisar, Mudassar Maqbool, Muhammad Athar Khaliq, Ahmed Kamran Khan, Maqbool Ahmad, Muhmmad Ijaz Hussain, Asma Noureen*
Ghazi University, Dera Ghazi Khan 32200, Pakistan
**Corresponding Author: kakhan@gudgk.edu.pk*

The world is in front of universal challenges in agriculture due to climatic fluctuations, ecological and soil degradation, scarcities of water supply, and eminence concern in food products. A plant factory with artificial lighting (PFAL) or indoor vertical farming system is a changeover for traditional greenhouses or open-field production and also the base of new markets and business prospects in Pakistan. In this regard we investigated the effect of light wavelength on growth and physiology of lettuce plants, Romaine lettuce and sunny leaf lettuce were chosen as targets for the study. Using single color LED lights (white, red, green, blue), leaf absorption of light, photosynthetic rate, stomatal conductance and transpiration rate of romaine lettuce leaves were examined. The results showed low correlation of light absorption percentage and stomatal conductance to photosynthetic rate of romaine leaf. However, transpiration rate and photosynthetic rate have high correlation, suggesting a relationship between these two processes. Sunny lettuce plants were cultivated on rockwool using hydroponic method under different light source including fluorescent lamb and LED of different colors (white, red, green, blue and rainbow). Plants illuminated by fluorescent lamp gave the highest dry weight, while rainbow LED provided plants with the lowest fresh and dry weight. Plants under white, red, green or blue LED do not differ significantly about fresh and dry weight. These results suggest that combination between different types of LED is required to achieve the best yield of lettuce plants.

About Author

Dr.Khurshied Ahmed khan joined Ghazi University as IPFP Assistant Professor in 2018 .He was awarded a PhD degree by China Agricultural University, Beijing, College of Water Resources and Civil Engineering, Key Lab of Agricultural Engineering in Structure and Environment. Dr. Khan is a prolific writer and has authored over 21 publications. His areas of expertise are Vertical Farming under LED lights, Controlled Environment Agriculture, Hydroponics Supporting Courses: Chiba University Japan.

BAS-205

Virulence and pathology of *Beauveria spp.*, *Metarhizium spp.*, AND *Isaria spp.* against two different insect species

Hassan Yasoob
Corresponding E-mail: hassan.yasoob@gmail.com

Biological Control Agents have gathered considerable attention by scientists worldwide and are popular as comparatively safe, efficacious and posing minimal risks and can be applied innundatively. Entomopathogen'spivotal role in regulation of insect population in nature elucidates them as the earliest insect pest control agents. Among all entomopathogens, fungi possess significant importance vis-a-vis bacteria and viruses as it enters though insect cuticle unlike needs to be orally ingested in case of others. It is well known that complex interactions occur between entomopathogenic fungi and their host insect where pathogenic fungi mannerly follows the sequential steps of interaction/infection in order to kill the insect. Till date many attempts have been made for understanding meticulous details underlying physiological and biochemical mechanisms involved in infectionbut not all of the questions been answered yet. The study conducted elucidates the efficacy and virulence of three different entomopathogenic fungus (EPFs) genera *Beuveria* spp., *Isaria* spp., *and Metarhizium* spp. as an alternative management for insect pests using *Mythimna separata* and *Tenebrio molitor* as insect models. Selected host's defense enzyme activities were analyzed during the infection to understand the interaction of the fungi and insects during the infection. Bioassay results in general, suggested that the strains used were pathogenic with varying level of virulence to both tested insect hosts and did not possess host specific requirements. In the experiment with *T. molitor* as a host insect, Qin-21 (*B. bassiana*) and YYC-091 (*M. robertsii*) were among the most virulent isolates of all in order with LD_{50} of 9.12×10^{4} and 3.4×10^{5} conidia/g and Mean Survival Time (MST) of 3.44 ± 0.04 and 4.33 ± 0.07 days at 2×10^{8} conidia/g for respective treatments, whereas BSH-03 (*B. asiatica*) was the least virulent of all with LD_{50} of 4.1×10^{7} conidia/g. Surprisingly, isolates of *Isaria* spp. outcompeted *Beauveria* and *Metarhizium* spp for their virulence in *M. separata* as host insect. ILDS-03 and ILDS-01 isolates of *I. cateniannulata* were the most virulent isolates in order with LD_{50} of 1.24×10^{06} and 1.71×10^{06} conidia/ml respectively and mean survival time of 4.73±0.16 and 3.64±0.12 days at 2×10^{08} conidia/ml dose of infection respectively. We then studied the changes in activity profilesof anti-oxidative enzymes: peroxidases (PODs), catalase (CATs), superoxide dismutases (SODs) and detoxification enzymes: glutathionhe S-transferase (GSTs) and carboxylesterase (CarE) and alkaline phosphatase (AKP) in both host

insects.peroxidase (POD) and carboxylesterase (CarE) enzyme activity were inhibited throughout the infection period (POD, $P<0.01$) by the most virulent isolate Qin-21, suggesting the selective suppression of defense related enzymes for the effective pathogenicity. Further, the highly virulent strains of *Isaria* spp. ILDS-03 showed consistent reduced enzymatic profiles for SOD, CAT, CarE throughout the time period from the 6-hpi but for POD, AKP reduced activity started from 6 hpi. Similarly, for ILDS-1 the second most virulent isolates continuously reduced the activity of GST and CarE. Whereas, *Metarhizium* isolates with less virulence showed consistent elevated enzymatic activities of GST and CarE complying to the effect of virulence in the host defense responsive enzymes. Scanning electron microscopy revealed that Qin-21 and YYC-091 have comparatively faster germination rate within 12 hpi followed by vigorous extension of germ tube for later one within 24 hpi. The infection process of ILDS-03 isolates studied through transmission electron microscope in different time points after infection showed effective penetration of the insect's cuticle and epidermis at 12 hpi followed by proliferation in body cavity at 48 hpi, which extend towards epidermis at 72 hpi and mycosis has been observed at 96 hpi. The study showed that different EPF can have varying level of virulence against host species, and the virulence differences were related to downregulation of selective enzymes of the host insects. It gives fundamental knowledge to understand the interaction of entomopathogenic fungi and their host insects and a valuable mark to select high virulence strain of entomopathogenic fungi.

KEY WORDS: Entomopathogenic fungi, *Beauveria, Metarhizium, Isaria, Mythmnia separata*, *Tenebrio molitor*, Pathogenicity, Enzyme activity.

About Author

Dr. Hassan Yasoob is one of Pakistani Research Scholar completed his PhD in "Agriculture Entomology and Pest Control" with title "Effects of Cantharidin, Nor Cantharidin and Thiamethoxam on Different Insect Pests" from "Northwest A&F University China" awarded by the Chinese Government in June, 2018. He started his research activities during his graduation as a "Research Fellow" in a project "Diagnostic and Research Centre for Mango Orchards" hosted by "Bahauddin Zakariya University Multan".

BAS-206

Transnational Water Grabbing in Pakistan: implications for food and water security

Salman Ata[1,], Nisar Hussain[1], Muhammad Arif Watto[2], Babar Shahbaz[2], and Muhammad Ali Tarar[1]*
**Ghazi University, Dera Ghazi Khan, Pakistan*
*** University of Agriculture Faisalabad, Pakistan*
Corresponding E-mail: sata@gudgk.edu.pk

The global financial crises have triggered the finance-rich resource-poor countries to acquire land in developing countries to ensure food security for their own population- a phenomenon known as transnational land acquisition (TLA) or land grabbing. Pakistan is the second top-ranked country in terms of groundwater depletion. The provision of freshwater resources to transnational land acquirers is associated with a reduction in water availability in the surrounding areas. Hence, to assess the hydrological implications and their impacts on the water systems of Pakistan, the quantification of water footprints of TLA is necessary. This research, for the first time, assessed the green and blue water consumption by UAE-based Al Dahara Agricultural Company in the Sindh and land acquired by UAE Royals in Rahim Yar Khan, Pakistan by computing collected data into a software developed by the Food and Agriculture Organization (FAO) of the United States. The study will present evidence to the Ministry of Water Resources about the rate of depleting water resources (both rainfall and irrigation waters) in Pakistan due to transnational land and water acquisitions. Policy recommendations to address water globalization are also provided.

About Author

Salman Ata
Assistant Professor (IPFP)
Department of Agricultural Extension Education
Ghazi University, D.G Khan

BAS-207

Static magnetic field and modulation of microRNAs

Dr. Ahmed Waqas
Department of Zoology, University of Education, Lahore Multan Campus. Bosan Road Multan, Pakistan

Static magnetic field has been implicated in different therapeutic purposes. It is involved in modulation of different pathways in human's body. In our study, we have focused on role of some microRNAs for their involvement under the stress of SMF in Caenorhabditis elegans (*C. elegans*). We selected few previously reported microRNAs in different stress conditions and our results demonstrated the upregulation of *mir-34* and *mir-83* in N2 wild type worms upon exposure to 0.5 tesla (T) and 1 tesla (T) SMF for 24 and 48-hour time duration. Exposure to high magnetic field (4T, 8.5T) had no significant effects. The extended life span (under normal conditions) of *mir-34* mutants decreased upon SMF exposure of 0.5 T and 1 T in *C. elegans*. As SMF normally affects development of the organism, we checked the brood size of worms after SMF but it did not show any significant effects. Again, we selected some known target genes of mir-34 from previous studies and online databases. So mir-34 seems to work via DAF-16 under SMF effects. On the other hand, *daf-16* is downregulated in N2 worms upon SMF treatment. Although DAf-16 is being downregulated in N2 worms but it had no effects on the life span of *daf-16* mutant (mu86) worms upon SMF treatment. So our results indicate that *mir-34* is being modulated upon SMF treatment and its acting via DAF-16 which is an important player of insulin-signaling pathway. Further studies are being carried out to find deeper insights into this phenomenon and linking roles of microRNAs in SMF.

About Author

Dr. Ahmed Waqas is working as assistant Professor of Zoology at University of Education Lahore. He did his PhD in Cell Biology from the University of Science and technology of China and worked as a Postdoctoral Researcher in the High Magnetic Field Laboratory at Chinese Academy of Sciences, Hefei. His area of research includes Molecular/Cell biology, Genetics and Toxicology.

BAS-208

Urban green spaces and their role in making cities sustainable: revisiting Multan city from 1988 to 2020

Anum Aleha[1], Waqas Ahmed Mahar[2,3,], Kahina Labdaoui[4,5]*
[1]Department of Architecture Design, National Fertilizer Corporation Institute of Engineering & Technology (NFCIET), Multan 60000, Pakistan; architectanny@gmail.com
[2]Department of Architecture, Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS), Airport Road, Baleli 87100, Quetta, Pakistan; architectwaqas@hotmail.com
[3]Sustainable Building Design (SBD) Lab, Department of UEE, Faculty of Applied Sciences, Universitè de Liège, 4000 Liège, Belgium
[4]Department of Architecture, Badji Mokhtar University, Sidi Amar, Annaba-BP12, Annaba 23000, Algeria; labdaoui.kahina@gmail.com
[5]LEMA, ArGEnCo Department, Université de Liège, 4000 Liège, Belgium
**Correspondence: architectwaqas@hotmail.com*

The vegetation patterns, woodlands, agriculture lands, garden, forests, parks, wetlands and green belts play a significant role in benefitting the ecological impact and social cohesion. It also maintains the balance between natural and built environment. In recent decades, it has been examined that green spaces in urban areas are quickly vanishing and destruct at an alarming rate. Studies discovered that the fast urbanization trend has brought rapid change in cities and converted into mega structures resulting in excessive destruction of green spaces. In the climate context, the vegetation cover of urbanized cities significantly impacts diminishing high temperature, decreasing air quality, retaining carbon dioxide from the air, subsiding particulate matter, and retaining smog. It is therefore helpful for achieving sustainable development objective. This research investigates the abandoned, deteriorating, proposed and existing urban green spaces in Multan from 1988 to 2020. The primary data is collected from the municipal corporation, development authority, satellite images, and meteorological data to assess the urban green spaces, their decline over time and climate effects. The results are examined, and mitigation measures are suggested to regenerate the urban open spaces that are the service provider of the ecological impact to contribute to sustainability and rejuvenate the city's environment.

About Author

Anum Aleha, an emerging female Architect practising and teaching in Southern Punjab, Pakistan, for the last six years. She is finalizing her Master's in Environmental Design from Allama Iqbal Open University (AIOU), Islamabad. Her areas of interest are sustainability, environmental design, and global warming.

BAS-209

VITAMIN BS AND C TO TREAT OXIDATIVE STRESS AS THE UNDERLYING PATHOPHYSIOLOGICAL MECHANISM OF NEURALGIAS

Dr.Komal Mahmood
Pharm-D, MPhil (Molecular Pharmacology)
DOW UNIVERSITY OF HEALTH SCIENCES
Correspoinding author: krabbykat93@gmail.com, 03461030398

Nerve pain, also called neuralgia or neuropathic pain, occurs when a health condition affects the nerves that carry sensation to the brain. It is a burning, lancinating pain characterized by high frequency repetitive firing. The first line defense is often Carbamazepine, a potent sodium channel blocker that binds to voltage gated sodium channels to prevent neuronal firing. While effective in sending neuralgia symptoms in remission, carbamazepine is associated with adverse systemic effects specifically in the elderly such as weight gain/loss, gastrointestinal problems, hyponatremia, impotence, as well as thrombocytopenia and neutropenia. Given that other pharmacological interventions such as topical lidocaine, pregabalin, oral gabapentin may stunt brain functions, it is crucial that alternative treatments be investigated. This review involves dealing with neuropathies in a two point perspective: first oxidative stress is established as the underlying pathophysiological mechanism causing the different nerve pains (neuropathic pain, trigeminal neuralgia, postherpetic neuralgia of herpes zoster); second it is suggested that multiple vitamin therapies (either a combination of various B vitamins or vitamin C) can be efficacious in the treatment of nerve pains. As early as the 1900s the efficacy of vitamin treatment in neuralgia has been proposed. Surgical interventions such as resection of sensory root of gausserian ganglia with potential danger of loss of right eye was waived by 10mg injections of vitamin B1 in affected patients (Borsook, Kremers, Wiggins, 1940). There is also evidence that B1, B6, B12 either alone or in combination may alleviate pain in rats with sham infraorbital nerve constriction surgery (Kopruszinski, 2012). This analysis will thus investigate the value of Vitamin therapy as a potential breakthrough and pharmacological alternative for alleviating the symptoms of neuralgias.

KEYWORDS: Vitamins, Neuralgias, Neuropathic pain, Oxidative stress, Antioxidants

BAS-210

MARINE FLORA: A PROMISING SOURCE FOR DRUG DISCOVERY

Wajiha Gul [a], Shaheen Parveen [b]
[a]Department of Pharmaceutical Chemistry, Dow College of Pharmacy, Dow University of Health Sciences, Karachi
[b]Department of Pharmaceutics, Institute of Pharmaceutical Sciences, Jinnah Sindh Medical University, Karachi
Correspoinding Email: wajiha.gul@duhs.edu.pk

Throughout history, potent compounds from natural products have played significant role for curing human diseases. Marine flora including all micro-flora (micro-algae, cyanobacteria, fungi) and flowering plants (mangroves, halophytes) have helped us in rational search of active components providing new lead compounds with biologically active, chemically distinctive and medicinally potent drugs. The process of extraction of drugs from marine started from late 1960s. Drugs with different pharmacological properties (anticancer, antidiabetic, antimicrobial, immunomodulator, antimalarial) have been developed using marine plants as lead compounds and are still giving us hope to provide even more drugs like signal transduction pathways in carcinogenesis and hybrids of natural products may give new lead compounds having better potency than the parent compound. The present study is a brief review of bioactive compounds from marine having potent pharmacological activity, the problems faced during their isolation and the future hopes from marine flora.

BAS-211

Complementing Taxonomy: - Molecular Characterization of Plant Diversity in District Zhob by using DNA Barcoding approach

Gulmeena Kakar¥ , Dawood Shahid¥ , Muhammad Saeed Shazia Irfan₮ , Shahjahan Shabbir Ahmed Rana¥, Nazeer Ahmed¥ , Imran Ali Sani¥ , Saadullah Khan¥*

¥Department of Biotechnology, Faculty of Life Sciences, Balochistan University of Information Technology Engineering and Management Sciences (BUITEMS), Quetta, Pakistan.

₮Sardar Bahadur Khan Women University (SBK), Quetta, Pakistan.

**Corresponding author Email: *Shahjahan.shabbir@buitms.edu.pk; Phone: +92-3003878199*

Study conducted at: Department of Biotechnology, Faculty of Life Sciences (FLS&I), Balochistan University of Information Technology Engineering and Management Sciences (BUITEMS), Quetta, Pakistan.

DNA barcoding involves the generation of DNA sequencing data from particular genetic regions in an organism and the use of these sequence data to identify or “barcode” that organism and distinguish it from other species. In this study, thirty-three species belonging to different plant families were characterized through chloroplast DNA gene sequences of rbcL and matK regions. The efficacy of these DNA markers as barcode markers were tested across the different species collected from district Zhob, Balochistan. These species were used to search possible relationships through phylogenetic analysis. The phylogenetic tree based on matK (~800 bp) and rbcL (~ 600bp) sequences showed diverged groups, respectively. The DNA barcodes reliabilities were evaluated using NCBI gene bank, BLASTn program, phylogenetic tree via Neighbour-Joining method with 1000 bootstrap replicates in MEGA X and barcoding gap assessment. rbcL showed promising results as a barcode with high discrimination power 75.7% clear resolution of species in Neighbour-Joining phylogenetic tree and a distinct barcoding gap follow by matK with discrimination power of 78.8%. The combination of barcode regions revealed that the lack of variation in matK but they are useful for preliminary identification followed up by rbcL for accurate identification. The present study might serve as a model to identify and differentiate new plant species from Pakistan and neighboring countries through similar methods. Key words: DNA barcoding, matK, rbcL, Phylogenetic Analysis, Plant Biodiversity of Zhob.

About Author

Dr. Wajiha Gul - B.Pharm., R.Ph., M.Phil, Ph.D (Pharmaceutical Chemistry, University of Karachi) . Working as an Assistant Professor at Dow College of Pharmacy, Dow University of Health Sciences, Karachi. Former Assistant Professor at Jinnah University for Women.

BAS-212

An Assessment of Dentists' awareness regarding Oral Health and Dental Protocol of Pregnant women.

Muneeza Fatima[1,] , Rabia Tahir[1] , Iqra Arbab[1] , Muhammad Mesam[2], Muhammad Humza bin saeed[1]*
[1]Islamic International Dental College and Riphah University, Islamabad
[2]Hamdard University, Karachi. Affiliation of author: 1- Muneeza Fatima (BDS),
**Corresponding E-mail: muneezarizvi579@gmail.com*

The aim of this study is to comprehend dentists' awareness regarding oral health and dentistry protocol for pregnant women. It was conducted in private Medical colleges among 100 dentists of Islamabad and Rawalpindi during the month of June 2016 and July 2016. A questionnaire based cross sectional study was conduct in private Medical colleges among 100 dentists of Islamabad and Rawalpindi during the month of June 2016 and July 2016. The participants were ask about their perception about the Oral Health and Dental Protocol of pregnant women. Ethical committee approval taken. Data was analyzed using SPSS software version 23 and MS Excel was used to generate pie charts and bar graphs. Almost half (53%) respondents reported that pregnant women complaint of problems in their teeth more often than others did. Among the participants 96% considered second trimester as the safest for dental procedures and only 10% considered dental imaging safe throughout pregnancy. 26% of respondents believed that premature birth is linked with maternal oral health problems. Most (69%) participants had received specific information on dental care to pregnant women and 89% considered a need for further research and education regarding dental treatment of pregnant women. It was concluded that knowledge of dentists is acceptable in some area but still there is a need to eradicate few misconceptions observed and to enhance knowledge.

About Author

Dr. Muneeza Fatima did her Bachelors in Dental Surgery from Islamic International Dental College, Riphah International University Islamabad and just completed her housejob from De'mont/Punjab Dental Hospital Lahore.

BAS-216

Fresh and Hardened Properties of Concrete incorporating Rice Husk Ash and Wheat Straw Ash as Binary Cementitious Material

Naraindas Bheel
Lecturer, Department of Civil Technology, Hyderabad College of Science and Technology Hyderabad, Sindh, Pakistan
Corresponding Author Email: naraindas04@gmail.com

This research work is performed on the concrete blended with 0%, 5%, 10%, 15% and 20% of rice husk ash (RHA) and wheat straw ash (WSA) as binary cementitious material (BCM) in the mixture. However, there is no any use of these agricultural wastes without landfilling and producing environmental pollution. Therefore, the use of these waste materials for commercial purpose, reduce the impact on the environment and also minimize the use of Portland cement in concrete mixture. The purpose of this experimental work is to investigate the influence of RHA and WSA as BCM on the fresh (slump), physical (water absorption and density) and hardened properties (compressive and split tensile strength) of concrete. In this regard, a total of 90 concrete samples (30 cylinders and 60 cubes) were prepared with 1:2:4 mix proportions at 0.50 water-cement ratio and cured at 7 and 28 days respectively. Moreover, the workability of green concrete is getting reduced as the quantity of BCM increases in the mixture. Besides, the compressive and split tensile strength is enhanced by 12.65% and 9.40% at 10% of BCM (5% RHA and 5% WSA) on 28 days consistently. Furthermore, the density and water absorption of concrete is declined with rising in the dosages of BCM on 28 days respectively. It is concluded that the utilization of 10% BCM in the mixture of concrete is optimum for structural applications.

About Author

I am Naraindas Bheel and I have done B.E Civil Engineering and M.E Structural Engineering. I have three years teaching Experience working as a Lecturer in the Department of Civil Technology, Hyderabad, College of Science and Technology Hyderabad, Sindh, Pakistan. My research interests area is Concrete Technology, Cement Replacement Materials, Sand Replacement Materials, pozzolanic Material, Fiber reinforcement Materials and Engineered Cementitious Composites. However, I have written 35 research papers in which 9 papers are published in impact factor journals, remaining papers are published in Springer, Elsevier, International conference and HEC recognized journals etc. The required Picture is attached herewith.

BAS-217

KINETIC AND THERMODYNAMIC STUDY OF SURFACE MODIFIED ADSORBENT FOR THE REMOVAL OF LEAD ION FROM AQUEOUS MEDIUM

Ali Rehman, Ijaz Ahmad*
Department of Chemistry, Kohat University of Science & Technology, Kohat, Khyber Pakhtunkhwa, Pakistan
Corresponding Author Email. ali210829@yahoo.com

The aim of the study was to develop economical, highly effective and easy approachable adsorbent for removal of lead (Pb) from aqueous solution. For this purpose, the adsorption efficiency of surface modified adsorbent prepared from *Parthenium hysterophorous* plant was evaluated. The selected plant was processed for carbonization at different temperature. Then surface modified adsorbent was prepared by treating the carbonized samples of the selected plant with Phosphoric acid. The prepared adsorbent was characterized by Fourier Transform Infra Red spectroscopy (FT-IR), Scanning electron microscopy (SEM) and Pore size analyzer for determination of functional group presence, surface structure and pore size of the adsorbent respectively. Lead ion solution was prepared in de-ionized water as target adsorbate to determine the adsorption characteristics of the prepared adsorbent. Different conditions like effect of initial concentration, pH, contact time, adsorbent dose and temperature were examined in adsorption process. In the current study, it was investigated that adsorption of lead was high at pH 5 and further increase of pH causes precipitation of lead. It was observed that adsorption of metals was high at the beginning and then slow down with time reaching to the equilibrium state. Kinetic and thermodynamic study was conducted. The adsorption equilibrium data was described by Langmuir and Freundlich isotherms.

Keywords: Adsorbent, Lead ions, Adsorption, Kinetic and Thermodynamic study

BAS-218

Polymer Ferrite nanocomposites: fabrication and characterization

Gulfam Nasar
Department of Chemistry, Balochistan University of Information Technology, Engineering and Management Sciences Quetta Pakistan
Corresponding E Mail/ Contact Détails: gulfamnasar@gmail.com, +923333641818

Terbium doped magnesium spinel ferrites (Mg1-xTbxFe2O4) and PVA/Mg1-xTbxFe2O4 composites having composition x=0.12, 0.14, 0.16, 0.18 were synthesized using micro-emulsion method and in-situ polymerization technique respectively. The structural properties were demonstrated using X-ray diffraction (XRD) and Fourier transform infra-red spectroscopy (FTIR). XRD analysis confirmed the fabrication of small concentration of Terbium into the spinel lattice whereas FTIR exposed the developed interactions between ferrite nanoparticles with polyvinyl alcohol matrix. The peaks obtained in both the above characterization techniques quite matched with those as reported in the literature and confirmed the formation of resulting nanocomposites. The dielectric and resistivity analyses were performed by determining dielectric parameters and current-voltage measurements. The values of dielectric constant, dielectric loss and tan δ were inversely proportional to the frequency under applied electric field at room temperature but become constant at higher frequency values. The lower values of dielectric constant of terbium incorporated magnesium ferrite polymer composites (MgFe2O4/PVA) are because of hindrance in electron exchange mechanism created by lockup among iron and terbium ions. The resistivity values of all the composites were found from 2.5x109 Ωcm to 18.8x109 Ωcm which showed a non- linear behavior.

Keywords: Ferrites, Nano, Energy Storage, nanocomposites

About Author

Dr. Gulfam Nasar

Ph D Physical Chemistry

Associate Professor, Department of Chemistry Balochistan University of Information Technology, Engineering and Management Science (BUITEMS) Quetta, Pakistan.

BAS-220

Chiral Photonic Liquid Crystalline Polyethers with Widely Tunable Helical Superstructures

Amjad Farooq
Department of Physics, Mir Chakar Khan Rind University of Technology, Dera Ghazi Khan, Pakistan.
Correspoinding E-mail: amjadfarooq969@gmail.com

Well-defined multicomponent polyethers comprising chiral cholesteric groups and photochromic azobenzene moieties have been carefully designed and synthesized by utilizing monomer-activated anionic ring-opening polymerization. The phase behaviors have been systematically studied and phase boundary diagram has been constructed. The CLC phase appears in a broad composition range and a wide temperature window down to the glassy state at room temperature, which provides a great opportunity to tune the photonic superstructure and keep the structure in the form of polymeric CLC glass. The reflection of the CLCs over the entire visible wavelength range including the primary RGB colors has been demonstrated in our experiments. The *trans-cis* photoisomerization of the Az component can additionally induce the switch of the system between the CLC and isotropic state reversibly, as the result of the cooperative interaction between the Az isomers and the rod-like Ch mesogens. We hope that this type of robust polymeric 1D photonic structure could find applications in advanced optical devices.

BAS-222

Deterrence of Unavoidable Metallic Interactions and Their Influence on RADS Activity

Rooh Ullah
Department of Natural and Basic Sciences/ Chemistry, University of Turbat
Correspoinding E-mail: roohullah@uot.edu.pk

The sulfur adsorption capacity of the adsorbents strongly depends on the pore structure, the chemical states and the dispersion of active species. In this work, ZnO-Al2O3 mixed oxides with an improved structure were synthesized via a freeze-drying modified cation-anion double hydrolysis (CADH) technique and used as the support. Freeze drying technique provided the adsorbent with a smaller sized ZnO and an improved pore structure compared with the normal oven drying method. Micro fibre alumina was synthesized using thermal urea precipitation technique and applied as support for the nano-sized ZnO precursor. The facile functionalization of nano sized ZnO in reactive adsorption desulfurization (RADS) performance and effect of diffusion rate in the desulfurization process were compared with commercially prepared alumina used as support for ZnO and Ni precursors. Higher breakthrough desulfurization activity and sulfur adsorption capacity were concluded that strongly depends on the diffusion rate of molecules, homogenous nano-sized ZnO dispersion and degree of active oxides interaction with support. Detailed characterization results conclude that higher external diffusion of reactant molecules within the cress crass micro-fibre, nano-sized ZnO particles and their lower irreversible oxides interactions (IOI) may be the reasons for superior RADS performance of Ni/ZnO-Al2O3-fibre adsorbent.

About Author

My name is Dr. Rooh Ullah

PhD in Material Sciences.

Chairperson / Assistant Professor Department of Natural and Basic Sciences, University of Turbat

BAS-225

SERENDIPITY: THE FINAL PUSH

Wajiha Gul [a,*], *Shaheen Parveen* [b]
[a]*Department of Pharmaceutical Chemistry, Dow College of Pharmacy, Dow University of Health Sciences, Karachi*
[b]*Department of Pharmaceutics, Institute of Pharmaceutical Sciences, Jinnah Sindh Medical University, Karachi*
**Corresponding E-mail: wajiha.gul@duhs.edu.pk*

Serendipity is the accidental finding when the scientist is in search of something else. It has played a major role in the major discoveries in every field like penicillin, Teflon, x-rays, PALSAR, carbon plastic and, other plastics. Although scientific discoveries take years of research but there are cases when a single push has led to historic discoveries. Discovery requires hard work and intelligence. During the hardship of working on a project, the potentials and knowledge of the worker can't be neglected. Observation is an important precursor to scientific discovery as compared to experiments in science. Whenever proceeding on any scientific method, one must always follow the pattern of observation and identification, collecting information, formulation of hypothesis, and finally interpreting the data. Along with it the experience and searching put extra effort into the overall work. Plastic was first produced accidentally while working on shellac. Velcro was invented by an engineer and strike able match by a pharmacist. all such scientist were busy working in their particular fields on their specific topics but a little mistake exposed to them something which has never occurred before and on observation they found what they had invented which they verified after further experimentation. In this article the role of scientist in perceiving serendipity and factors that enhanced his/her perceptions to increase the chances of serendipity has been discussed.

BAS-226

Using microbial fuel cell as a green renewable energy source for sustainable energy production from wastewater

Naeemullah
Department of Chemistry, University of Turbat, Balochistan-92600, Pakistan
Corresponding E-mail: naeemullah@uot.edu.pk

This research used an open chamber mediator-less microbial fuel cell to convert the chemical energy into electrical energy by the fermentation of domestic wastewater through the use of yogurt. The wastewater sample was subjected to aerobic fermentation in a single and double chamber BFC for 7 days by using yogurt. Parallel and series combinations were also developed by using copper and zinc electrodes in single and double chamber BFC. The parallel and series combinations were based on four units of the single and double chamber BFC separated. The physical parameters such as pH, conductance, current density, voltage, power output and resistance were monitored for a week to observe changes due to metabolic activities of microorganisms. It was observed that the current density of the single unit was multiplied with the total number of units connected in a parallel combination. On the other hand, in the series combination the voltage of the one unit is multiplied by the voltage of the total number of the added units. The high current density (39.20 mA) was found in the parallel combination of single chamber open system BFC using eight electrodes each of zinc and copper. On the other hand, the high voltage (4.10 V) was found for the series combination of double chamber open system BFC using continuous-circuit bridge and two electrodes each of zinc and copper. These results showed that the fermentation of domestic wastewater with yogurt result in a valuable increased in electrical energy.

About Author

Dr Naeemullah is recently working as an Assistant Professor and chairperson in the Department of Chemistry, University of Turbat, Baluchistan, Pakistan. he did PhD form NCEAC, University of Sindh, Jamshoro -78060, Pakistan and Post Doctorate Gaziosmanpasa University, Faculty of Science and Arts, Chemistry Department, 60250 Tokat, Turkey. He has been awarded consecutively 5 time research productivity award from 2012-2017 by the Pakistan Council of Science and Technology.

BAS-227

Renewable diesel synthesis over monometallic Mo/Al_2O_3 Catalysts from Rubber seed oil via hydrodeoxygenation

[a,b]Mariam Ameen, [d]Mohammad Tazli Azizan, [a,c]Anita Ramli, Suzana Yusup[a,b]*
[a]HiCoE, Center for Biofuels and Biochemical Research (CBBR), Institute of Sustainable Building (ISB), [b]Department of Chemical Engineering, [c]Department of Fundamental and Applied Sciences, Universiti Teknologi PETRONAS, Bandar Seri Iskandar, 32610, Perak, Malaysia
[d]Faculty of Chemical Engineering Technology, Universiti Malaysia Perlis, Kompleks Pusat Pengajian Jejawi 3, 02600 Arau, Perlis, Malaysia
**Corresponding Author Email: mariam.ameenkk@utp.edu.my; mariam.ameenkk@gmail.com*

Renewable diesel has high potential to serve as sustainable fuel, obtained from hydrodeoxygenation of vegetable oil. An effective catalyst system is required in order to produce high quality fuel. In present study, rubber seed oil has been tested for its potential as renewable diesel through hydrodeoxygenation (HDO) process over monometallic Mo/Al_2O_3 (3wt.%, 12 wt.% and 15 wt.%) as the catalysts designed over sonochemical approach. The catalysts were subjected for characterization such as XRD, FESEM and SAP for evaluation and screening the physicochemical properties. The hydrodeoxygenation was conducted in fixed bed tubular reactor at 290°C, 35 bar (H_2 balanced with N_2), WHSV $1h^{-1}$ and H_2: oil ratio 1000 N (cm^3/cm^3). Prior to the HDO all the catalysts were reduced under hydrogen pressure at 35 bar.The effect of temperature towards the synthesis of renewable diesel from rubber seed oil was investigated. The best catalyst (15wt.%Mo/Al_2O_3) after the preliminary examination was investigated for optimum temperature. The temperature raised from 290°C to 350°C increase the conversion and yield 97% and 67% respectively. Whereas, further increase of temperature dropped the conversion from 97% to 82% and yield from 67% to 52% respectively. From the results, it is concluded that the conversion remains approximately 99% for temperature above 300°C to 350°C This decrease in yield and conversion is mainly due to coke deposition which was observed the highest at 350°C. Conclusively, it can be confirmed that temperature has significant effect on the green diesel production in terms of conversion, the yield, and coke deposition.

About Author:

Dr. MARIAM AMEEN is a young scientist Affiliated with Higher Institute Center of Excellence, Center of Biofuels and Biochemical Research in Universiti Teknologi PETRONAS, Malaysia. She graduated with PhD in Chemical Engineering in 2019 and persuaded her Postdoctoral Research in UTP.

BAS-228

A Modified Memory-Efficient U-Net for Segmentation of Skin Images

Asif Ahmada,∗ , Noor Badshah b
[a] *Department of Basic Sciences & Humanities, CECOS University of IT & Emerging Sciences Peshawar, Pakistan.*
[b] *Department of Basic Sciences & Islamiat, University of Engineering and Technology Peshawar, Pakistan.*

Skin cancers, melanoma and non-melanoma, are among the most prevailing types of cancer in today's world. These tumor entities have increased the incidence rate of skin cancers worldwide. Every month around 5400 and 7180 people die of non-melanoma and melanoma, respectively. Early stage detection of the cancer can prevent the deaths. Computer Aided Diagnosis (CAD) system could be a major breakthrough for early detection of the cancer. The system uses image processing techniques. Among the image processing techniques segmentation has a great value. The diagnostic process results are highly dependent on the accuracy of performed segmentation. Nowadays, many supervised and unsupervised techniques are used for the task of segmentation. Deep neural networks have outperformed other state-of-the-art approaches for the task. In this paper, we present an end-to-end deep neural network for segmentation of the skin images. The network is modified version of the U-Net architecture. The network being much more memory efficient than the U-Net architecture, inferences segmentation of skin images more accurate than the U-Net and other state-of-the-art architectures. We reduce number of layers of the U-Net architecture both in the encoding and decoding path; and introduce residual blocks and batch normalization in the encoding path to prevent learning of redundant features, to avoid overfitting and to accelerate the training process, and in the decoding path to avoid gradient vanishing issue in long dependence of the neural network during training we use bi-directional long short term memory network with batch normalization. We train and validate the network on ISIC 2018 data set for the task. The network accurately segments the cancerous part of the skin images with 94% accuracy. Keywords: Deep Learning; Deep Neural Network; Image Segmentation; U-Net.