



Kuwait University

Office of the Vice President for Research

RESEARCH SECTOR

Under the Patronage of

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President of Kuwait University

Prof. Jasem Y. Al-Kandari

Vice President for Research

Announces
the Organization of

SCIENTIFIC POSTER DAY

**Scientific Faculties &
Kuwait Institute for
Scientific Research**

Computing Sciences & Engineering . Engineering & Petroleum .
Life Sciences . Science . Kuwait Institute for Scientific Research



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Scientific Poster Day, March 20, 2019

Scientific Poster Day - Sciences, and Health Sciences Faculties, and KISR

*(Computing Science & Engineering, Engineering & Petroleum, Life Sciences,
Science & Kuwait Institute for Scientific Research)*

March 20, 2019

Prof. Jasem Al-Kandari
Vice President for Research
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Foreword

The Research Sector presents the latest research achievements of the humanities and sciences faculties through its annual commitment of organizing the Poster Day event, offering a common platform to faculty members for displaying their ongoing and accomplished research. The RS organized two separate events, on Wednesday, March 13th 2019 for the humanities faculties and on Wednesday, March 20th 2019 for the sciences faculties and Kuwait Institute for Scientific Research (KISR). The event held for the humanities and social sciences sector involved six participating faculties including the colleges of Arts, Business Administration, Education, Law, Sharia & Islamic Studies, and Social Sciences. Similarly, the sciences poster event involved six participating faculties including the faculties of Architecture, Computing Sciences & Engineering, Engineering & Petroleum, Life Sciences and Science, as well as KISR as external participants. The Poster Day event has become an integral part of RS annual agenda, encouraging the spirit of scientific openness and exchange of ideas and interests among researchers as well as spurring creativity and innovative research. The main objective of this event is to promote a culture of joint scientific research and to bring scientific and research perspectives closer together in an environment conducive to dialogue and supports joint research with multiple scientific disciplines. Essentially, the poster event is based on the collective display of faculties' research activity on the posters platform for public viewing, creating a congenial atmosphere to develop new ideas and concepts while benefitting from the scientific themes and areas already covered across faculties.

The year 2019 Sciences Poster Day went beyond its key objective of scientific display of research activity within KU colleges, by enlisting the external participation of KISR's researchers for the sixth successive year. While RS welcomes all external participants, it is endeavoring to attract far wider response from KU colleges in this annual activity. The event is thus reflective of RS commitment to promote the culture of scientific excellence across faculties and highlight quality research at Kuwait University.

Taking place at the Life Sciences faculty grounds, the Poster Day event for the Sciences faculties will be held under the patronage and presence of Prof. Hussein Al-Ansari, Kuwait University President, and organized by the Research Sector, witnessing the attendance of Vice Presidents, Assts. Vice President, faculty Deans, Vice Deans, faculty members, graduate students and interested researchers.

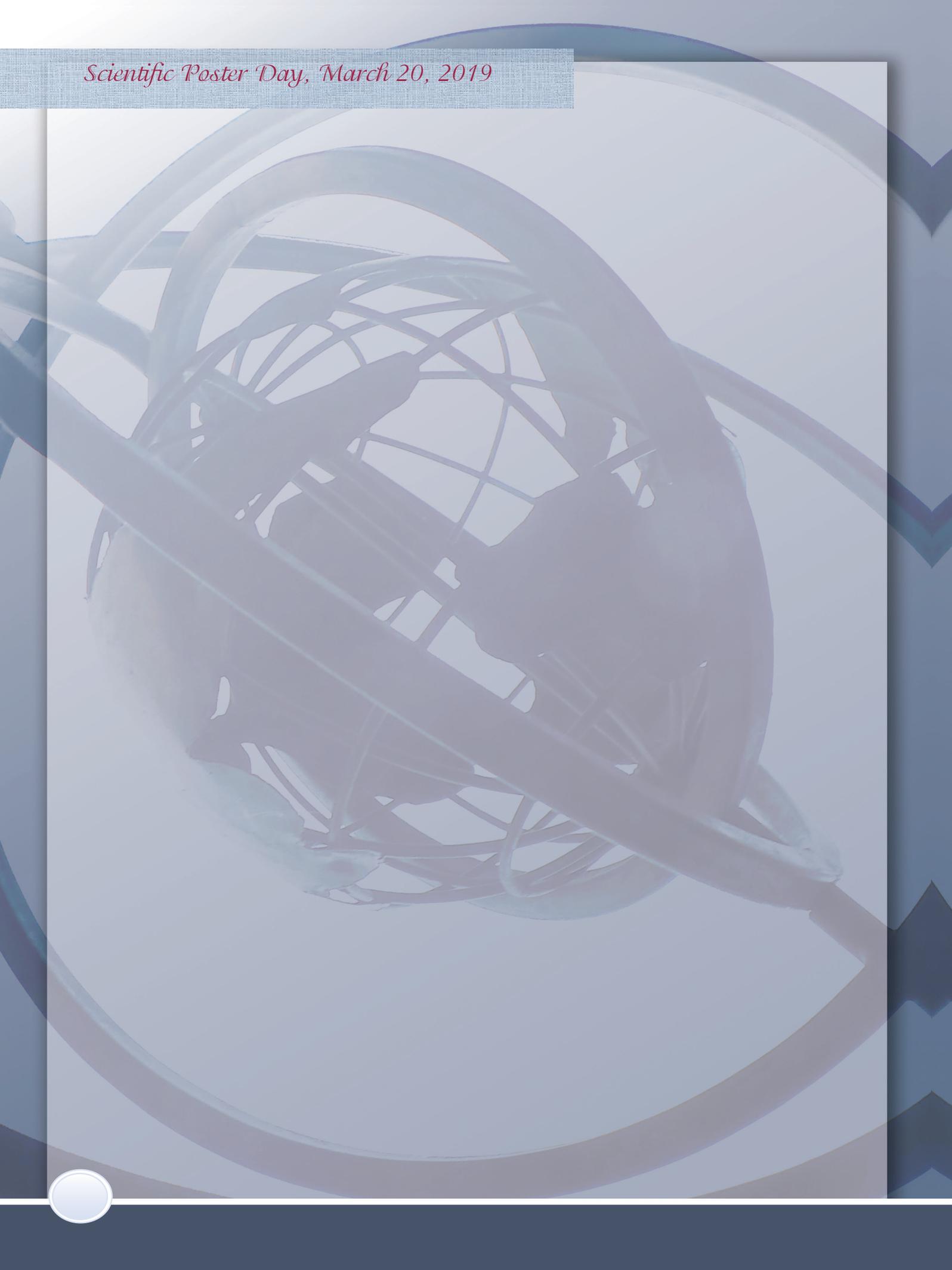
Quite significantly, the Poster Day event continues to enjoy the added value of awards that RS offers for top ranking posters. All posters are reviewed by a specially constituted Professors' level Committee for shortlisting the top three best posters as winning entries, with awards granted in the categories of faculty members, teaching assistants and graduate students.

This document consolidates all posters displayed at the year 2019 Sciences Poster Day, providing a handy reference to faculties and researchers keen on benefitting from the scientific themes covered during the event, and developing new ideas and concepts for gearing their scientific activity in the pursuit of advanced, innovative and inter-disciplinary research.

Prof. Jasem Al-Kandari
Vice President for Research

March 2019

Scientific Poster Day, March 20, 2019



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An Efficient Moving Target Strategy for Building DoS Resilient Mobile Adhoc Networks

Norah H. Alrashidi
Computer Science department

Abstract:

The concept of Mobile Ad-hoc NETWORK (MANET) has been the main topic of many researches over the past decade till today since, it is considered as a major breakthrough in modern wireless networking technology. The initial problem that this research aim to solve is to decrease the chances of a successful DoS attack on the MANET node through an efficient Moving Target Defence (MTD) strategy.

Fog Computing Based E-learning

Gadir Alkandari, Hanady M. Abdulsalam, and Fatma Bujarwa
Department of Information Sciences, Kuwait University

Abstract:

- Cloud Computing is based on applying a network of remote servers hosted on the Internet to store, manage, and manipulate data.
- Fog Computing extends Cloud Computing in carrying out storages, application and communication at edge devices in order to improve mobility, location awareness and low latency.
- Recently, deficiencies have been addressed in the E-learning within the Cloud Computing, such as lack of mobility and reliability.
- This study focuses on applying Fog Computing on E-learning systems to overcome the deficiencies of Cloud Computing.

An Evaluation for The Quality of Kuwait E-Government Services

Shok Shama, Hawraa Abdulreda, Zainab M. Aljazzaf
Department of Information Science

Abstract:

Quality of Services (QoS) has been used to measure the overall performance of a provided service through a Website. This approach gains a lot of attention from many researchers. Therefore, a lot of studies built QoS models to evaluate the government Websites' quality performance. This research aims to apply an existing QoS model to study the quality of Kuwait e-government services, and this include ease of use, trust, functionality of the interaction environment, reliability, content and appearance of information and citizen. The model is evaluated using a questionnaire and the data is collected and analyzed. The results of this study lead to an important conclusion, which is the impact of the quality of electronic services provided by Kuwait e-government portal in achieving the satisfaction of beneficiaries.

Information Security Behaviors of Healthcare Professionals in Kuwait

Dr. Dari Alhuwail, Dr. Eiman Al-Jafar, Dr. Yousef Abdulsalam,
and Dr. Shaikha AlDuaij
Department of Information Science

Abstract:

Objective: To uncover behaviors and attitudes of health professionals in the State of Kuwait toward information security in the workplace (i.e. hospital/clinic).

Methods: A cross-sectional design through an anonymous* survey. A purposive sampling approach is followed to recruit a representative sample of healthcare professionals, including physicians and allied health professionals, working in across healthcare institutions in Kuwait.

Results: Most staff have knowledge of organizational security policies. Overall, a majority of healthcare professionals adhered to password security practices, though issues still remain with sharing passwords and "weak" password choices. %11 of professionals exchanged patient information via personal emails.

Conclusion: While most healthcare professionals appear to be aware of general security guidelines and practices, there are several areas of low awareness of accepted practices such as with data access rights and information sharing.

Mental Health Apps: A Systematic Assessment of Anxiety and Depression Arabic Apps

Dr. Dari Alhuwail, Rama Albaj, Fatma Ahmad, and Khawlah Aldakheel

Department of Information Science

Abstract:

Objective: To conduct a systematic assessment of the features of Depression and Anxiety mobile apps available for Arabic speakers.

Methods: A critical systematic review of all currently available Arabic depression and anxiety apps (May 2018). Apps are identified through searching both web interface + respective stores on smartphones.

Results: Only 23 apps available in Arabic compared to English (N = 243). Nearly all apps are informational in nature. Only 2 apps associated with a recognized healthcare or research institution.

Conclusion: There is a low number of Arabic mental health apps. More apps required to address needs of patients and capitalize on the opportunity. Policymakers should monitor apps' efficacy and safety.

*Scientific Poster Day
March 20, 2019
Research Sector*



Implementation and Optimization of SIMON Block Cipher Based FPGA

Eng. ReemJaffal, Dr. Sa'ed Abed and Dr. Bassam Jamil
Computer Engineering Department

Abstract:

Security of sensitive data exchanged between devices is an essential requirement, as it provides the needed authentication, confidentiality and privacy. Ciphers, which are encryption algorithms, form the basic mechanisms to implement security. Recently, Low-Resource Devices (LRDs) are increasingly becoming ubiquitous. LRDs are designed for constrained environments where cost, power, energy supply and area are limited. Lightweight block ciphers are targeted for LRDs. They balance the required security and minimal resource over head. Lately, there are several lightweight block ciphers proposed, implemented and optimized in hardware and software platforms. SIMON is one of the lightweight block ciphers that was proposed by National Security Agency (NSA) for the aim of fill the demand for secure, flexible, and analyzable light weight block ciphers. Our study shows that calar implementations require 39% lessre sources and 45% less power consumption compared with pipelined implementations.

Analysis on the Efficacy of Parallel Cuckoo Search on CUDA

Monzer Khamash, Dr. Ayed Salman, Dr. Ali Almutairi
Computer Engineering Department

Introduction:

CUDA works for most evolutionary alg. but there is not much work for CS on CUDA, and so, we attempt to do so. We compare our work to a serial version, and then we improve upon the algorithm through intuitive modification.

**Push-Based Vulnerability Scanner (PBVS)
How to provide vulnerability scanning service for 10
million users efficiently using 1 Server?**

Sari Sultan and Ayed Salman

Computer Engineering Department

Abstract:

We propose a novel vulnerability scanner called PBVS that is fast, scalable accurate, and does not require high network traffic. PBVS utilizes a novel pattern recognition and generation techniques to match applications with the public vulnerability database of Common Vulnerabilities and Exposures (CVEs) maintained by the National Institute of Standards and Technology. We re-design vulnerability scanning to eliminate the need for host-discovery, port scanning, and service enumeration.

File Systems Digital Forensics Educational Framework

Sari Sultan and Ayed Salman

Computer Engineering Department

Abstract:

Training is different that education for digital forensics. Training inform students how to use specific tools, which circumscribe the forensics case outcomes to the tool's capabilities. Education, however, teaches students the scientific background for forensics science as well as using tools, which help students to examine more intricate cases. There is a pressing need in the literature for specialized educational tools for digital forensics because the available tools are designed for training.

Sustainable Supply Chain Optimization in the Petroleum Industry

Aya Elghool, Dr.Ghanima Al-Sharrah, Prof. Haitham M.S. Lababidi
Chemical Engineering Department

Abstract:

The main concern of this work is to develop a multi-objective model that considers all three aspects of sustainability (Economics, Environment, and Social) and implement it for the supply chain network of a petroleum organization in Kuwait. The model uses Cost, IRCHS (Indiana Relative Chemicals Hazard Score), and the total number of accidents together with training hours per employee as economic, environmental, and social indicators, respectively. Results showed that the economic gain is not significantly affected by the inclusion of other objectives.

Rheological Droplet Size Determination After Controlled Moving Of Geometry

Abdulwahab S Almusallam, Bini T.B.
Chemical Engineering Department

Abstract:

We aim to investigate the droplet size of PBD in PBD/PDMS blend subjected to different shear rate by a new method of moving the cone plate geometry upwards at a constant rate after preshearing. The blend was subjected to 2 hours preshearing at 250C at different shear rates for each experiment. The top cone plate geometry was then subjected to controlled upward movement in two stages. The bottom parallel plate was then carefully removed along with the blend settled on the plate and viewed under the optical microscope for the analysis of the size of the droplet phase. The blend was photographed at different magnification and the droplet size was measured using the AxioVision software in the Optical microscope. The average of the droplet size was calculated for each shear rate. All the different shear rates studied was analyzed similarly.

Optimal Bus Frequency for Kuwait Public Transportation Company: A Cost View

Sharaf Alkheder, Fahad AlRukaibi and Areej Zaqzouq
Civil Engineering Department

Abstract:

In this study, The Optimal Number of buses for Kuwait Public Transport Company (KPTC) was determined. Integer linear programming model for the general problem was developed first. A case study where this model was applied to Kuwait Public Transport Company was considered. It is important to mention that the most important five routes were selected using Pareto analysis. Finally, the optimal annual profit was computed for each route and the model results were compared with the current condition. The results showed that using Mercedes buses was more economically efficient than using the other types, Volvo and Daewoo. Compared with the existing situation, the number of cycles as well as the number of buses should be increased to satisfy the average daily demand. The overall annual profit for the routes was proportional to their high daily demand except for one route. Even though, the model in this project can be extended to cover more paths and divide the day into shifts, which may lead to a better solution. Further studies are highly recommended to improve the public transport system in Kuwait.

Urban Noise Impact Model for Kuwait New Railway

Dr. Sharaf AlKheder, and Dr. Fahad AlRukaibi
Civil Engineering Department

Abstract:

Transportation is responsible for producing high noise levels that negatively affect people's life causing critical annoyance and sleep disturbance. Although railways are considered one of the most sustainable transport modes, a considerable levels of noise are emitted from railways operation that should be controlled. This paper was developed in order to predict the noise effect of establishing a new railway system in Kuwait. The calculation method was based on the national calculation method from the Netherlands. It was applied using the Predictor 5.04 commercial software. The overall emission levels in dB(A) were estimated using the SRM II propagation calculation method in octave bands. The studied areas near the rail line were analyzed from an acoustic point of view. Based on the calculation model, several isophone alternatives for these areas were produced. According to the isophone plans, it can be concluded that the emission levels in the buildings near the route are admissible. Finally, the alternatives were compared and classified according to their acoustic quality based on their surface lengths.

Adaptation of Technology transfer and Commercialization in the United States: University of Michigan

Hanadi Mubarak Al-Mubarak, Michael Busler
Civil Engineering Department

Abstract:

Purpose of this paper is to discuss and analyze the adaptation of the Technology transfers and commercialization program in the United States (US) through an examination of University of Michigan as successful case studies.

Methodology/approach: The research methodology used qualitative as case study. Findings: The findings of this study indicated three outcomes such as: 1) promoting student and encouraging faculty in the activities of innovation and entrepreneurship, 2) high collaboration with the industry, and 3) vital tool for regional and local economic development. **Originality/value:** This study makes a contribution to knowledge about the technology transfer best practice in developed countries.

Traffic Safety: The effectiveness of MOI decision of using left shoulder at rush hours

Dr.Fahad Alrukaibi, Eng.Lulwa Alabduhmuhsen
Civil Engineering Department

Abstract:

Recently, the Ministry of Interior (MOI) has announced a new traffic control action, which involves the allowance of using the left shoulder in order to reduce traffic congestion at peak hours. A shoulder represents a reserved lane by the verge of a road or motorway, and thus serves as an emergency stopping lane. The current study aims to assess the MOI decision of allowing the usage of left shoulders and determine the awareness level of the drivers related to this new decision and its rules. The left shoulder lane along the 6th ring road toward Maseelah was chosen to be studied in this research. Findings based on observation and opinion survey reveal that 64.7% of drivers know about this decision, but the majority of them do not know the rules of using it. More than 58% did not know the allowance time of using the left shoulder. Hence, the MOI should consider preparing the roads and using visible clear signs before announcing any decision related to roads traffic control and guarantee that using this shoulder won't affect ambulance or police cars movement in case of emergency. Eventually, more stringent actions should be taken towards anyone who violate traffic laws.

Measuring Human Productivity in the Kuwaiti Construction Industry

Eng. Alia H. Esmael, Eng. Bader H. AlSaqabi
Civil Engineering Department

Abstract:

Productivity is an important aspect in the construction industry. It is considered the most effective index for performance efficiency. The most two important performance measures are the average labor utilization and the cost of direct labor. Labor utilization indicates the overall performance or productivity of the process. The aim of this project is to study labor productivity in Kuwait by measuring the labor utilization factor in different construction sites, periods, times and seasons. Labors were monitored in different periods during the working day for the same task performed. This monitoring is repeated randomly during the year months and seasons. The collected data are analyzed by work study methods to get the productivity measurements. A comparison for the labor productivity during the working periods and seasons are determined to show factors that affecting such human productivity

Shear Resistance of Recycled Aggregate Concrete Beams

Khaldoun Rahal
Civil Engineering Department

Abstract:

This research aims at investigating the effects of using recycled concrete aggregates (RCA) on the shear strength of reinforced concrete beams containing stirrups. Tests were conducted on beams made of concrete in which part and full replacement of natural coarse aggregates with recycled concrete aggregates (RCA), and the results are reported.

Performance Analysis For Diverse Simulation Arrangements for DSDV, DSR and AODV MANET Routing Protocols

Qutaiba Razouqi, Ahmed Boushehri, Mohamed Gaballah
Electrical Engineering Department

Abstract:

A mobile ad-hoc network is a network comprised of mobile devices that are capable to go around freely in a random manner. The user nodes and the infrastructure itself can be continuously changing. In this Research we will continue scrutinize standard routing protocols mostly used in MANET DSR, DSDV and AODV that are inspected in this work using dissimilar settings in terms of nodes density variation and nodes velocity along with a variety of traffic types. Protocols are examined against a number of performance criteria>s, energy usage, throughput, small packet delivery ratio and total packets dropped.

The Design of an Integrated Diplexer-Power Divider

Mohammed A. Kourah
Electrical Engineering Department

Abstract:

A novel method to design diplexers with integrated power division capabilities is presented. The diplexer is developed from a five-port power divider that is capable of providing power division ratios of 1:1:0:0 and 0:0:1:1 between its outputs. The development does not involve filter design, and is implemented using dual-band quarter-wavelength lines, dual-band dual-susceptance stubs, and dual-band impedance buffers. The proposed method is applied to design a microstrip diplexer that operates at 1 and 2.5 GHz. Simulation results are presented to verify the validity of the proposed design method.

Five Ports Power Dividers with Reconfigurable Power Division

A. S. Al-Zayed, M. J. Al-Yousef and S. F. Mahmoud
Electrical Engineering Department

Abstract:

A new configuration for designing -5ports controllable power dividers of equal and various power division ratios is proposed. Analytical design equations are presented for three different types of performances and simulations along with measurements are obtained for the targeted performances. The results proved the capability of dividing the input power between the four outputs equally or with various power division ratios. Amplitude modulated signals are obtained by using a single varactor diode. In addition, the divided powers are switched between two pairs of the output ports by means of two varactor diodes.

Ultra Wide Band Antenna with a Notched Band

Ayman S. Al-Zayed¹, Mariam A. Albagli
Electrical Engineering Department

Abstract:

A compact Ultra-wideband planar monopole antenna with a notched band at WLAN frequencies is presented. The antenna is fed using a finite ground coplanar waveguide and has a structure consisting of stair-shaped radiator and ground plane. The notched band is implemented by cutting two symmetrical narrow slits from the ground plane. The antenna is fabricated on a substrate with a dielectric constant of 4.4 and has a compact size of 18×26×1.6 mm³. Experimental and simulation results of the fabricated antenna are found to be in good agreement. The antenna achieves an average gain of 3 dBi and efficiency of more than 80% over the operational band. Time domain analysis, which includes the group delay response and fidelity calculation, implies that minimal distortion is introduced by the proposed antenna which makes it suitable for portable pulsed UWB systems.

Photovoltaic System for Maximum Energy Production: A Case-Study in the State of Kuwait

Abdullah K. Alqallaf
Electrical Engineering Department

Abstract:

This work presents a case-study for the proposed photovoltaic system to maximum energy production in the state of Kuwait. The impact of the tilt-angle and irradiation on the energy production and the performance ratio are studied and compared. The tilt-angle of the photovoltaic system is optimized to maximize the energy production. The results indicated that tilt angle of 30 degrees is the optimal angle and the corresponding annual energy production from the photovoltaic system is 8,610 kWh per 22 panels. The results illustrate that, the irradiation increase the performance ratio decrease in summer due to the high temperature. Finally, the simulation results also demonstrated that the performance ratio can be maximized up to 14.26 %.

An Investigation of Organizational Learning Practices Inside and Outside the Construction Industry

Rufaidah Y. AlMaian & Amani S. BuQammaz
Industrial & Management Systems Engineering Department

Abstract:

This research is an introductory effort to understand the role of organizational learning to improve risk management for construction organizations. The aim is to study how organizational learning can provide better decisions and practices in managing risk for construction projects. To satisfy the aim of the research, an analysis of the organizational learning practices are assessed for multiple industries to determine the best practices that can be adopted for use within the construction industry.

Development of Validation of a Mechanistic Vapor-Compression Cycle Model for Refrigerant Charge Prediction

Ammar Bahman, Davide Ziviani, Eckhard Groll
Mechanical Engineering Department

Abstract:

Predicting accurately the performance at both full - and part-load conditions of vapor compression systems using mathematical modeling is the objective of this work. In this work, a generalized framework for simulating vapor compression cycles (VCC) has been developed with emphasis on a charge-sensitive model. In order to illustrate the capabilities of the tool, a direct-expansion (DX) cycle has been considered. In the cycle model, the compressor was mapped by employing dimensionless π groups correlation, the evaporator and the condenser were constructed based on the ACHP model. With respect to the charge inventory estimation, the two- point regression model was used to account for inaccurate estimation of refrigerant volumes, ambiguous flow patterns for two-phase flow, and amount of refrigerant dissolved in the oil. The model was validated with available experimental data available in literature. The simulation results demonstrated that the proposed model is more accurate and more generic than other methods presented in the literature.

Development and Validation of CO₂ Gas Cooler Moving-Boundary Model for Effectiveness Performance Prediction

Ammar Bahman, Davide Ziviani, Eckhard Groll
Mechanical Engineering Department

Abstract:

This work presents the development of a CO₂ gas cooler model using the moving-boundary (MB) method. The model aims to separate the gas cooler into two regions: supercritical gas and supercritical liquid by means of the open-source CoolProp thermophysical property library. The model uses the latest correlations for refrigerant and air-side heat transfer coefficients and pressure drops. The experimental results for fin-and-tube type and micro-channel type gas coolers were used for model validation. The model predicted the gas cooler heating capacity with a mean absolute error (MAE) of less than approximately %4 and refrigerant side outlet temperature of less than 3 K. The present MB model also showed an improved computational time up to 10 times faster compared to a discretized model, which can reduce the overall computational effort in the simulation of detailed transcritical cycle model.

Simulated Annealing for Discrete Stochastic Optimization: New Algorithms and Comparisons

Eng. Fatemah Salah AlAwadhi
Industrial & Management Systems Engineering Department

Abstract:

We develop two modifications of the simulated annealing (SA) algorithm for solving discrete stochastic optimization problems where the objective function is stochastic and can be evaluated only through Monte Carlo simulations. In the proposed modifications, the Metropolis criterion depends on whether the objective function values indicate statistically significant difference at each iteration. In order to test the performances of the two proposed algorithms, we implement our SA variants to the well-known discrete stochastic optimization problem; the buffer allocation problem (BAP). In addition, we compare the performances of the proposed SA algorithms with other existing SA variants. The comparison process is carried out at two levels. In the first level, we compare the performances of the six SA variants with regard to a single performance measure. In the second level, we apply the response surface methodology (RSM) to determine the best SA variant when there are multiple responses involved in the presence of many factors affecting these responses.

Investigation of Steam Pipeline Weld Failure

Amani Al Ba'noon and Ahmad Elkholy
Mechanical Engineering Department

Abstract:

Failure investigation of 12" high-pressure steel welded pipe shown in Figure (1), was carried using ASTM standards. Visual and lab tests were performed on samples taken from the pipe and the weld. Failure was found to be due to combination of operating conditions, cyclic stresses, depletion of chromium. and , oxidation. Recommendation to reduce the failure were discussed.

An Optimum Sinusoidal Arrangement of Tubes in Shell-and-Tube Heat Exchangers with Good Heat Transfer Characteristics Combined with Improved Pressure Drop Requirements

Raed Bourisli, Afnan Abdulkareem
Mechanical Engineering Department

Abstract:

Shell-and-tube heat exchangers are prevalent in numerous process and power applications. The conventional, staggered arrangement results in good heat transfer but large pressure drops. A proposed sinusoidal arrangement mitigates these shortcomings.

Optimum Insulation Thickness Distribution for Heat Loss Uniformity from Heated Corrugated Pipes

R. I. Bourisli
Mechanical Engineering Department

INTRODUCTION:

Insulation of pipe is everywhere. For many non-circular pipes, insulation is not optimum. Heat leaks from sections not sufficiently insulated while other sections are "over-insulated." The plan is to optimize the layout of the insulation material is optimized in a way that eliminates heat leaking spots—i.e., make heat loss uniform.

Effect of Nanotechnology on Relative Permeability

Dr. Osamah Al-Omair, Eng. Ahmed Omar, Ahlam Al-Fadhli,
Muneerah Al-Failakawi, Hadeer Elhoseny
Petroleum Engineering Department

Abstract:

In recent years, nanoparticles are used to enhance the oil recovery in petroleum industry. When nano-fluids are injected into the reservoir, they are sufficiently small to pass through pore throats reducing oil-water interfacial tension which alter rock surface wettability. Hence, reducing capillary force that oil needs to be mobilized which eventually improve the oil-water relative permeability curves taking in consideration its low expenses and positive social and environmental impact which is missed out in the conventional technologies. The current study illustrates the effect of nanoparticle types with concentration of 0.05 wt. % on the behavior of oil-water relative permeability. An experimental test consists of four sets of injection, first, the base case which is the injection of brine water and the other three cases are injection of three different types of nanoparticles to displace an intermediate crude oil were performed on a sand stone (Gray Berea) core samples. The results of this work can help with finding the most effective displacement nano-fluid based on recovery factor calculation and economic evaluation.

Laboratory Investigation of the Effect of Nanoparticles on Wettability

Dr. Osamah Al-Omair, Eng. Mahmoud Ali, Fatma Al-Ajmi,
Reyouf Al-subaie, Dalal Al-Otaibi
Petroleum Engineering Department

Abstract:

Increasing the oil recovery efficiency in oil-wet reservoirs is considered one of the most importing target in oil field sector. Different techniques to increase the oil recovery have to be pursued, and one of them is altering the wettability of porous reservoir rock surfaces to more water wet by letting the value of contact angle (θ) less or equal 90. This project discusses the decrease in contact angle after the injection of nanoparticles that is done experimentally, and also evaluates the production performance for different injection of nanofluid types by using numerical simulation (CMGTM).

Modeling Heavy Oil Two-Phase Flow Pattern Transition in Upward Vertical Oil Wells

Prof. Eissa M. Al-Safran, Dr. Mohammad Ghasemi, Dr. Feras Al-Ruhaimani
Petroleum Engineering Department

Abstract:

Two-phase flow in vertical wells is a common occurrence in oil and gas production. Heavy oil (HO) upward vertical flow in wells and risers presents a new challenge for predicting pressure gradient and liquid holdup due to the poor understanding and prediction of the flow behavior, specifically the flow pattern (the spatial geometrical distribution of gas and liquid in radial dimension of the flow channel). Current two-phase flow mechanistic models were developed, validated, and tuned based on low-viscosity liquid two-phase flow data for which they show accurate predictions. The objective of this study is to investigate theoretically flow pattern transitions for heavy oil liquid two-phase flow in vertical wells.

Predicting Asphaltene Deposition in Kuwait Fields Using Integrated Reservoir/Wellbore Production Modeling

Prof. Eissa M. Al-Safran, Dr. Mohammad Ghasemi
Petroleum Engineering Department

Abstract:

This work presents a robust systematic approach for forecasting the asphaltene depositions in the production system through coupling the reservoir and subsurface production models. Results reveal the importance of the integrated asphaltene depositions workflow that provides the solution tools to identify the asphaltene depositions at any point in the production system. The proposed approach in this study is based on integrating four models workflow to predict asphaltene deposition.

*Scientific Poster Day
March 20, 2019
Research Sector*

Exploring the Awareness of Environmental and Health Impact of Using Plastic Packaging for Some Traditional Food in The State of Kuwait

Heba Al-Helailah, Maryam Al-Asousi, Mariam Al-Shammaa
Environmental Technology Management Department

Abstract:

The consumption of out-of-home food has been increasingly popular over the last decades, due to its low cost, conveniently and good taste. This study aims to investigate the consumption and awareness of consumers related to hot chickpeas and broad beans packed in plastic containers in State of Kuwait. A total of 695 subjects aged (18- 60 years) from different governorates were responded to electronically-distributed public survey. Socio-demographic data and environmental and health awareness were determined. About 84.3 % of the subjects were of hot beans consumers. Among the beans consumers, 61.1% were purchasing the beans packed in plastic containers.

Estimating the Power Output of Variable Solar Energy Using a Monte Carlo Approach

Mohammad Alshawaf, Rahmat Poudineh, Nawaf Alhajeri
Environmental Technology Management Department

Abstract:

Solar power is variable due to their weather dependence and have seasonal and diurnal production patterns. The uncertainty of power output poses two fundamental challenges to power sector; sufficient or reliable power supply and system flexibility. This study proposes using a Monte Carlo (probabilistic) approach to estimate and potential electrical power generated from a 700MW photovoltaic plant.

Environmental Awareness, Paper Consumption and Sustainability Among KU Students

Dhoha Rushoud Al-Rushoud
Environmental Technology Management Department

Abstract:

Environmental awareness of university students reflects students' behaviour and attitudes toward their environment. Universities and educational institutions have many direct and indirect negative impacts on the environment such as; huge energy consumption, use of chemicals in laboratories, huge paper and material waste, negative impacts of some research activities and transportation. A sustainable approach to reduce and limit these impacts is a very important consideration for any institution. In this study, I present the results of two separate surveys conducted during the semester Fall 2019/2018 for students at Adiliya campus, Kuwait University.

Impact of food processing techniques, relative humidity on properties of montmorillonite nanoclay

Ahmad R Allafi
Food Science and Nutrition Department

Abstract:

The objective for this study was to investigate the effect of high pressure processing and retorting, relative humidity and percent loadings on the barrier and mechanical properties of naylor 6 nanocomposite materials. Surface modified montmorillonite nanoparticles with the commercial name of Nanomer® I.30T nanoclay were used in this study to create five different films with varying loading levels of nanoparticles. Films were tested for their barrier properties to oxygen (OTR) and mechanical properties using the Instron tensile tester Model 5542. Results showed that high pressure processed samples had the lowest oxygen permeation rates. Retorting seemed to reduce the tensile strength slightly but there were no alterations in modulus and elongation after retorting and HPP.

The Effect of Tea Preparation Method on Aluminum Cookware Leaching

Maryam Al-Asousi

Food Science and Nutrition Department

Abstract:

Aluminum is non-essential element for humans and considered to be a toxic metal. The intake of aluminum from cooking utensil is of growing health concern. The present study was carried out to determine the amount of leaching aluminum concentrations resulting from different tea preparation methods, and to find the best way to reduce the intake of aluminum via consumption of tea prepared in aluminum utensils. The pH and the concentration of the resulting solution were measured. The Results revealed a relation between pH and the leaching degree. The minimum leaching was when water was boiled separately, while the highest was when tea leaves were boiled with water.

Is Vitamin D Associated with Cognitive Function in Adolescents?

Abdur Rahman, Abdullah Al-Taiar, Lemia Shaban, Reem Al-Sabah,
Anwar Al-Harbi and Olusegun Mojiminiyi

Food Science and Nutrition Department

Abstract:

High levels of vitamin D (VD) are associated with better cognitive function among elderly but this association has not been demonstrated among children or adolescents. As VD deficiency is highly prevalent in adolescents, we investigated the association between VD and cognitive function among adolescents. A cross-sectional study was conducted on 1370 adolescents (16-11 years) randomly selected from public middle schools in Kuwait. Cognitive function was tested using the Raven's Standard Progressive Matrices (SPM) test.

Obesity in Adults with Intellectual and Physical Disabilities in Kuwait

Maryam Zadeh, Dalal Alkazemi*, Tasleem Zafar
Food Science and Nutrition Department

Abstract:

We assessed the nutritional status of a sample of adult patients with intellectual and physical disabilities (N=41) residing at the Rehabilitation Center in Kuwait. We conducted an overall nutritional assessment, which included the anthropometric indicators such as body mass index, midarm muscle circumference, triceps skinfold thickness, calf circumference, nutritional biomarkers, and the feeding disorders. We collected dietary intake using three-day diet record through direct observation to evaluate their dietary intake and diet quality. The Subjective Global Assessment method was used to determine the prevalence of malnutrition among institutionalized residents. More than third of the patients were at risk of malnutrition, with high level of muscle depletion, despite high level of overweight and obesity. There is an evident cardiometabolic deterioration especially in women. Patients were found to exceed their daily caloric requirements which with physical inactivity contribute to very high level of obesity in this population.

Food Safety Knowledge, Attitudes and Practices of Food Handlers in Restaurants in Kuwait

Jumanah Al-abdeen, Dina Al-Kandari Ph.D.
Food Science and Nutrition Department

Abstract:

This study was conducted to assess the level of food safety knowledge, attitudes and practices among 402 food handlers in Kuwait restaurants. The information was collected through face to face interviews and questionnaires comprising four sections: demographic characteristics, knowledge, attitudes and practices. The study suggests that even though the knowledge, attitudes and practice level of food handlers was satisfactory, some aspects related to cross-contamination, food pathogens and time and temperature control need to be stressed. Continuous food safety training for food handlers in Kuwait should become mandatory to strengthen food handlers in the areas which seem to be lacking. Training should not only focus on theoretical aspects of knowledge, but also be practical and foster positive attitudes towards food safety and promote good food safety practices.

Coffee culture: assessment of coffee-based beverage consumption trends, factors influencing consumer choice and nutritional knowledge among young adults in Kuwait

Asma Saleh, FarhiaAhmad, AbirHersi, Sara Aljluwi, Ahmad Allafi
Food Science and Nutrition Department

Abstract:

Very limited studies explore coffee consumption and knowledge trends among youths and whether it influences their daily intake. The objective of this study is to assess coffee-based beverage consumption habits and trends among young adults in Kuwait. A cross sectional study targeting young adults aged between 18 to 35 years was conducted online using a previously validated questionnaire.

Elevated cadmium and lead levels in adolescent school children in Kuwait

Reem Jallad, Muddanna Rao, Abdullah Al-Taiar, Lemia Shaban,
Reem Al-Sabah³, Abdur Rahman
Food Science and Nutrition Department

Abstract:

Cadmium (Cd) and Lead (Pb) are heavy toxic metals, which mainly affect the central nervous system. Environmental exposure to these metals is still a public health problem in both developed and developing countries. We investigated blood levels of Cd and Pb in adolescent school children. A cross-sectional study was conducted on 681 (396 males) adolescents aged 16-11 years, randomly selected from public middle schools from all governorates of Kuwait. Whole blood samples (0.5ml) were digested in 5 ml Perchloric/Nitric acid mixture (1:5) and analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). In the overall sample, %12.5 of children had Cd levels above of safety limit of 5 µg/L, whereas, %51.5 children had Pb levels above 5 µg/dL. High Cd levels were observed in %22.3 boys, compared to %3.2 girls (p<0.0001). On the other hand, high Pb levels were observed in %46.8 boys compared to %55.9 girls (p<0.0001). Our data suggest that a significant number of children has Cd and Pb levels higher than the safety limit set by the CDC. Further research is needed to identify the source of this environmental contamination. Preventive measure must be adopted to limit the exposure of children to these neurotoxic heavy metal.

Food Safety Knowledge and Handling Practices Among Students at the College of Life Sciences

Sharifa Alkandari, Ahmad Allafi, Dalal Alkazemi
Food Science and Nutrition Department

Abstract:

This study aimed to assess the level of food safety handling knowledge and practices among 372 university students (20 > %59 yrs) recruited from College of Life Sciences (CLS); and to explore the association between their knowledge/practices and (1) the socio-demographic characteristics; and (2) major fields of study. They completed a questionnaire of 16 food handling practices and 14 food safety knowledge questions related to preparation, cross-contamination, storage and hygiene.

Determination of the Glycemic Response and Glycemic index of Toast Breads in Kuwait

Dana Alghadouri, Jiwan Sidhu, Tasleem Zafar, Ahmed Aldughpassi
Food Science and Nutrition Department

Abstract:

The objective of this study was to determine the post-prandial blood glucose (BG) responses to different types of locally produced toast breads (TB) and their glycemic index (GI). Thirty healthy volunteers consumed on different days, a 25 g available carbohydrates (CHO) serving from five varying types of toast bread (white TB (WT), Whole Wheat TB (WGT), Multi-grain TB (MGT), Bran TB (BT)) and a -25gram oral glucose drink as a control. BG was determined using a Biosen C-line glucose analyzer (EKF-diagnostics, Germany). The GI of all TB was determined using the internationally standardized method (ISO 26642:2010).

High amylose cornstarch improves blood glucose concentration but does not affect appetite or food intake in healthy individuals

Tasleem A. Zafar

Food Science and Nutrition Department

Abstract:

High fiber diets promote satiety and sustain normal blood glucose by delaying digestion and slowing glucose absorption, but their longer-term impact on body weight loss is thought to be due primarily to their lower energy density. Starches that are slowly digested in the small intestine, resistant starches (RS), contribute to a diet's fiber load. The worldwide epidemic of obesity has supported the incorporation of RS in commercial food products to curtail body weight gain. The present study explored whether consumption of a beverage containing RS from high amylose cornstarch (Amylose) from Hi-Maize 260 will lead to higher satiety and lower food intake.

Common Variants in Cholesterol-Related Genes Associate with the Effect of Dairy Intake on Serum Cholesterol Concentrations in Healthy Adults

Mohammad M H Abdullah, Peter Eck, Patrick Couture, Benoît Lamarche, Peter J H Jones
Food Science and Nutrition Department

Abstract:

Existing evidence on the influence of genetic architecture on serum cholesterol responsiveness to dietary interventions focuses on individual single nucleotide polymorphisms and single nutrients. We associated the combination of ABCG5 rs-6720173C, CYP7A1 rs-3808607TT, and DHCR7 rs-760241GG genotypes with lower LDL-cholesterol concentrations relative to the combination of rs-6720173GG, rs-3808607G, and rs-760241A genotypes (-0.12 ± 0.37 (n = 9) vs. 0.14 ± 0.38 mmol/L (n = 7), $P = 0.0016$) following a blended dairy (3 servings/day for 4 weeks) intervention.

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Mangrove Restoration at Al-Jahra Nature Reserve, Kuwait: An Integrated Ecological Approach (Phase I)

Amani Alzaidan, Abdullah Alzaidan, Badar Albulushi, Mohammed Hasan
Biological Sciences Department

Abstract:

The Grey Mangrove Restoration Project (GMRP), is one of EPA's projects aiming to transform the coastal area of Al-Jahra nature Reserve into a wildlife safe haven that will create additional habitats for countless marine life and bird species. *Avicennia marina* (grey mangrove) seeds were planted both in-situ and ex-situ to assess germination and development success. Ex-situ planting insured adequate germination rates away from the harsh environmental factors which effected the in-situ plants. It is envisaged that the ex-situ germination and vegetative development will contribute to the successful transplantation of the grey mangrove in the wild.

Authentication & Phylogeny of Commercial Seabreams (Perciforme: Sparidae), Kuwait

Amani Al-Zaidan, Hussain Bahbahani, Salim Al-Mohanna
Biological Sciences Department

Abstract:

Identification of commercially important Sparidae species represents a key aspect of biodiversity conservation and food security. We conducted 2 surveys to assess the existence of secondary sparids at fish stalls and the preference of consumers in relation to sparids. The genotypic identification of 5 sparids was via DNA barcoding techniques. Findings showed that secondary sparids not listed in the official landing list are targeted by consumers. Thirty barcodes were submitted successfully to the Genbank. The taxon identification tree generated revealed that sparids of Kuwait have a unique genetic identity relative to similar species from neighbouring oceans. Legislators are urged to modify the existing list to ensure species sustainability and conservation.

**NATIONAL UNIT FOR ENVIRONMENTAL RESEARCH AND SERVICES
A GENERAL FACILITY - SRUL13/01**

Dr. Abdul Rahim, Aswathy Thomas, Melba Kishor, Alberto Orayan,
Alia Awan, Milu Jose, Mariam Abbi and Dr. Hussain Bahbahani
Biological Sciences Department

Introduction:

- NUERS - Specialized Research Unit Laboratory (SRUL13/01) located on Khaldiya Campus of KU (KH33-).
- We are providing analytical services to the researchers and students of Kuwait University.
- We also provide services to the external clients
- We deliver a wide range of analytical services on different sample types.

**Germ Cell Apoptosis: Interplay between the Thioredoxin System
and the ASK1/Trx/Txnip/JNK signaling pathway**

Al-Kandari N, Pattilath S, Al-Maghrebi M
Biological Sciences Department

Abstract:

Testicular ischemia reperfusion injury (tIRI) is caused by testicular oxidative stress mediated by ROS production to an extent that exceeds the cell's capacity to neutralize them through its endogenous antioxidant system. Thus, inhibition of apoptosis signaling and enhancing the endogenous antioxidant systems might be a plausible attempt to eliminate the damaging consequences of tIRI. The aim of this study is to examine the effect of inhibiting the pro-apoptosis ASK1 signalling pathway on preventing the tIRI-induced damages and the involvement of the antioxidant thioredoxin system, which is associated with ASK1 signaling using a tIRI rat model. Three experimental groups were employed: sham, tIRI only and tIRI + NQD1-. During tIRI, pro-apoptosis genes were upregulated, caspase3- was activated, the redox antioxidant system was disrupted and finally the ASK1/JNK/p38 signalling pathway was activated. Inhibition of ASK1 by NQD1 treatment reversed all the tIRI damaging consequences, which was associated with positive regulation of the Trx system, thus, supporting the interplay between ASK1 and the Trx system during tIRI pathogenesis.

Mitochondrial Dysfunction Contributes to Germ Cell Apoptosis via the JNK/Survivin/p53 Pathway

Mohammad F, Pattillath S, Al-Maghrebi M
Biological Sciences Department

Abstract:

Testicular ischemia reperfusion injury (tIRI) explains the pathophysiological mechanism underlying testicular torsion and detorsion (DTT). A rat model for tIRI/DTT is used to study the role of the c-Jun N-terminal kinase (JNK) signaling pathway by using its specific inhibitor SP600125 and its association with mitochondrial stress in the induction of germ cell apoptosis. Molecular, histological and biochemical assays were employed in this study. The novel study outcomes implicate the contribution of mitochondrial dysfunction in the generation of reactive oxygen species and induction of germ cell apoptosis via the JNK/survivin/p53 signaling pathway during tIRI.

Mitochondrial Variation in Camel Breeds: Polymorphism Quantity and Direction of Introgression

Randa Alaqeely, Bader H. Alhajeri, and Hasan Alhaddad
Biological Sciences Department

Introduction:

- The single-humped camel (*Camelus dromedarius*) is a unique mammal that is well-adapted to survive hot arid conditions.
- Camels are of great economic importance that can be used in transportation, farming, and have many beneficial products including milk, meat, hide, and isolated antibodies that share high homology with human immunoglobulin.
- Dromedary camels lack breed standard criteria and definition.
- There are several classifications and categorization systems for dromedary groups or named breeds, but with no scientific support.
- Mitochondrial DNA (mtDNA) can be used to investigate breed limits since it can reveal population dynamics, maternal lineages, and their diversity.

**Mudskippers as Bioindicators of Marine Plastic Pollution:
A Preliminary Study**

Esraa Al-Fares, Salim Al-Mohanna, Amani Al-Zaidan
Biological Sciences Department

Abstract:

Microplastics are found globally in coastal habitats and can be ingested by marine faunal populations. This preliminary study documents microplastics and its correlated heavy metal contamination in three species of mudskipper from Sulaibikhat Bay. Fish were examined and plastics were found in the gastrointestinal tracts of %15 of specimens. Acutely toxic mean levels of iron, aluminum and zinc in tissues were recorded at levels surpassing the accepted concentrations by 88 ,395, and 35 times respectively. Further work is required to establish the magnitude of the physical and chemical presence of plastics in marine fauna, and its potential consequences on the integrity of the ecosystem.

**Impact of the Sheikh Jaber Al-Ahmad Al-Sabah Causeway Project:
A Preliminary Study**

Esraa Al-Fares, Zainab Dashti, Adel Al-Othman,
Mohammed Hasan, Amani Al-Zaidan
Biological Sciences Department

Abstract:

Ashish Al-Doha is known for its ecological importance as a nursery ground for crustaceans, mollusks, fish, and shorebirds. Anthropogenic activities have increased in the area during the past 19 years, such as the Sheikh Jaber Al-Ahmad Al-Sabah Causeway Project that is under construction and will stretch 23.5 km. This preliminary comparative study found that sediment composition in 2017 changed from what it was in 1998. The decline in *Opusia indica* species abundance in 2017 is possibly a result of sediment changes or noise pollution which caused the decline of shorebirds that prey upon crustaceans. This project was found to have created major alterations on the mudflats and its status needs to be evaluated in further research once the causeway project is completed to assess the degree of impact on the site. Unless management, monitoring, and restoration of the site is implemented, faunal populations will continue to decline.

Correlation Between Tolerance to Food Preservatives and Metabolic Fingerprints of Indigenous Strains of Salmonella

Abdullah Eissa, Aliaa AL-Mousawi and Esmail AL-Saleh
Biological Sciences Department

Introduction:

Salmonella is considered as a major cause of gastrointestinal diseases (Swanson et al, 2007) partially due to its ability to resist food preservatives that are thought to inhibit general cell metabolism thereby leading to the eradication of Salmonella. However, resistance to food preservatives could be encoded by specific resistance mechanisms independent of the general cell metabolism (Bower and Daeschel, 1999; Kwon and Ricke, 1998). The aim of this study was to investigate the possible association between the potential of foodborne Salmonella species to tolerate food preservatives, and the general cell metabolism. The outcome of this study could provide a method to cluster Salmonella according to their phenotypic characteristics and facilitate the epidemiological monitoring of food-borne diseases.

Geographic Variation in Skull Morphology of Two Monotypic Species of Gerbils (Gerbillinae, Rodentia)

Zainab Dashti, Hasan Alhaddad, and Bader H. Alhajeri
Biological Sciences Department

Introduction:

- The Indian gerbil *Tatera indica* Hardwicke, 1907 and the Cape short-eared gerbil *Desmodillus auricularis* Smith, 1834 belong to the subfamily Gerbillinae.
- The distribution of *T. indica* includes parts of the Middle East and central Asia, while the Cape short-eared gerbil only occurs in parts of Southern Africa.
- The auditory bulla (includes portions of the middle and inner ear) is enlarged in most gerbils, presumably an adaptation to aridity.
- The zygomatic plate (part of the upper jaw) in *T. indica* is broad, which is thought to be an adaptation to its diet, which consists of solid, rough food.
- Biological mechanisms that could promote or limit geographic variation in skull morphology in these gerbils may include climatic adaptation, isolation by distance, and the occurrence of dispersal barriers.

FGF5as a Candidate Gene for Long-hair Phenotype in Dromedary Camels

Tasneem Maraqa, Bader H. Alhajeri, and Hasan Alhaddad
Biological Sciences Department

Introduction:

- Hair is one of the main characteristics that distinguishes mammals from other vertebrate groups.
- Hair has a three-phase growth cycle, known as anagen, catagen, and telogen, which is regulated by more than 2,289 genes.
- The main hair growth regulator is the Fibroblast Growth Factor 5 (FGF5) gene.
- The FGF5 gene consists of three exons separated by two introns.
- Alternative splicing of FGF5 results in two isoforms (Fig. 1).
- The full length FGF5 isoform initiates the transition from the anagen phase to the catagen phase which affects hair length.
- Several FGF5 mutations have been identified that are associated with long-hair phenotypes in many domestic animals (Fig. 2).
- The dromedary camel exhibits variations in hair length similar to that of other camelids (Fig. 3).

Quality Control and Selection of Dromedary Camel STR Data

Huda AlAskar, Bader H. Alhajeri, Faisal Almathen, Hasan Alhaddad
Biological Sciences Department

Introduction:

- Dromedary camels are distributed throughout the deserts of Africa and Asia.
- Little is known about dromedary camels' genetic diversity, population structure, and breed status.
- The analysis of camel genetic data allows for inference about the relationships among dromedary camel types (i.e. breeds) and is essential for selective breeding programs.
- STR (Short Tandem Repeats) or microsatellite markers are suitable for understanding recent population dynamics due to its fast mutation rate and high number of alleles per marker.

Genome diversity and relationship among Arabian Peninsula dromedary camels

Arwa Afana, Abdulaziz Al-Ateeqi, Faisal Al-mathen and Hussain Bahbahani
Biological Sciences Department

Abstract:

The dromedary camels (*Camelus dromedarius*) are single-humped animals living in the deserts of Africa, Arabian Peninsula and the south west Asia. This species is highly adapted to the harsh desert environment. Historically, they were used for trading and transportation across the desert, and hence known as "the ship of the desert". In this study, we are planning to analyze the genome of dromedary camels from the Arabian Peninsula to assess their genome diversity and relationship. The full genomes of 38 dromedary camel samples (14 from Kuwait, 20 from Saudi Arabia, two from Oman, two from Sudan, two from Morocco and one from Pakistan) will be sequenced using Illumina next generation sequencing platform. Principle Component Analysis (PCA), Admixture and heterozygosity analyses will be conducted on the variants detected from full genome data. To assess their genome diversity and structure The expected outputs of this research are considered as the first in analyzing the full genome of dromedary camels from the Arabian Peninsula using next generation sequencing approach.

HSP27 a biomarker and therapeutic target that down regulates HER2 protein through HER2 pathway to increase ovarian cancer patients survival rates

Dr. Laila A. Jarragh Alhadad
Chemistry Department

Abstract:

Recently, American Cancer Society estimated that new ovarian cancer cases exceeded 22 thousand including 14 thousand expected death case. Clinically, the standard chemotherapy drugs used to treat patients with ovarian cancer are combination of a platinum-based drug such as carboplatin or cisplatin with a taxane such as paclitaxel or docetaxel. The goal of this study is to find ovarian cancer cell line which is highly expressing HER2 and then test the nimesulide analogs toxicity effect on these cell lines to select the potent agents that target dual proteins through HER2 pathway.

Efficient and reusable magnetic AC-Fe₃O₄ nanocomposite for rapid removal of pharmaceutical waste from water

Metwally Madkour, Bessy D'Cruz, Mohamed O. Amin and Entesar Al-Hetlani
Chemistry Department

Abstract:

In this study, activated carbon-Fe₃O₄ magnetic (AC-Fe₃O₄) nanocomposite was used as an adsorbent for the removal of promazine drug from water. The characteristics of the adsorbent were evaluated by Raman, FTIR, BET, XRD, TEM and XPS. The nanocomposite exhibited high adsorptive capacity, easy magnetic separation and reusability. The results indicated that promazine was removed by %99.9 after only 15 minutes.

Advances in Forensic Applications: The Integration of Nanoparticles into LDI-MS for Rapid Analysis and Detection of Illicit Drugs in Forensic Associated Samples

Mohamed O. Amin, Entesar Al-Hetlani, Metwally Madkour and Ahmed Abdel Nazeer
Chemistry Department

Introduction:

The escalation of crime reports has prompted the development of reliable, convenient and cost-effective methods to improve the detection of drugs. Of these, the application of nanoparticles (NPs) of different size, morphology, surface chemistry and physicochemical properties into laser desorption ionization-mass spectrometry (LDI-MS) technique has boosted the detection sensitivity, selectivity and reproducibility of small molecules. In the present work, metal oxide NPs and CeO-2CB nanocomposite were employed for the detection of illicit drugs that could be present in latent fingerprints (LFPs) or slipped into unsuspecting individual drink. Firstly, TiO₂, ZnO, Fe₂O₃ and CeO₂ NPs were utilized as dusting agents and LDI substrates to visualize LFPs and detect drugs of abuse deposited on the LFPs. On the other hand, CeO-2CB nanocomposite was applied for the analysis of drug-spiked beverages without sample pretreatment or extraction. All the NPs-based substrates showed high detection sensitivity towards the analytes with minimum background interference enabling rapid and accurate identification of the drugs.

CdS/CNT/CeO₂ nanoheterostructures as natural solar radiation active photocatalyst for industrial wastewater treatment

Asma A. Ali, Metwally Madkour, Ahmed Abdel Nazeer and Fakhreia Al Sagheer
Chemistry Department

Abstract:

In this study, a nanoheterostructure based on CdS/CeO₂ modified with SWCNT as electron mediator was successfully prepared via a modified co-precipitation and hydrothermal method. The as-prepared nanoheterostructures were characterized via UV-Vis, Fluorescence, XRD, BET, DLS, XPS, N₂ adsorption and TEM. The morphological behavior of the nanoheterostructure showed a uniform distribution of spherical nanoparticles of CdS and CeO₂ on the carbon nanotubes with particle sizes of 3.2 nm and 5.1 nm for CeO₂ and CdS/CeO₂ respectively.

Ar-MWCNT-Based Sol-gel Coating for Capillary Microextraction Sorbent for the Detection of Carcinogenic Pollutants

Abdullah Alhendal and Shereen A. Majeed
Chemistry Department

Abstract:

Sol-gel technique was employed for the preparation of multi-functionality sorbent prepared by a simple and convenient route. Multi-walled carbon nanotubes (MWCNTs) were functionalized with aramid oligomers (Ar-) on the outer surface to enhance the solubility of the MWCNTs in organic solvents. The main purpose for the addition of Ar-MWCNTs is to provide several types of intermolecular interactions to collectively serve as an analytical microextraction media in form of capillary microextraction for the analysis of polycyclic aromatic hydrocarbons (PAHs).

Reforming of Hydrocarbon Compounds on Bifunctional Sites Created in-situ on the surface of W-based Catalyst

Ahmed M. Mohamed, Halema A. Al-Kandari and Mohammad A. Hasan
Chemistry Department

Abstract:

Tungsten trioxide (WO_3) supported on titanium dioxide (TiO_2) catalyst composite (WTi) was prepared via facile and an environmentally friendly wet impregnation method using only distilled water as the solvent. This catalyst composite was investigated by in-situ XPS-UPS and ex-situ BET and XRD characterization techniques. The catalytic activity was evaluated toward the hydroisomerization /hydrocracking of n-hexane(nC6) and n-heptane(nC7). Increase the M/A ratio improved the catalytic reaction in favor of isomerization selectivity for nC6 and nC7.

In-situ XPS monitoring of the active catalytic sites formed on the surface of W-based catalysts for the hydroconversion of methylcyclohexane

Ahmed M. Mohamed, Mohammad A. Hasan and Halema A. Al-Kandari
Chemistry Department

Abstract:

Here, three catalyst composites of WO_3/TiO_2 (WTi), 2.5%Pt/ WO_3/TiO_2 (PtWTi) and 2.5%Ni/ WO_3/TiO_2 (NiWTi) were prepared via wet impregnation of TiO_2 pellet with chloroplatinic acid hydrate or nickel nitrate hydrate and ammonium metatungstate salts as precursors for Pt, Ni and W, respectively. To estimate the effect of Pt- and Ni-addition on the catalytic properties of the catalyst composite prosperities, PtWTi and NiWTi were investigated in-situ by x-ray photoelectron spectroscopy (XPS) and the obtained results were compared with unprompted WTi.

Novel 3D solid-state chemiluminescence sensor based on $\text{Ru}(\text{bpy})_3^{2+}$ -poly(MAA-co-EDMA) monolith for the detection of antidepressant drugs

Bessy D'Cruz, Entesar Al-Hetlani and Mohamed O. Amin
Chemistry Department

Abstract:

For the first time a 3D network of poly(MAA-co-EDMA) was used as a solid support for chemiluminescence (CL) reaction in a microcapillary system. The positively charged $\text{Ru}(\text{bpy})_3^{2+}$ complex was electrostatically linked to the negatively charged monolith to form $\text{Ru}(\text{bpy})_3^{2+}$ -poly(MAA-co-EDMA). The $\text{Ru}(\text{bpy})_3^{2+}$ -poly(MAA-co-EDMA) was thoroughly studied using FT-IR, SEM, BET, isoelectric point and UV-Vis spectroscopy. The results showed the successful formation of the 3D structure and attachment of $\text{Ru}(\text{bpy})_3^{2+}$ on its surface. The 3D miniaturized platform was optimized by studying the effect of the flow rate and concentration of the oxidant and was finally utilized for the detection of tricyclic antidepressant drug namely, imipramine.

Microporous Polycarbazole Networks as Highly Efficient Supercapacitor Energy Storage Electrode

Ahmed Abdel Nazeer, Ali A. Husain, Asaithampi Ganesan, Saad Makhseed
Chemistry Department

Abstract:

Herein, we report molecular design and synthesis of microporous polycarbazole network material (MPN) and its application as an efficient supercapacitor energy storage electrode. The highly conjugated designed structure possessed a large surface area (1263 m²/g) and dominated by ultramicroporosity (0.8 nm), thus providing a large electroactive area and easy access for electrolyte for energy storage application. As a result, a high specific capacitance, excellent rate capability and cycling stability were achieved as electrode for supercapacitors in 1M H₂SO₄ electrolyte. Specific capacitance was as high as 486.2 F/g at a charge/discharge rate of 1 A/g and 314.2 F/g at 20 A/g. The supercapacitor retained 94% of the initial energy density even after 5000 cycles at a charge/discharge rate of 10 A/g. These results will be of assistance for fabricating an electrode material, exhibiting a high capacitance, good stability and superior rate performance with long cycle life.

High-Performance Supercapacitor Based on Electron-rich Nickel Phthalocyanine

Basma Ghazal, Ali Husain and Saad Makhseed
Chemistry Department

Abstract:

Supercapacitors are electrochemical energy storage devices that operate on simple mechanism of ions adsorption from an electrolyte on high-surface-area electrodes. Electron enriched phthalocyanine complexes with metal redox centers can be combined with electrical double layer capacitive carbon materials for improving charge storage capability. Therefore, electrochemical capacitance applications utilizing nickel nitrogen-rich carbazoyl-phthalocyanine (Car-NiPc) coated onto graphite paper substrate were explored. Such newly prepared composite exhibits a superior specific capacitance, 310.28 F g⁻¹ at 1 Ag⁻¹, along with good stability over continuous cycling for 1000 cycles. The synergistic effect of Car-NiPc with graphite sheet gave an excellent physical interface and consequently improved the charge storage capacity.

A Green Approach for the Synthesis of Thiazole Drugs in Water Using Recyclable Organic-Based Catalysts

Ali Husain, Asaithampi Ganesan, Basma Ghazal, Saad Makhseed
Chemistry Department

Abstract:

Water is an ideal solvent that has many advantages over organic solvents which are toxic, flammable, volatile, non-reusable, expensive, etc. Water in general is cheap, reusable, eco- and environmentally friendly. However, due to the poor solubility or the insolubility of most organics in water, organic reactions in aqueous media would be either slow or does not proceed. Herein, watersoluble resorcin[4]arene cavitand glycoconjugates (RCGs) were applied as efficient micro-reactors for the synthesis of thiazole containing drugs in water. RCGs were evaluated in the synthesis of thiazole species by studying the reaction of α -thiocyanato propiophenone with aniline derivatives and results were achieved in good to high yields. In addition, the capability of RCG2 catalyzing the onepot thiazole formation was investigated resulting in thiazole species in good to high yield. Also, the recoverability and the reusability of RCG2 catalyzing the thiazole formation was investigated.

Nitrogen-Enriched Microporous Carbon with Remarkable CO₂ storage

Saad Makhseed, Ali A. Husain, Asaithampi Ganesan
Chemistry Department

Abstract:

Facile carbonization of a microporous organic polymer resulted in a nitrogen rich novel carbon material with predominantly microporous structures and unprecedented CO₂ uptake capacity. The polycarbazole based precursor (Pcbz-Pn) with a uniform microporous structure was prepared in this work and exhibited high surface area 1242 m² g⁻¹. Carbonization of this polymer resulted a porous carbon material (C-Pcbz-Pn) with higher surface area of 1736 m² g⁻¹ and exceptional CO₂ uptake capacity (45 wt % at 1 bar/273 K) and high value of isotheric heat of adsorption 29 kJ/mole. As a result of its high microporosity (0.7- 0.8 nm), improved surface area and augmented nitrogen content, this newly prepared microporous material show promising potential in CO₂ capturing applications.

Nano-Conjugates of Carbazole Containing Phthalocyanine Within Graphene Quantum Dots: in Quest of Strong Optical Limiting Response

Shereen A. Majeed and Saad Makhseed
Chemistry Department

Abstract:

Four carbazole containing phthalocyanine complexes were conjugated to graphene quantum dots (GQDs) via π - π stacking. The morphology, sizes, and crystallinity of the Nano-conjugates were determined using Raman, EDX, TEM and XRD. The nonlinear optical (NLO) properties of all the prepared metallophthalocyanines with nanosecond light pulses have been investigated and their excited states characterization important for nonlinear absorption process were studied. The effects of different substituents, central metal ions and solvents on the NLO properties of metallophthalocyanines were evaluated. Promising optical limiting performance at 532 nm exhibited by complex X was gained due to its conjugation with nanomaterial.

Chitosan-based N₂-rich Activated Carbon for Water Treatment in Kuwait

Fatma Hussain Emamy, Ali bumajdad, Jerzy P. Lukaszewicz
Chemistry Department

Abstract:

High surface area nitrogen enriched activated carbon (N-AC) with both micro and/or mesoporous structure is essential for heavy metal ion capture. In this work, we describe a method for converting chitosan into a high surface area and nitrogen enriched porous active carbon (microporous) to be used for sea, industrial waste, sewerage, and drinking water contamination treatment in Kuwait. Chitosan, which is a low cost and highly abundant biopolysaccharide bio-waste materials, were activated using different activating agents such as Na₂CO₃, K₂CO₃ and KOH. Carbonation took place in specially designed quartz boat in quartz tube furnace at 600°C for one hour under constant nitrogen flow, followed by treatments for the removal of acidity and/or basicity. In this study, the N-AC were characterization by nitrogen sorptiometry, X-ray photoelectron spectroscopy (XPS), scanning and transmission electron microscopy (SEM, TEM). This study aims to evaluate the surface characteristics and chemistry of activated carbons (ACs) synthesized from chitosan and to get high surface area microporous high performance AC.

The impact of urbanization expansion on the geomorphology of the southern coastal Sabkhas from Ras Al-Jailiaha to Al-Khiran, Kuwait

Ameenah Al-Dalamah and Adeeba Al-Hurban
Earth and Environmental Sciences Department

Introduction:

Kuwait is considered one of the desert regions of the Arabian Peninsula. Kuwait is also subject to geomorphological processes that form the earth's surface features. The human factor in urban development affects earth geomorphology as in the southern coastal sabkha such as (Al-Jailiaha, Az-Zor and Al-Khiran). The coastal sabkha extends along the elongated coast from Al-Jailiaha to Al-Khiran area. Formation of sabkhas is related to pre-existing morphological features such as depressions and slopes, and is distributed in the study area in different geomorphological zones. The objectives of this project are to monitor the geomorphological changes on the southern coastal sabkha with the effect of urban expansion on them.

Geomorphological change detection along the coastal area between Ras Al-Julaiha and Ras Az-Zour, southern Kuwait

Maryam Al-Shimmari and Adeeba Al-Hurban
Earth and Environmental Sciences Department

Introduction:

The coastal area comprises of low flat areas, form continuous belt along the entire Kuwait coastline, and varies considerably in shape and width. The geomorphic differences reflect variations in the sedimentary environment. The study area is the coastal area between Ras Al-Julaiha and Ras Az-Zour in the southern part of Kuwait (Fig.1). The coordinates of the investigated area lie between latitude $28^{\circ} 44' 39.28''$ N and $28^{\circ} 52' 47.07''$ N, and longitude $48^{\circ} 23' 43.43''$ E and $48^{\circ} 17' 23.30''$ E. This southern intertidal environment is bounded by a sandy berm and wave-cut cliff. The coastal area considered as cove, or unsheltered bay. It is limited by two promontories Ras Al-Julaiha in the north and Ras Az-Zour in the south. The length of the shoreline is about 23 km between the two promontories.

Environmental footprint of Electricity Water Combined System

Mohammad Abotalib
Earth and Environmental Sciences Department

Abstract:

This research adopted the life cycle assessment (LCA) approach to assess the environmental impact assessment of electricity generation in the State of Kuwait focusing on global warming potential (GWP) and water consumption (WC) per kWh of electricity generated under different electricity generation scenarios. The initial analysis for Kuwait grid mix indicates that one kWh of electricity generated would have a GWP of 680g CO₂eq, mainly from the fuel combustion process, water consumption of 1.13 Liter, about 68% from cooling processes and WC of 1499 m³ to produce one kWh of electricity. However, the GWP decreased by 17% in the case of applying the system expansion which assigns a displacement credit for desalinated water produced as a co-product.

**Internal Tidal Waves on the Continental Shelf of
the Northwestern Arabian Gulf**

Fahad Al Senafi and Ayal Anis
Marine Science Department

Abstract:

The fluxes and turbulence mixing supported by internal waves (IWs) play a major role in transporting nutrient-rich waters in coastal ecosystems, affecting biological productivity as well as sediment transport. A better understanding of the effects of these waves in numerical models is required to reproduce the crucial links between large scales into which most energy is injected and small scales in which dissipation occurs. To address some of these issues, we examined the characteristics of IWs, and the associated multi-scale energy cascade from IWs to turbulence, on the continental shelf of the northwestern Arabian Gulf, off the coast of Kuwait. The study, conducted during midsummer (15 to 27 July, 2017), collected spatial transects and time-series measurements at five moorings and five-days of continuous turbulence profiles at four locations in the vicinity of the moorings.

On The Periodicity of the Knotted Trivalent Graphs

Ayman Abouzaid Ezzelarab Aboufattoum
Mathematics Department

Abstract:

The purpose of this paper is to obtain criteria of periodicity of links, we derive criteria of periodicity of knotted trivalent plane graphs. In particular, criteria for periodic links can be derived.

Assessment of the High-Resolution Paleoseismicity Record from Sediment Gravity Flows in Prince William Sound, Alaska

Elisabeth R. Clyne, Steven A. Kuehl, Joshua R. Williams,
Mohammad Al Mukaimi, Timothy Dellapenna
Physical Science Department

Abstract:

South-Central Alaska is one of the most seismically active and climatologically sensitive regions in the world. Within this region, Prince William Sound (PWS) receives abundant sediment from local rivers and glaciers, potentially housing a high-resolution environmental record with >100 m of sediment accumulated over the past 4,000 years. Previous studies have focused on southern/central PWS, and this study extends our knowledge of sediment characteristics in northern PWS.

Radioactivity in Fish

Tareq Alrefae, Tiruvachi Natrajan Nageswaran, Taher Al-Shemaly,
Zainab Jumaa and Nasser Demir
Physical Science Department

Abstract:

This study investigated the natural and man-made radioactivity in fish. The measurements were performed on 20 samples originated from 8 different countries. While the natural radionuclides ^{232}Th and ^{40}K were detected in all samples, ^{226}Ra was detected in 18 samples. As for the man-made radionuclide ^{137}Cs , it was detected in two samples only. The magnitude of the radioactivity was found to be within the acceptable ranges and less than the relevant guideline levels, thus confirming the radiological safety of fish.

Band Configurations and Urbach Tails of Fluorine-Doped Zinc Tin Oxide Thin films Prepared by Ultrasonic Spray Pyrolysis

Ahmed R. Hegazy, B. Salameh and A.M. Alsmadi
Physical Science Department

Abstract:

Tin oxide is a transparent conductor that has been celebrated for long due to its use in solar cells, such as CdTe cells. The new quaternary material of fluorine-doped zinc tin oxide (FZTO) still needs many investigations in terms of the optical properties. In particular, no works were done on the identification of the band and defect levels in FZTO. Also, the optical phenomenon of Urbach tail effect was never investigated in this material. For this purpose, this study sets up a homemade deposition system to prepare thin films of FZTO by the ultrasonic spray pyrolysis (USP).

Femtosecond laser ablation of gallstones

Ali Shuaib, Ali Bourisly, Jahja Kokaj, Nimmy Jose, Mathew Joseph
Physical Science Department

Abstract:

A femtosecond laser is used to generate plasma for laser ablation. We tested the feasibility of utilizing femtosecond-pulsed laser radiation $\lambda=800$ nm, $t_p=100$ fs, $E_p=4$ mJ with 750, 500, 250, 100, and 1000 pulses for gallstone ablation. The craters produced as a result of the femtosecond laser ablation are characterized using microCT. The crater diameter and depth were varied from 250 to 400 and 1000 to 5000 micrometers respectively depending on the number of pulses. Debris with sizes ranging from 1 to 20 μm were observed in much smaller proportions. No debris larger than 20 μm in diameter was observed. Femtosecond-pulsed laser ablates gallstones with micron sized debris and facilitates easy removal of particles. There by this technique can be used as an alternative to the traditional laser lithotripsy methods.

Terahertz Spectrometer: Design and Implementation

Fatemah Al-Dousari, Ali Shuaib, Mathew Joseph and Nimmy Jose
Physical Science Department

Abstract:

We designed and implemented a conventional Terahertz time domain spectrometer (THz-TDS). Ti:Sapphire mode locked femtosecond laser (800 nm, 100 fs) was used to generate THz radiation in the spectral range from (0.1 – 3) THz. THz-TDS system is basically consists of three parts; fs-laser, THz-emitter, and THz-detector including optics and electronic devices. Femtosecond laser emits ultrafast laser pulses in the domain of femtoseconds (10^{-15}). The THz-radiation is generated by illuminating semiconductor material surface by fs-laser (THz-emitter). The emitted THz radiation measured by electro-optic sampling technique using a nonlinear optical crystal (THz-detector). The accomplishment of THz-spectrometer with a reliable THz- radiation can be used in material and medical science applications, imaging, inspection and quality control. We present the basic design construction and working of the system.

Statistical Shape Analysis of Helices

Dr. Mai Alfahad, Prof. John Kent & Prof Kanti Mardia
Statistics and Operation Research Department

Abstract:

In this study we establish a method, called ChangePoint-Detector, to test if a given protein -helix has a change point or not; and if so, to find the change point position and study the reasons of this change point. We study 6 test statistics to investigate the nature of the change point.

*Scientific Poster Day
March 20, 2019
Research Sector*



Remediation of Oil-Contaminated Soil in Kuwait Under Controlled Conditions

R. Rahmeh, H. Al-Mansour, M. Kishk, M. Al-Shemali, A. Shajan
Biotechnology Department

Abstract:

Oil spills have serious impacts on the environment and society due to the hazardous property of the oil. Petroleum soil contamination has toxic effects on the earthworm, bacteria and plants. The biological, chemical, thermal and physicochemical methods are the common remediation methodologies for treatment of oil contaminated soil.

How Rhodopseudomonas Palustris Degrade Long Chain Phenylalkane Carboxylates

Abrar Akbar, and David Kelly
Biotechnology Department

Abstract:

Aromatic monomers of various structures are known to be degraded by bacteria through conversion to benzoyl-CoA and then further degradation using different pathways, which involve ring cleavage, ring reduction and β -oxidation. Rhodopseudomonas palustris has the ability to grow on different chain length aromatic compounds ranging from -3phenyl propionate to -8phenyl octanoate. Fcs1 in Rhodopseudomonas palustris was implicated to be the first CoA ligase in an aromatic β -oxidation pathway.

**INVESTIGATING THE PREVALENCE OF ROTAVIRUS AND ITS
EARLY DETECTION IN CALVES OF KUWAIT DAIRY FARMS USING
MOLECULAR TECHNIQUES**

Dr. Mohammad Alotaibi, S. AL-AMAD, E. HAIDER, H. AL-AQEEL and A. AL-HAJJI
Biotechnology Department

Abstract:

Rotavirus is one of the main pathogens causing morbidity and mortality in neonatal dairy calves worldwide, and is responsible for 30 - 44% loss in cattle. It is considered to be the most common etiologic agent of diarrhoea in neonatal dairy calves and children, the dominant type, being group A. The objectives of this project were as follows; to introduce early detection technique for screening and characterizing the viral serogroup in young calves in Kuwait using molecular techniques and to investigate the prevalence of rotavirus initially by immunological detection technique which is Latex Agglutination test.

Tidal Harmonic Analysis and Prediction for Kuwait's Territorial Waters

Eng. Nada Alsulaiman
Coastal Management Program

Abstract:

Astronomical tides are the dominant force controlling the fluctuation of water levels. The tidal constituents governing the astronomical tides of Kuwait were extracted through the means of harmonic analysis via the least squares fit by using MIKE 21 software. Five monitoring stations were chosen to cover the study area from north to south. The extent of the analysis dictated the number of constituents extracted. The result of the analysis was used to identify the tidal characteristics of the area, and to forecast the astronomical tides for December 2018. The predicted tides agreed by %97-90 with observational measurements.

Oil and Gas Industry Resilience to Sand and Dust Storms: Vulnerability Assessment in Kuwait

Mariam J. Malek, Dr. Ali Al-Hemoud, Dr. Ali Al-Dousari, Dr. Rafaat Misak
Crisis and Decision Support Program

Abstract:

There is a lack of published research on the economic burden and the risk associated with sand and dust storms (SDS) worldwide. Hot spots of wind erosion, dust frequency and severity formed the basis to locate the most susceptible oil and gas fields and operations. Ten sectors with potential loss vulnerabilities were evaluated: exploration, drilling, production, gas, marine, soil remediation, project management, water handling, maintenance, and research and development.

Human Health Impact Assessment of Exposure to Fine Inhalable Particulate Matter in Kuwait

Abdullah N. Al-Dabbous, Ali Al-Hemoud
Crisis and Decision Support Program

Abstract:

Air pollutants generated by indoor and outdoor sources adversely affect air quality in many environments. Exposure to particulate matters with diameters less than $2.5\mu\text{m}$ ($\text{PM}_{2.5}$) is of great concern to the policy makers and environmental authorities due to their adverse impacts on public health. Previous studies have documented the association between exposure to fine inhalable particulate matter ($\text{PM}_{2.5}$) and cardiopulmonary mortalities, as well as hospital admissions for cardiovascular and respiratory diseases in many parts of the world. However, only one study has been conducted to quantify the health impacts associated with $\text{PM}_{2.5}$ exposure in the Arabian Peninsula of the Middle East. The objective of this study is to assess the impact of $\text{PM}_{2.5}$ on five cause-specific mortalities (ischaemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease and acute lower respiratory infection) and two hospital admissions (cardiovascular and respiratory diseases) in Kuwait.

A Comparison of Atmospheric Dust in Urban and Desert Area of Kuwait

Noor Al-Dousari, Ali Al-Dousari and Modhi Ahmad
Environment and Life Sciences Research Centre

Abstract:

The sun photometer instrument measures atmospheric dust and aerosols distribution showing aerosol optical properties of the atmosphere. The study shows different uses of the device when used in urban area (K) or desert area (S) investigating 339 days of collected data from August 2015 to July 2016 in the visible wavelength i.e. 870, 675, 500, 440 nm. Results show that there were 35 days of extreme dust events. Values varied from one location to another but in General, data in urban area were always higher than those of desert area. The objective of this study was to investigate particle distribution difference between two different locations. Values obtained for the urban area exceeded desert area on dusty days with a 32.21% due to wind element that is considered a critical factor in obtaining data.

Molecular Characterization of *Haloxylon salicornicum* Moq. Populations in Kuwait

Nazima Habibi, Fadilah Al Salameen, Vinod Kumar, Sami Al Amad,
Jamal Dashti, Lina Talebi and Bashayer Al Doaij
Environment and Life Sciences Research Centre

Abstract:

Haloxylon salicornicum (Rimth) is a native perennial herb belonging to the family Amaranthaceae. The plant is utilized as food source for domestic stock and wildlife, stabilizes the soil surface and considered as one of the most promising species for revegetation due to its salt and drought tolerance ability. The plant community is under threat from desert camping, overgrazing, and Iraqi war explosions. Assessment of genetic diversity is important to the preservation of this species. Application of molecular markers for the measurement of genetic diversity is a widely accepted practice nowadays. A set of 16 inter simple sequence repeat (ISSR) markers were used to assess genetic diversity and population structure of 108 genotypes from six locations in Kuwait. Our results suggest that *Haloxylon* communities in Kuwait demonstrated a high genetic diversity within the populations however the genetic distances among the populations were weak. To strengthen this the populations with higher diversity in Subiya, should be protected in situ as well as utilized for ex situ conservation.

Kuwait's Fishes of Natural and Artificial Reef

Shaker H. Alhazeem, Talal Dashti, and Adel H. Alsaffar
Ecosystem Based Management of Marine Resources

Abstract:

Twenty eight fish species from 19 families were observed on both natural and artificial reefs. Two families Chaetodontidae and Sparidae had the highest number of species each contributing four. *Diplodus sargus kotschy* was the most numerous species with a total observed number of 11,228, followed by *Abudefduf vaigiensis* (649 in number) and *Hilsa kelee* (500). The most and second most frequently occurring species were *Pomacanthus maculosus*, and *Scolopsis taeniatus*, respectively. Fish ecological indexes were compared between and within artificial and natural reefs.

Kuwait's Coral Reefs are Restoring

Shaker H. Alhazeem and Adel H. Alsaffar
Ecosystem Based Management of Marine Resources

Abstract:

North West patch coral reef of Kubbar Island indicate the comparable existence of a variety of coral species to that found on Kubbar Island reef. Because of two factors; the coral larvae life span of about four weeks and the prominent Northwesterly current, the conclusion that the patch reefs positioned north west of Kuwait's coral islands reefs could be a considerable source of restoring coral larvae settling, with the highest of $0.44 \pm 0.59 \text{ m}^{-2}$, on associated nearby island coral reefs, is supported. The resiliency is another aspect of restoring, with no significant changes in Kuwait coral reefs for three decades.

ACCURACY OF USING A MONOFACIAL SOLAR SIMULATOR TO ESTIMATE THE POWER OF BIFACIAL PV MODULES

A. T. Alasfour and A. N. Alquenna
Energy and Building Research Center

Abstract:

Equivalent irradiance intensity (GE) method was proposed in literature to estimate Pmax generated from both sides of a bifacial (BiFi) PV device by measuring only one side using monofacial illumination. This study aims to investigate the influence of the parasitic resistances on the power estimation error. Results have shown errors to be as high as 4.8%. The analysis showed that such deviations stemmed from shut resistance asymmetry between the two sides as a function of irradiance intensity.

LED Light Quality Influences Growth and Quality of Strawberry and Lettuce in a Hydroponic Plant Factory System

Krishnakumar Sugumaran, Amwaj Al-Roumi, Vinod Kumar,
Binson M Thomas, and Mohammed Albaho
Desert Agriculture and Ecosystems Program

Abstract:

There exists a strong need for developing an artificial cultivation environment for sustainable and feasible solution in order to ensure food safety. The main objectives of the -24mo duration project was to study the effect of various LED light qualities (Red, Blue, and White) on the productivity and nutritional quality of hydroponically cultivated crop plants, and were accomplished by conducting experiments with selected cultivars of leaf lettuce (*Lactuca sativa* cv. New Red Fire) and strawberry (*Fragaria ananassa* cv. Sweet Charlie) as test crops.

Seed Viability Assessment Techniques for Native Species of Kuwait

Majda Khalil Suleiman, N. R. Bhat, Sheena Jacob,
Mini T. Sivadasan and Rini R. Thomas
Desert Agriculture and Ecosystems Program

Abstract:

One of the main attempts towards the recovery of degraded areas in Kuwait is re-vegetation using native plant species. Success of any re-vegetation, restoration program, is based on factors such as, suitable species selection, opportune plant establishment and species compatibility. Seed quality testing is a vital measure for ensure successful establishment of a plant. There are many methods for assessing the viability of seeds, which vary amongst various species. It is important that the procedure used for assessing the viability should give reliable and reproducible results. Previous work on the establishment of a protocol for the assessment of region and species-specific seed viability procedure is scarce. This is the most vital baseline information for carrying out restoration activities taking place in Kuwait and the region. The current study discusses suitable procedure for assessing the seed quality of certain native species of Kuwait. It is a pioneer effort to establish an efficient protocol on the quality testing of native plant species to ensure effective mass propagation.

High-pressure Assisted Enzymatic Proteolysis of Kidney Bean Protein Isolates and Characterization of Hydrolysates by Functional, Structural, Rheological and Antioxidant Properties

Noor A. Al-Ruwaih, Jasim Ahmed, Mehraj Fatema Mulla, Yasir Ali Arfat
Food and Nutrition Program

Abstract:

The objective of this work was to explore the influence of high-pressure (HP) treatment (300–600 MPa for 15 min) and addition of Alcalase (0.5–1% E/S) on the proteolysis of kidney bean protein isolate (KBPI) followed by characterization of the hydrolysates by measuring functional, structural, rheological and antioxidant properties to assess their potential uses. Proteolysis of KBPI at 300 MPa for 15 min with an addition of 1% Alcalase produced the highest degree of hydrolysis (23.9%) and antioxidant activity (30.1% DRSA). SDS-PAGE exhibited the dissociation of polypeptides. The KBPI exhibited thixotropic behavior, which reduced significantly after the hydrolysis. Finally, HP-assisted enzymatic hydrolysis of KBPI would provide benefits in the production of desired bioactive peptides with higher functionality and antioxidant activities.

Rehydration Properties of Freeze-Dried Whey Protein Isolate in Water and in Sugar Solution

Sarah A. Al-Jassar and Yrjo H. Roos
Food and Nutrition Program

Abstract:

The water hydration of protein with solvent components was measured in water solution and in sugar solution. To understand the effect of sugar on the hydration of whey protein isolate, calorimetric measurement, isotherm water sorption, and viscosity analysis was obtained to examine the surface hydration state of freeze-dried Whey Protein Isolate (WPI) and Whey Protein Isolate-Sucrose (WPI:Sc) mixture. The structural relaxation time is characterized by mechanical properties that control the stability and quality of food upon storage (the particle structure, viscosity, collapse, flow characteristics). Two methods of hydration for WPI powder have been designed for this study. (1) Whey protein hydrated in sugar solution and (2) WPI powder hydrated in aqueous solution followed by mixing with sugar solution. Our result showed that WPI powder hydrated in sugar solution displayed better viscosity than protein powder hydrated in water then in sugar solution, more study needed to examine the different method of protein hydration with sugar.

Rehydration of Whey Protein Isolate: Effect of Temperature, Water Activity, and Storage Time

Sarah A. Al-Jassar, Shuto Mikajiri and Yrjo H. Roos
Food and Nutrition Program

Abstract:

The hydration properties of Whey Protein Isolate (WPI) powder is important in food and pharmaceutical processing. The present study focused on WPI at high concentrations and high solids systems. Amorphous WPI were humidified over a wide water activity, a_w , range (0.85-0.11 a_w). WPI aqueous solution were prepared at 30, 20, 10, 5, and 40 (mass). The rehydration/hydration transition of WPI was temperature- and time-dependent. Variation in protein hydration resulted in a_w hysteresis during the dynamic heating and cooling steps. The physical flow behavior of WPI dispersions was significantly higher at $\leq 35^\circ\text{C}$, corresponding to increased protein hydration at low temperatures in agreement with DSC data. The loss of viscosity of protein dispersions around 35°C was a result of changes in protein conformation structure. As a result, it could be suggested that the dehydration of WPI took place at temperature $> 40^\circ\text{C}$. Further study is needed to understand the effect of water activity on the hydration temperature of whey proteins.

Development of LLDPE-based Antimicrobial Films for Food Packaging

Hasan Al-Attar¹, Mehrajfatema Mulla¹, Jasim Ahmed¹, Rafael Auras²
Food and Nutrition Program

Abstract:

Linear low-density polyethylene (LLDPE) is one of the most commercially successful packaging materials. To make the film viable for food packaging, two approaches were tested. In the first one, the films were produced by the hot melt-extrusion process by reinforcing zinc oxide (ZnO) nano-particles. The second approach was to infuse clove essential oil (CEO) on the surface of the acid-leached LLDPE.

Galvanic Corrosion in Sodium Chloride Solution

Abeer Al-Farhan
Petroleum Research Center

Introduction:

Galvanic corrosion is very common when two or more different metals are electrically connected, where the more active one acts as anode and corrodes, while the less active one is cathode [1]. The active metal is the metal with more negative potential in the electromotive force series of metals; while the noble metal is the metal with less negative potential [2]. The magnitude of the potential difference between dissimilar metals cannot be used to predict the severity of galvanic corrosion, because electrochemical potentials are a function of the thermodynamics and not of the reaction kinetics that may occur. It is the surface kinetics that determines the severity of galvanic corrosion [3].

Silicon Dissociation in light coker products

N. Ghaloum, H. Al Rabeea, L. Al Ostath, N. Bader, and M. Al Shimali
Petroleum Research Center

Abstract:

Anti-foam agent addition is very essential in the delayed coker operation resulting in a buildup of foaming in the drum at temperature over 500°C, causing a severe problem that reduces the capacity of the products. Polydimethylsiloxane (PDMS) is currently the most cost-effective coker foam control agent (antifoaming agent) available. The objective of this study was to develop a method for the quantification and identification of the siloxane derivatives at low concentrations in the coker naphtha.

Development of $MgH_2/4TiMn_2/3TiC$ Hydrogen Storage Material for Fuel Cell Energy Applications

Eissa Al-Nasrallah and M. Sherif El-Eskandarany
Nanotechnology and Advanced Materials Program

Abstract:

The increasing demand for energy in the world requires the development of innovative technologies to provide clean and sustainable sources of energy. Hydrogen is a clean and abundant source of energy that can be applied in various fields. However, hydrogen storage is an obstacle towards convenient commercial application and has high risks. Solid-state hydrogen storage is a safe way to store and transport hydrogen for application in vehicles. But the storage capacity of the materials and reactions kinetics need to be improved prior to commercial application. While different types of materials are investigated around the world, metal hydrides attracted special attention due to their abundance, accessibility, low cost, and high hydrogen capacity. In our research we develop a magnesium-based hydrogen storage for fuel cell applications with improved reaction kinetics by inducing it with $TiMn_2/TiC$ nano-catalyst. The catalysts improved both kinetic and thermal behavior of the storage system.

Evaluating the Potential of Anti-soiling Nanocoatings for Cleaning Photovoltaic Modules

Abdullah Alkandary, Abdulwahab Al-Asfour, Feras Alzubi
Nanotechnology and Advanced Materials Program

Introduction :

Soiling loss due to dust accumulation on photovoltaic (PV) modules surfaces plays a critical role in PV performance; especially in arid desert environments. Kuwait lies in one of the world's driest and highest dust-intensive regions-ideal for testing anti-soiling nanocoatings outdoors.

Synthesis and characterization of C- doped ZnO nanoparticles as efficient photocatalyst and its photocatalytic activity

Mariam Al Saidi, Adel. A. Ismail, L. Al-Hajji, Prof.Ali Bumajdad, Faten Al Metawa
Nanotechnology and Advanced Materials Program

Abstract:

Carbon- doped zinc oxide (C-ZnO) nanoparticles have been successfully synthesized at different C contents (0-57 wt%) through a single-step sol-gel method in presence of urea as carbon doner. The photocatalytic performances of the prepared photocatalysts were evaluated under visible light irradiation for photodegradation of Methylene blue.

Unraveling the Process Controlling the Acidity of Hyper Saline Coastal Groundwater in Kuwait A Geochemical Modeling Approach

Harish Bhandary, Asim Al-Khalid
Water Research Center

Abstract:

The groundwater composition of the coastal regions generally reflects salinity due to the seawater intrusion. It was inferred from the samples collected along the coastal regions of Kuwait that a few of the samples were hypersaline among which certain samples showed acidic pH. The statistical analysis carried out earlier indicate that two factors were governing the hypersalinity; 1) Desalination rejects and 2) H₂S in water. Standard plots also witnessed this scenario, and further this process was modeled to understand the evolution of this groundwater. This process was addressed by using PHREEQC geochemical model, that considered the oxidation of sulfides in groundwater. It was inferred that the acidic hypersaline waters were due to the oxidation of H₂S to acid and then this acid was disassociated to release H⁺ and combine with Ca²⁺ to form gypsum. The hypersaline samples with acidic pH were observed near the shorelines of Kuwait city.

A study on the influence of climate change on water resource management in Kuwait

S. V. V. Dhanu Radha & Fajer Al Otaibi
Water Research Center

Abstract:

Climate change affects water resources directly through changes in the major long-term climate variables such as atmospheric temperature, precipitation, and evapotranspiration. The relationship between climate variables and groundwater resource is more complicated and poorly understood. Kuwait is an arid country, has very limited natural water resources. In this context, a study focusing on the direct climate change factors viz., the temperature, precipitation and indirect factor like population for the past 100 years was carried out. The study reveals the fact that there is an interrelationship of rainfall, temperature, CO₂ emissions and population on the water resources and hence the water management practices have to consider this interrelationship for sustainable and efficient management practice.

A Study on the Aqueous and Sediment Interrelationship of Trace Metal to Common Fish Varieties of Kuwait

Ameena Ali, Chidambaram S.
Water Research Center

Abstract:

The impact of the trace metals on selected marine fishes in Kuwait is attempted by studying the metal concentrations in marine water and sediments. The metals in the sediment samples were also studied for different hazard indices like Contamination factor, Metal pollution index, and etc. The estimated daily intake and the chronic daily intake for the Kuwait male and female was determined by evaluating the metal concentration in four marine fish Sheam (*Acanthoparagus lactus*), Lobster, Speatty (*Sparidentex hastax*) and Nagroor (*Pomadasys argentus*), varieties collected during winter and summer.

Assessment of Extraction Process of Valuable Minerals and Salts from Reverse Osmosis Concentrate

M. Ahmed, S. B. Al-Muqahwi, and B. Garudachari
Water Research Center

Introduction:

The extraction of valuable minerals from seawater reverse osmosis (SWRO) concentrated brines offers multiple economic and environmental benefits. This study is to assess the extraction feasibility of commercial valuable minerals from Reverse Osmosis brine, to evaluate technical and economic knowledge base on the performance of the demineralization technologies to extract valuable minerals from SWRO brine under different operating conditions, to design and develop semi-commercial scale magnesium oxide (MgO) production process from SWRO brine.

Performance Comparison between Two Prevention Methods for Barium Sulfate Scaling at Different Locations in Kuwait Using Different Brine Concentrations

Maha A. Salman
Water Research Center

Abstract:

- The scaling potential of BaSO₄ using different saline solutions at a different position of Kuwait was estimated through a calculation model and compared to real experimental works.
- The best location in regard of lowest potential for barium sulfate scaling was selected.
- A physical treatment method and chemical treatment method were used to control BaSO₄ scaling using saturated solutions at different operating conditions.

Laboratory Investigation of Spiral Wound Cellulose Triacetate Forward Osmosis Membrane for Desalination

M. Ahmed; F. M.A. Elaj; R. Kumar; B. Garudachari; J. P. Thomas
Water Research Center

Introduction:

Potential applications of Forward Osmosis:

- Seawater desalination
- Wastewater treatment
- Brine (and other difficult streams) treatment
- Food processing
- Power generation
- Fluid concentration

Pilot Scale Assessment of Forward Osmosis and Absorption Hybrid System for Seawater Desalination

M. Ahmed; M. Tabtabaei; R. Kumar; B. Garudachari; J. P. Thomas
Water Research Center

Abstract:

This study is a Comparison between RO and FO for Seawater Applications, to assess the performance of Forward Osmosis-Absorption Pilot Scale Hybrid System for Seawater Desalination.

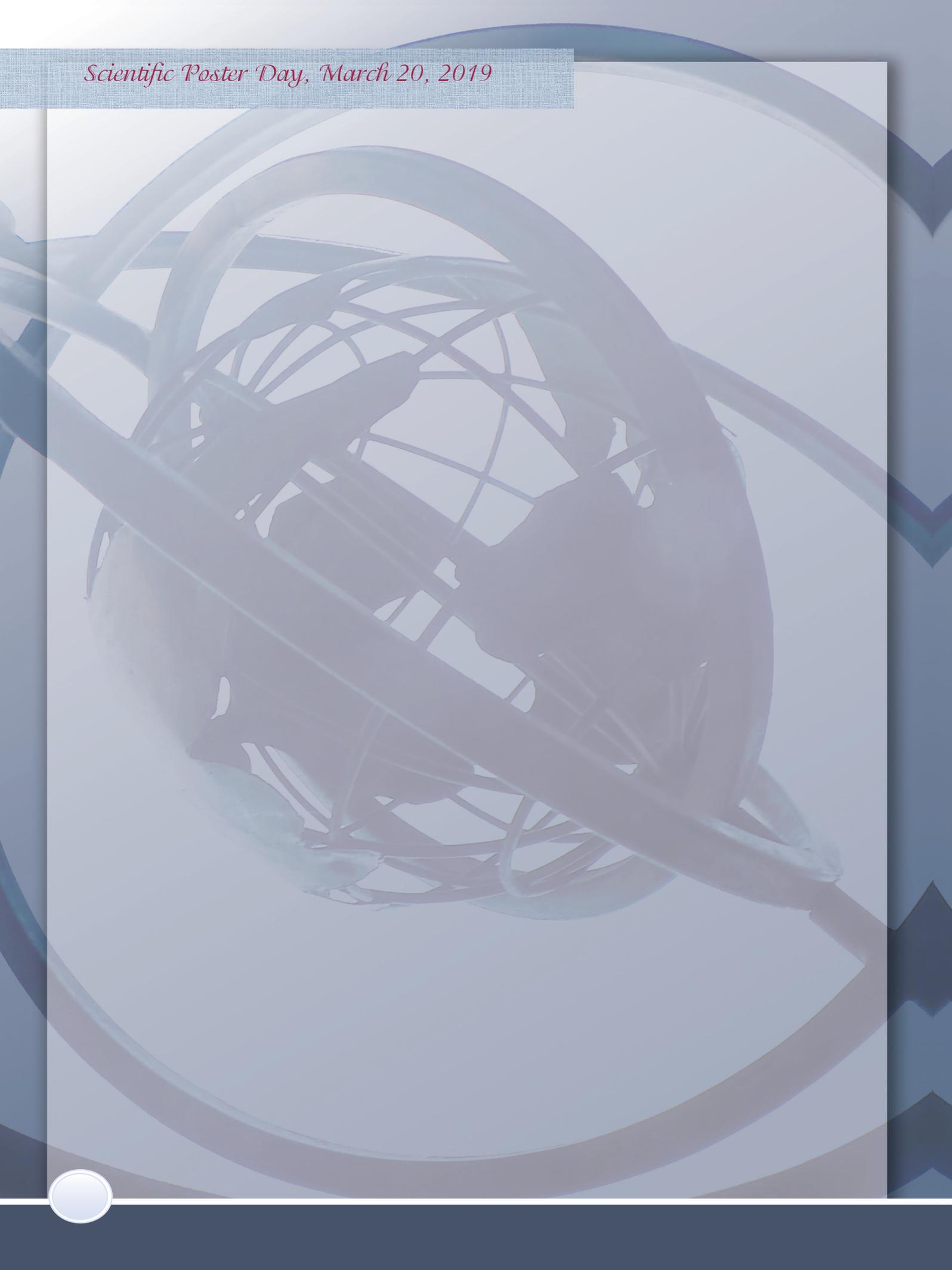
Evaluation of performance of biomimetic membranes for hybrid desalination process using forward osmosis technology: Laboratory scale study

A. Al-Sairafi, M. Ahmed, B. Garudachari, and Jibu P. Thomas
Water Research Center

Introduction:

Forward osmosis (FO) is one of the promising desalination technology to provide fresh water with low energy consumption. The use of biomimetic membrane in FO desalination process reduce fresh water cost, capital and operating cost. This study is to establish physiochemical characterization of the commercially available biomimetic and CTA membranes. To evaluate the performance and viability of the commercially available biomimetic and CTA membranes for desalinating different sources of saline waters using FO technology.

Scientific Poster Day, March 20, 2019



ويضم هذا الإصدار ملخصات جميع الملصقات المشاركة في فعالية هذا العام من الكليات العلمية ومعهد الكويت للأبحاث العلمية، ليكون في متناول جميع المهتمين كمرجع عملي سيساعدهم على الإلمام بالقضايا والموضوعات المتناولة في المجالات العلمية للكليات المشاركة، مما يمهد السبل أمام إنجاز الأبحاث والدراسات المتقدمة والمشاركة بين التخصصات المختلفة.

أ.د. جاسم الكندري
نائب مدير الجامعة للأبحاث

مارس 2019



المقدمة

يقدم قطاع الأبحاث الإنجازات العلمية والبحثية للكليات الإنسانية والعلمية من خلال التزامه السنوي بتوفير منبر بارز يتمثل بفعالية يوم الملصق العلمي للكليات، الذي يتم فيه عرض أحدث إنجازاتها العلمية الناتجة عن أبحاثها الجارية والمستكملة. وفي هذا العام، نظم قطاع الأبحاث فعاليتين منفصلتان أولهما في يوم الأربعاء الموافق 13 مارس 2019 للكليات الإنسانية والعلوم الاجتماعية، والثانية يوم الأربعاء الموافق 20 مارس 2019 للكليات العلمية ومعهد الكويت للأبحاث العلمية. وقد ضم يوم الملصق العلمي لقطاع الإنسانيات والعلوم الاجتماعية مشاركة ست كليات (الآداب، والعلوم الإدارية، والتربوية، و الحقوق، والشريعة والدراسات الإسلامية، والعلوم الاجتماعية)، أما يوم الملصق للكليات العلمية فقد ضم ست كليات (العلوم الطبية المساعدة، و العمارة، وعلوم وهندسة الحاسوب، والهندسة والبتترول، والعلوم الحياتية، والعلوم) إلى جانب المشاركة المتميزة لباحثي معهد الكويت للأبحاث العلمية. وقد أصبحت فعالية يوم الملصق العلمي جزءاً أساسياً من جدول الأعمال السنوي لقطاع الأبحاث، لتشجيع الباحثين على الانفتاح العلمي وتبادل الآراء والأفكار، وطرق أبواب جديدة في الإبداع والابتكار العلمي. ويتمثل الهدف الجوهرى من عقد هذه الفعالية في تعزيز ثقافة البحث العلمي المشترك، وتقريب وجهات النظر العلمية والبحثية في بيئة ملائمة تشجع الحوار وتدعم الأبحاث المشتركة ذات التخصصات العلمية المتعددة. ويتركز نشاط يوم الملصق على مبدأ العرض الجماعي للنشاط البحثي في الكليات على هيئة ملصقات، بهدف نشر الوعي بالمنجزات العلمية والبحثية في كل كلية، وتوفير مناخ مناسب لتطوير الأفكار الجديدة المستقاة من المواضيع التي يتم بحثها في مختلف المجالات والتخصصات العلمية في جميع الكليات.

وقد تحطت أهمية فعاليات يوم الملصق العلمي لقطاع الأبحاث حدود كليات جامعة الكويت لتجذب مشاركة الباحثين من معهد الكويت للأبحاث العلمية للسنة السادسة على التوالي. وبينما يرحب قطاع الأبحاث بأي مشاركات خارجية في فعاليات يوم الملصق، يبقى تركيزه الأكبر منصباً على تعزيز مشاركة الكليات في هذا الحدث السنوي. لذلك، يعكس تنظيم فعاليات الملصق العلمي سنوياً عزم قطاع الأبحاث و جديته في تطوير ثقافة التميز العلمي في أبحاث الكليات، وتسليط الضوء على جودة البحث العلمي في جامعة الكويت.

وسيتم عقد فعالية الملصق العلمي للكليات العلمية ومعهد الكويت للأبحاث العلمية في كلية العلوم الحياتية تحت رعاية وحضور أ.د. حسين الأنصاري، مدير جامعة الكويت، وبتنظيم وإشراف قطاع الأبحاث، وسط حضور مميز من نواب المدير ومساعديهم، وعمداء الكليات وعمداء المساعدين، وأعضاء هيئة التدريس، وطلبة الدراسات العليا وغيرهم من المهتمين.

ويعزز قطاع الأبحاث أهمية هذا الحدث بتخصيص سلسلة من الجوائز السنوية التي يقدمها تكريماً لأفضل الملصقات المشاركة في فعاليات الملصق العلمي، حيث يتم عرض جميع الملصقات على لجنة فنية متخصصة يتم تشكيلها من الخبراء والأساتذة لتقييم الملصقات وتحديد أفضل الأبحاث واختيار الفائزين بالجوائز تحت فئات أعضاء هيئة التدريس، والمدرسين المساعدين وطلبة الدراسات العليا.

يوم الملصق العلمي للكليات، 20 مارس 2019
الهندسة و البترول، العلوم، كلية البنات الجامعية و العلوم و هندسة الحاسوب

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الموقع الإلكتروني : <http://www.ovpr.kuniv.edu>
<http://www.ovpr.kuniv.edu/research>:

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مكتب المعلومات الفنية والمطبوعات
قطاع الأبحاث

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جامعة الكويت

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قطاع الأبحاث

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مدير جامعة الكويت

الأستاذ الدكتور/جاسم يوسف الكندري
نائب مدير الجامعة للأبحاث

يعلن عن

يوم الملصق العلمي

للكتليات العلمية و معهد
الكويت للأبحاث العلمية

علوم و هندسة الحاسوب . الهندسة و البترول
. العلوم الحياتية . العلوم . معهد الكويت للأبحاث العلمية

