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## **Keynote Speaker**



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Nirmal Kumar  
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GICECG1607052

**Optimization using Response Surface Methodology for Chromium(VI) removal from wastewater by Manganese Oxide Nanoparticles**

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**Abstract**

Water is one of the essential constituents of various life forms on earth since its creation, evolution and continuity. Though, both Hexavalent Chromium and Trivalent Chromium exist in industrial wastewater, but Cr(VI) is 500 times more toxic and more soluble than Cr(III). In the present work, studies have been performed on manganese oxide nanoparticles for the removal of Chromium(VI) from wastewater. The precursors used in the preparation of MnO nanoparticles are Manganous Chloride Tetrahydrate  $[\text{MnCl}_2 \cdot 4\text{H}_2\text{O}]$ / Manganese Acetate Tetrahydrate  $[\text{Mn}(\text{CH}_3\text{COO})_2 \cdot 4\text{H}_2\text{O}]$  and Oxalic acid  $[\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}]$  with Ethanol as a solvent. The sample prepared from manganese chloride was labeled as “sample 1” and that from manganese acetate was labeled as “sample 2”. The characterization of MnO nanoparticles was carried out using SEM, XRD and EDX to determine crystalline phase of MnO nanoparticles. The effect of initial Chromium ion concentration, adsorbent dosage and pH in the removal efficiency was studied. The hexavalent Chromium in the supernatant was measured with diphenylcarbazide using UV-Visible double beam spectrophotometer as described in the literature. The Freundlich and Langmuir adsorption isotherms, pseudo first order and pseudo second order reaction kinetics and intraparticle diffusion model studies were performed. Optimization of processes was done by Response Surface Methodology (RSM). The pure-quadratic model equation was used in the optimization process of the experimental data to maximize the adsorption of Chromium(VI). Three independent test variables are chosen for statistical experiment design i.e. adsorbent dose (X1, g/L), pH (X2) and initial Chromium(VI) ion concentrations (X3, mg/L). A 3-level four factor Box-Behnken experimental design has been used in the optimization process during this study. It can be concluded from the above study that MnO nanoparticles as an adsorbent have the potential for the removal of Chromium(VI) from wastewater. The optimum conditions obtained for the removal of Cr(VI) from wastewater using response surface methodology were synchronized well with the experimental data. This approach further proved to be very effective and time saving as the total number of experiments to be performed could be reduced significantly.

**Keywords:** Chromium, Wastewater, Adsorption, Isotherms, Kinetics, Optimization, Response Surface Methodology



Yung-ShuenShen

**Study on the Photooxidation and Biological Reactions of Bisphenol A in Aqueous Solutions by UV/Oxidants Processes**

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**Abstract**

The decomposition of bisphenol A in aqueous solutions by advanced oxidation processes (AOPs) - UV/H<sub>2</sub>O<sub>2</sub> and UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> under various operational factors (pH,

GICECG1607053	<p>UV light intensity, initial concentration of BPA, and dose of oxidants) was studied to evaluate the treatment efficiency. The biotoxicity assay in term of HepG2 cells was applied to the BAP treated wastewaters to be as an indicator of health risk.</p> <p>The experimental results revealed that both UV/H<sub>2</sub>O<sub>2</sub> and UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> processes can decompose Bisphenol A(BPA) effectively during 90 minutes. Removal rates of BPA by UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> were found to be larger than those by UV/H<sub>2</sub>O<sub>2</sub>. The removals of BPA increase with increasing UV light intensity and decreasing with initial concentration of BPA. The solution pH values affect significantly on the reaction rates of BPA by AOPs, the optimum pH was found to be at neutral conditions by UV/H<sub>2</sub>O<sub>2</sub> compared to those at pH 3 and pH 11 by UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>. The mineralization efficiency of BPA by UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> was larger than those by UV/H<sub>2</sub>O<sub>2</sub> even though at low doses of oxidants.</p> <p>Reaction stoichiometric efficiencies (RSEs) were to be determined to evaluate the degree utilization of oxidants and found to be dependent on various operational conditions in the oxidation systems. The EE/O values decreases with increasing the initial concentration of BPA. The chemical kinetic equations for the decomposition of BPA by the two AOPs were established and found that the order of UV light intensity by UV/H<sub>2</sub>O<sub>2</sub> was larger than it by UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> but the order of dose of oxidant by UV/H<sub>2</sub>O<sub>2</sub> was smaller than it by UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>. In the UV/Thermal/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> system, the treatment efficiency of BPA increases with decreasing temperature. The BPA treated wastewaters by UV/H<sub>2</sub>O<sub>2</sub> and UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> were found to be toxic to HepG2 cells based on the results of biotoxicity assay especially in the UV/Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub> system possible due to the residual effect of SPS to kill HepG2 cells.</p> <p>Figure 1 reveals that the decomposition rates of BPA in aqueous solutions by UV/H<sub>2</sub>O<sub>2</sub> process increase with increasing with UV light intensities because of more OH· radicals generated from the excitement of H<sub>2</sub>O<sub>2</sub> by larger UV light intensities.</p>
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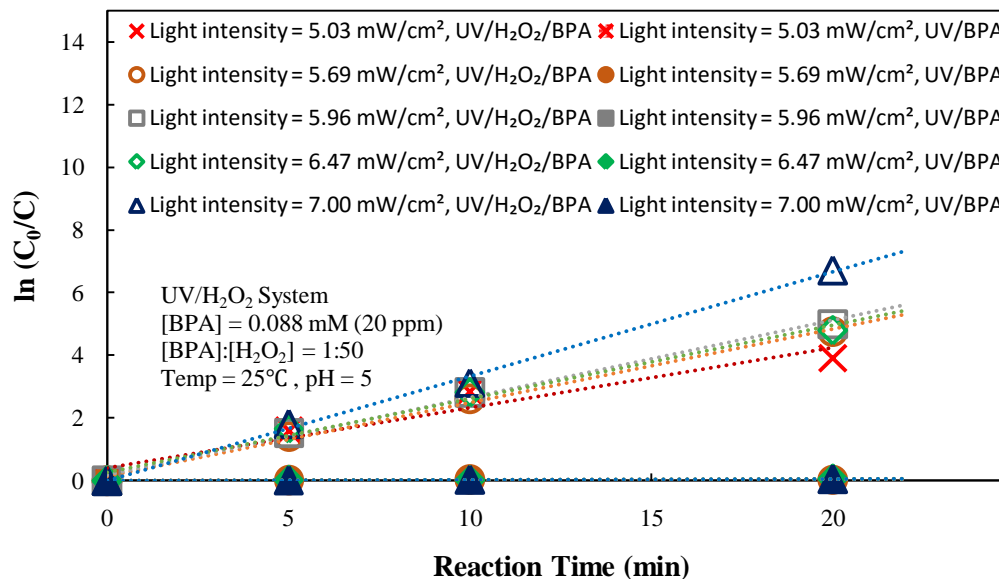


Figure 1. The decomposition rates of BPA in aqueous solutions by UV/H<sub>2</sub>O<sub>2</sub> process at various UV light intensities

In UV/H<sub>2</sub>O<sub>2</sub> system, the contribution on the decomposition of BPA can be attributed to UV direct photolysis and OH<sup>•</sup> indirect oxidation generated from the excitement of H<sub>2</sub>O<sub>2</sub> by UV irradiation. The pseudo-first order reaction rate constants of the two driving forces are referred to be  $k_{UV}$  and  $k_{OH}$ . The two reaction rate constants in the reaction system can be supposed to be the linear summation (Shen et al., 1995), thus:

$$k_{UV/H_2O_2} = k_{UV} + k_{OH}$$

where  $k_{UV/H_2O_2}$ : pseudo-first order rate constant of BPA by UV/H<sub>2</sub>O<sub>2</sub> process

$k_{UV}$ : pseudo-first order rate constant of BPA by UV direct photolysis

$k_{OH}$ : pseudo-first order rate constant of BPA by OH<sup>•</sup> indirect oxidation

The pseudo-first order reaction rate constants of BPA in UV/H<sub>2</sub>O<sub>2</sub> systems at various UV light intensities are summarized in Table 1. It was found that the decomposition rates of BPA increased with increasing UV light intensity and the values of  $k_{OH}$  are apparently larger than those of  $k_{UV}$ . The main contribution on the decomposition of BPA in aqueous solutions in UV/H<sub>2</sub>O<sub>2</sub> systems is determined to be above 99% by the OH<sup>•</sup> indirect oxidation.

Table 1. The pseudo-first order reaction rate constants of BPA in UV/H<sub>2</sub>O<sub>2</sub> systems

UV intensity (mW/cm <sup>2</sup> )	k <sub>UV</sub> (min <sup>-1</sup> )	r <sup>2</sup>	k <sub>UV/H<sub>2</sub>O<sub>2</sub></sub> (min <sup>-1</sup> )	r <sup>2</sup>	k <sub>OH<sup>-</sup></sub> (min <sup>-1</sup> )	k <sub>UV</sub> /k <sub>UV/H<sub>2</sub>O<sub>2</sub></sub>	k <sub>OH<sup>-</sup></sub> /k <sub>UV/H<sub>2</sub>O<sub>2</sub></sub>
5.03	0.0018	0.99	0.1955	0.99	0.1937	0.92%	99.08%
5.69	0.002	0.99	0.2351	0.99	0.2331	0.85%	99.15%
5.96	0.0023	0.99	0.2474	0.99	0.2451	0.93%	99.07%
6.47	0.0024	0.99	0.2808	0.99	0.2784	0.85%	99.15%
7.00	0.0027	0.99	0.3131	0.99	0.3104	0.86%	99.14%

**Keywords:** photooxidation, bisphenol A, Persulfate, advanced oxidation processes (AOPs)



**Ranjeet Kumar  
Brajpuriya**  
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**Synthesis of large area high quality graphene using CVD for solar applications: XPS analysis**

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Today graphene- two dimensional, single atomic layer of covalently bonded material with honeycomb structure, because of its remarkable properties is considered as a promising material that could be the base for future generations of low-power, faster, smaller and smarter electronic devices [1-3]. It has all the potential industrial uses from high speed computing devices to efficient solar cells, flexible electronic displays to gas sensors, etc. However, the commercial exploitation of graphene is still a challenge because it is critical to synthesize large area graphene with high throughput and reliability. The key to solving this challenge requires us to develop synthesis and transfer methods to employ in the fabrication and transfer of large area single layer graphene films with an optimal degree of control. Recently, extensive research efforts focused on graphene synthesis using distinct methods have succeeded in large area synthesis. Among many methods, considering its low cost, scalability and high efficiency, we found chemical vapor deposition (CVD) method to be the most appropriate approach for producing graphene for large-scale manufacture. In this paper, therefore, our aim is to obtain improved and sustainable growth method of large area high-quality graphene. The cleanliness and the quality of the film are checked by x-ray photoelectron spectroscopy. D-parameter (19.5 eV) obtained from carbon Auger feature (C-KVV) and dominated single peak at 284.5 eV assigned to the *sp*<sup>2</sup> graphitic C=C confirms the film deposited on Cu is graphene is clean with no contaminants.

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	<p>International Research Fellowship for this work.</p>
 <p>MahshidTashakori GIC16071051</p>	<p><b>Lalejin Pottery: A Sustainable Suggestion in Olive Oil Packaging</b></p> <p>MahshidTashakori University of Bualisina, Hamedan, Iran</p> <p><b>ABSTRACT</b></p> <p>Nowadays sustainable development debates are becoming the central attention in governments, businesses and societies. The urgency of sustainable design is also becoming internationally recognized as a vital contribution towards a sustainable future. Sustainable design aims in coordinating design of products and services with sustainable development, offering several techniques and methods. Regarding environmental, social and financial considerations, packaging design is brought in line with sustainable development framework.</p> <p>The current study was conducted in 2011 purposing innovative design of an extra-virgin local olive oil packaging which simultaneously has distinctive aesthetic and functional specifications, and meets sustainable design principles.</p> <p>Hypothesis of the research questions the possibility of increasing sustainability of olive oil packaging, using a new material in the field. Sustainable design methods and criteria are applied in assessment of current and suggested materials.</p> <p>To investigate the hypothesis, two methods of Sustainable Design are used: Life Cycle Analysis, and Triple Bottom Line of Sustainability, which assess sustainability of the process. Eventually a sustainability score is gained by each material.</p> <p>This survey uses desk and field research methods, quantitative and qualitative tools which discusses that pottery could be a more sustainable choose over other options for olive oil packaging.</p> <p><b>Keywords:</b> sustainable development; sustainability; sustainable design; : Life Cycle Analysis; Triple Bottom Line of Sustainability; pottery</p>
 <p>Ar. Anoop Kumar Sharma GIC16071052</p>	<p><b>Sustainability Guide to the Urban Redevelopment of Tourism Gracious Indian City</b></p> <p>Ar. Anoop Kumar Sharma Department of Architecture and Landscape Design, Shri Mata Vaishno Devi University, Katra, Jammu and Kashmir-India</p> <p><b>Abstract</b></p> <p><b>Introduction:</b> City's Urban Infrastructure icons are the Arteries &amp; veins of the modern society. All cities are the outcome of rigorous social interaction &amp; beliefs over a large period of time One of such Social belief driven town is KATRA, situated in Jammu &amp; Kashmir (India); targeted through this paper.</p> <p>Katra is very close to Our Present hon'ble PM Sh. NarendraModias only recently, he has inaugurated the railway line upto this religious Town. Katra town is world</p>



	<p>famous for the rich religious history attached to it as it forms the base town (Camp) of Trikuta Hills upon which (12 kms away from base town) the Holy Shrine of Goddess MaaVaishno Devi is believed to be located. Clearly, this shrine dictates the development of all sorts in the holy town Katra. Every year Millions of Pilgrims from around the globe visit the shrine &amp; hence they witness the Katra Town too. Additionally, The Katra town is the major contributor of J&amp;K (Jammu &amp; Kashmir State) economy &amp; India at Large.</p> <p><b>Methodology:</b> In this paper, existing urban development scenario of Katratown shall be presented present with its critical analysis. Petinently, critical analysis of the Urban Infrastructure off-late of the Katra Town shall be deliberated upon with in sustainability parameters particularly with the amount of floating population it receives. A Brief model shall also be presented to comment &amp; propose its future urban development &amp; redevelopment of this religious Town Katra which must not compromise with social beliefs &amp; the ever-increasing economic &amp; infrastructural burden on its Architecture.</p> <p><b>Focus of Study:</b> India is known for pilgrimage tourism. Having said it, Katra is bound to live till eternity because of the religious beliefs attached to it. Whereas, ecology, human comfort &amp; the quality of life in the base camp-Katra town is altogether neglected in present development. Thus making the city avoidable for a longer stay for tourists &amp; unsafe. In addition, surroundings areas are also falling into prey with the obvious urban extensions due to infrastructural additions (pilgrims burden). The Focus of the study is to guide these urban extensions development with in Ecological &amp; Sustainable parameters so that Katra's urban development should be a thing to cherish for one and all in the future years to come from all legible social, cultural, economy &amp; environmental point of views that is what sustainability aims for.</p> <p><b>Keywords:</b> Development, City, Urban, Infrastructure, Ecology, sustainability, Religious, Pilgrims, Katra.</p>
<p><b>Kishore Kumar Reddy. N.G.</b></p>	<p><b>Estimation of Durability Of Rice Grains Using Sensors And Mobile Technology</b></p> <p><b>K.Rajeshwari</b> Department Of InformationTechnology, EaswariEngineeringCollege, Chennai, India</p> <p><b>Abstract</b></p> <p><i>Ensuring the dryness of Rice Granules is essential for the storage of Rice. The moisture content present in the rice granules deteriorates the quality and toughness that is expected from the the final produce. Existing systems that were put forth to find the moisture content of rice granules are not efficient enough. Their throughput is influenced by a variety of factors such as material density and packing. The official oven method consumes more time .The moisture content present in the rice granules is calculated using the equilibrium relative humidity technique [ERH]. The equilibrium relative humidity, and temperature, of rice granules were measured by using temperature and relative humidity sensors. Sensors are calibrated to improve</i></p>



	<p>accurateness and precision. The moisture content was calculated by using an equilibrium moisture content model. The data collected from the sensors are sent to the user which gives intimation about the prevailing conditions in the storage place as a message. According to the message, the prevention methods are listed. The error of the moisture content determined with this method was within 0.5% w.b. at moisture.</p> <p><b>Keywords:</b> Rice Granules, Equilibrium Relative Humidity, Moisture Content, Storage.</p>
<p><b>Jennifer Mojica</b> GICICRST1607052</p>	<p><b>Nutrient Dynamics in Hydroponic Production of Mint (<i>menthaarvensis</i> L.) using Household Greenhouse Module</b></p> <p><b>Jennifer Mojica</b> Central Luzon State University Philippines</p> <p><b>Abstract</b></p> <p>Hydroponic nutrients are the basis behind the success of any indoor garden. By focusing on the two most important solution factors - nutrient balance and nutrient concentration, the hydroponic solution will give maximum growth and yields. Hence, this study looked at the dynamics of nutrient solutions for mint production, in terms of location and time, in a household hydroponics system module. The systems' environment parameters such as pH, temperature, electrical conductivity and total dissolved oxygen were also monitored and their effects to nutrient dynamics had been examined. Based on the data gathered, nutrients in a household set up hydroponics varied as they traveled from the tank, growing tubes, raft cultures until they reached the collection point. Likewise, changes in nutrients solutions happened in time. Moreover, with regard to results in nutrient dynamics in different collection points, it was found out that it was only during the first and third weeks when the highest nutrient concentrations were observed in control point. In week 2 and week 4, highest concentration values were seen in collection points 2 and 1, respectively. In terms of nutrient dynamics at different times there were no significant difference on the following nutrient concentrations: copper (Cu), iron (Fe) and manganese (Mn) while significant difference from Weeks 1 to 4 was observed in calcium (Ca), magnesium (Mg) and nitrate nitrogen (NO<sub>3</sub>-N). The presence of 11 common nutrient deficiencies observed in the hydroponics production of mint could be attributed to deficiencies in total nitrogen, potassium, phosphorous and iron.</p> <p><b>Keywords:</b> hydroponics, <i>Menthaarvensis</i> L., mint, nutrient dynamics, nutrient</p>

	deficiencies
 <p>Hend Mohamed El-SayedMandour GICICRST1607052</p>	<p>Genetic analysis an <i>in vitro</i> selection for drought tolerance in wheat (<i>Triticumaestivum</i> L.)</p> <p>Hend Mohamed El-SayedMandour National Research Centre, Dokki,Giza,Egypt</p> <p>Abstract</p> <p>Selection for drought tolerance of fifteen wheat genotypes (five parents and their ten F<sub>1</sub> hybrids) was performed under laboratory .Three different callus induction media were used to determine the optimum hormone balance for callus induction from mature embryos of wheat genotypes and also to study the genetic response of the studied wheat genotypes to callus induction. MS media supplemented with different concentrations of poly ethylene glycol (PEG) were used to evaluate the obtained calli for drought tolerance. Then the drought stressed calli were then transferred to plant regeneration medium for studying their ability to regenerate.</p> <p>M2 medium (2mg/l 2,4D+300 mg/l casein hydrolysate) gave the highest callus induction frequency (85.5%) followed by M1 (2mg/l 2,4D) medium (85%) and M3 (2mg/l 2,4D +4 mg/l AgNo<sub>3</sub>) medium (81.6%). The differences between the three callus induction media were significant for all characters except callus induction frequency (CIF %) and M2 medium was the best media for callus induction.</p> <p>Regeneration was obtained in all genotypes under 0, 5 and 10% PEG, and in most genotypes under 15% PEG, but was completely absent under 20% PEG.</p> <p>Data obtained revealed that the parental cultivars, Giza168 and Sids13 and their hybrid (Giza168 xSids13) were the most drought tolerant genotypes, while the parent Misr1 was the most sensitive to drought.</p> <p>A set of ISSR markers for drought tolerance and (BSA) approach were used in molecular studies. Five tolerant molecular markers appeared in positive molecular markers for drought tolerance.</p>
 <p>Jamilu GICICRST1607054</p>	<p>The Effects of Biodegradation on Asphaltenes Bound Biomarkers</p> <p>Jamilu Department of Chemistry, Sokoto state University, Sokoto, Nigeria jamiluusman2020@gmail.com</p> <p>ABSTRACT</p> <p>Two oils were separated using Thin Layer Chromatography (TLC) and initial characterisation of the aliphatic and aromatic fraction was carried out by GC and GC/MS analysis. Asphaltenes from the crude oil were then extracted and subjected to ruthenium ion catalysed oxidation (RICO) in order to investigate the hydrocarbon and biomarkers occluded onto the asphaltenes. The asphaltene-bound hydrocarbons were compared with the maltene-derived hydrocarbon to evaluate the effect of biodegradation on asphaltene-bound biomarkers. The biodegraded maltene-derived hydrocarbons show depletion of n-alkanes, acyclic isoprenoids and alteration to sterane and hopane biomarkers. However, asphaltene-bound hydrocarbon shows n-alkanoic acid distribution from C7 – C34 which corresponds to n-alkanes suggesting</p>

	<p>protection of the hydrocarbons from biodegradation. The steranoic acids of non-degraded sample show similar distribution to corresponding steranes in the maltenes. This is different for biodegraded samples which have different distribution of steranoic acids with the steranes counterparts in the maltenes suggesting secondary oil charging from different source. Hopanoic acids distribution for both samples show similar distribution as compared to their hopane counterparts in maltenes. The distribution of asphaltene-bound biomarkers is suggested to represent two oil samples which is protected from biodegradation as a result of being occluded onto asphaltenes. This result shows the possibility of using asphaltene-bound biomarkers as an alternative oil-source correlation technique especially in biodegraded oil samples where the biomarkers from the maltenes fraction have been altered.</p>
<p><b>Seong-Hwan Kim</b> GICICRST1607055</p>	<p style="text-align: center;"><b>Method of Recovery of Deleted Records in a PostgreSQL Database</b></p> <p style="text-align: center;"><b>Seong-Hwan Kim</b> Linux Data System Corporation, South Korea</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>As more and more information is being handled in enterprise IT environments, database utility has been increasing accordingly. With the increased use of databases, there is a high possibility that database records will need to be utilized as evidence, as in the case of IT-related crimes. There has been a growing need for the recovery of both maliciously deleted and ordinarily deleted records in order to use database records as legal evidence. Research on the methods of record restoration has only been carried out in regard to certain database management systems (DBMS). However, even though it is open source, research on the record restoration method for PostgreSQL has not been performed. This paper recommends recovery methods for records deleted from PostgreSQL. When recovering deleted records, PostgreSQL data files, which contain a history of deleted records, are required. Also, a Hex editor is used, which is able to check the contents of data files. One can analyze each record's header information by opening PostgreSQL data files with a Hex editor. Then, the analyzed header information from the records is checked. If it is deemed that there are deleted records, they can be extracted for recovery. If VACUUM, which is a record cleanup program offered by PostgreSQL, has been used for deletion, the records cannot be restored.</p> <p><b>Keywords :</b> PostgreSQL, Record, Delete, Recovery, Forensic</p>
 <p><b>Jahangeer</b> GICICRST1607056</p>	<p style="text-align: center;"><b>Modelling of water flow through subsurface in semi-arid regions of Rajasthan, INDIA</b></p> <p style="text-align: center;"><b>Jahangeer</b> Research Scholar, Department of Hydrology, Indian Institute of Technology Roorkee, INDIA</p> <p style="text-align: center;"><b>Pankaj Kumar Gupta</b> Research Scholar, Department of Hydrology, Indian Institute of Technology Roorkee, INDIA</p> <p style="text-align: center;"><b>Brijesh K Yadav</b> Associate Professor, Department of Hydrology, Indian Institute of Technology Roorkee, INDIA</p>

	<p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the developing countries, the industrialization, over-exploration of natural resources, increasing demographical pressure, and emerging pollution causes depletion of water resources. In India, groundwater availability and management is the most important and emerging issues to fulfil safe drinking and irrigation water requirement. For the fulfillment of these requirements, there must be the vulnerability assessment and the potential pollution risk assessment of the area. Therefore, the aim of this study is to provide the overall vulnerability scenarios and the potential vulnerable area map using the quantitative, qualitative and socio-economic assessment to groundwater in selected district of Rajasthan. Vulnerability maps of the study area were developed based on integration of all three assessment approaches. The quantitative assessment gives the net recharge volume, runoff volume using the water balance methods and SCN-CN methods respectively. Similarly, groundwater samples were collected and different laboratory analysis conducted for the measurement of the hydro chemical variables for the qualitative assessment, which gives the groundwater qualities scenario of the area. The study showed the entire area needs the sustainable planning, policy, and the technological approaches for the sustainable groundwater resources development.</p> <p><b>Keywords:</b> Developing countries, Groundwater Resources, Vulnerability assessment, Semi-arid region.</p>
 <p style="text-align: center;"><b>Paul Kim</b> GICICRST1607057</p>	<p style="text-align: center;"><b>Forces and Stiffness of the Water Droplet Bouncing Phenomenon</b></p> <p style="text-align: center;"><b>Paul Kim</b> Korea International School</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>When a water droplet is dropped on a solution, one would normally expect them to coalesce immediately and not survive. However, under the correct circumstances, the water droplet will not coalesce immediately but survive for a short period time before coalescing. In this paper, this phenomenon will be studied when a water droplet or a liquid ball with radius less than 1.0mm are dropped on the surface of the sodium dodecyl sulfate solution at varying concentrations, height, and droplet radius. The effects of change that are primarily studied in this paper is the change in acceleration and stiffness as the concentration of the solution affects the forces in the water and as the height and droplet radius affect the depth of the deformation.</p> <p>For the analysis of the experimental data, a camera and a video analysis program was used to analyze the motions of the water droplet. Also in this paper, the major forces that are applied to the water droplet are forces such as surface tension and buoyancy. The whole phenomenon's motion was simplified through taking a mechanical perspective and was seen as a linear spring instead of a fluid dynamics as it would give a simpler and different approach. And with this approach we calculated the effective average spring constant of the solution surface which depends on the depth of deformation, force given by surface tension of the surface and the force given by buoyancy.</p>



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**Propagation of Circularly Crested Thermoelastic Waves in A Homogeneous Isotropic Cylindrical Plate Subjected to Stress Free And Isothermal Conditions Using Different Theories**

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**ABSTRACT**

The propagation of circularly crested thermoelastic waves in a homogeneous cylindrical isotropic plate subjected to stress free and isothermal conditions is investigated in the context of (CT), (LS), (GL), and (GN) theories of thermoelasticity. The secular equation for the circular plate in closed form and isolated mathematical conditions for symmetric and skew symmetric wave mode propagation in completely separate terms are derived. It is shown that the motion for SH modes gets decoupled from rest of the motion and remain unaffected due to thermomechanical coupling and thermal relaxation effects. The phase velocities for SH modes have also been obtained. It is noticed that the rest of the motion of circular crested waves is again governed by the Rayleigh-Lamb type secular equations. The secular equations for these plate and Lamé modes are also obtained. The results for coupled and uncoupled theories of thermoelasticity have been obtained as particular cases from the derived secular equations. At short wave length limits, the secular equations for symmetric and skew symmetric waves in stress free insulated and isothermal circular plate reduces to Rayleigh surface wave frequency equations.

**KEYWORDS:** Thermoelasticity, Symmetric, Secular equations, isothermal, wavelength

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**On the Exploratory Approach to Identifying Weak Signals: Assessing Potential Impacts of Signals in Textual Data**

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**ABSTRACT**


Recently, the significance of detecting weak signals has been increased in technology foresight. Weak signals are defined as the early signs of prospective phenomena that appear to be noise at present but have high potential impact in the long term due to emerging technologies and discontinuous innovations. Among others, textual online data are the primary source of futuristic information. However, intrinsically, identification of weak signals from huge amount of future data is by no means facile. Particularly, defining and measuring the potential impact of weak signal is subject to fundamental difficulties. In response, this research proposes an exploratory approach that evaluates various types of the potential impact of signals in textual technological information. Specifically, the framework consists of three major modules: input collector, throughput transformer, and output generator. First, through data mining tools, evolutionary impact, relational impact, and transformational impact information are retrieved from textual data. Then, by applying visualization algorithms, such visual outputs as keyword visibility/diffusion map, keyword network map, and keyword novelty map are drawn. Finally, by doing so, textual/quantitative information is converted into innovative knowledge for



	identification and interpretation of weak signals.
 <p>Afira Waqar GICICRST1607061</p>	<p><b>Susceptibility of TCF7L2 Variation Increases the Risk of Diabetes Type II in Pakistani Ethnicities</b></p> <p>Afira Waqar Govt. College University, Lahore, Pakistan afira6@hotmail.com</p> <p>Bushra Chaudhry Ikram-ul-Haq</p> <p><b>ABSTRACT</b></p> <p>Transcription factor 7-like 2 (TCF7L2) is one of the most susceptible genes for the occurrence of type-2 diabetes (T2D). A common SNP rs12255372 of TCF7L2 is associated with T2D in Europeans however; it showed inconsistent association in previously reported South Asians. Our aim was to investigate the association between TCF7L2 polymorphism rs12255372 (G/T) with T2D in Pakistani population. Subjects were recruited from Karachi and Lahore based population (n=1750), consisted of diabetic cases (n=800) and controls (n=950). DNA was extracted and T-ARMS PCR was performed for genotyping and the collected data was statistically analyzed in SPSS version 20.</p> <p>Genotype frequencies analysis was 21.8%, 60.3% and 17.9% and 13.2%, 71.4% and 15.4% for GG, GT and TT in cases and controls, respectively. All subjects fall in HWE. Binary logistic regression analysis showed that in cases, GT genotype is significantly associated with T2D (95% OR=2.1; 1.02-4.2, p=0.04), age group (40-70, OR: 1.52; 0.78-2.93), Obese BMI (&gt;25kg/m<sup>2</sup> OR: 1.26; 0.52-3.06.) and female gender (OR: 1.77; 0.95-3.32). Frequency of G and T allele in total population was 17.3% and 82.7%. (X<sup>2</sup>=254, P=3.96E-57). It was significant in both genders. The minor T allele was found significantly associated with T2D (X<sup>2</sup>=15.58, p=8.30E-5). We observed a strong relationship of age 20-70 years (<math>\beta</math>=0.432), female gender (<math>\beta</math>=-0.745) and BMI (<math>\geq</math>25Kg/m<sup>2</sup>; <math>\beta</math>=0.73) in diabetic cases per single allele. Presence of one copy of T allele increase the 2.9 folds higher risk for developing diabetes and two copies of T allele showed 16.5 fold higher risk of diabetes in females in adjusted analysis.</p> <p><b>Key Words:</b> TCF7L2, T2D, SNP</p>
 <p>Syed Afaq Ali Shah GICICRST1607062</p>	<p><b>SYNTHESIS, MODELING AND PHOTOVOLTAIC PROPERTIES OF A BENZOTHIADIAZOLE BASED MOLECULE FOR DYE-SENSITIZED SOLAR CELLS</b></p> <p>Syed Afaq Ali Shah Faculty of Engineering Sciences, Ghulam Ishaq Khan, Institute of Engineering Sciences and Technology, Topi, District Swabi, Khyber Pakhtunkhwa 23640, Pakistan hsayyad62@gmail.com sayyad@giki.edu.pk</p> <p>Muhammad Hassan Sayyad Faculty of Engineering Sciences, Ghulam Ishaq Khan, Institute of Engineering Sciences and Technology, Topi, District Swabi, Khyber Pakhtunkhwa 23640, Pakistan</p>

	<p style="text-align: center;"><b>Fazal Wahab</b> Faculty of Engineering Sciences, Ghulam Ishaq Khan, Institute of Engineering Sciences and Technology, Topi, District Swabi, Khyber Pakhtunkhwa 23640, Pakistan</p> <p style="text-align: center;"><b>Khalil Ahmed Khan</b> Institute of Chemistry, University of the Punjab, Lahore 54000, Pakistan</p> <p style="text-align: center;"><b>Munawar Ali Munawar</b> Institute of Chemistry, University of the Punjab, Lahore 54000, Pakistan</p> <p style="text-align: center;"><b>Hytham Elbohy</b> Department of Electrical Engineering, Center for Advanced Photovoltaics, South Dakota State University, Brookings, SD 57007, USA</p> <p style="text-align: center;"><b>Qiquan Qiao</b> Department of Electrical Engineering, Center for Advanced Photovoltaics, South Dakota State University, Brookings, SD 57007, USA</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>A benzothiadiazole based solution-processable organic dye D1 (N4-Phenyl-N4,N7,N7-tri{4-[(2-ethoxycarbonyl)-2-cyanovinyl]phenyl}benzo[c][1,2,5]thiadiazole-4,7-diamine) was synthesized. Dye-sensitized solar cells (DSSCs) were fabricated based on D1 and a commercially available benzothiadiazole based RK1 dye. The photovoltaic parameters of these cells were studied under simulated AM 1.5 illumination (100 mW cm<sup>-2</sup>). The DSSC sensitized by RK1 dye provided a power conversion efficiency of 5.7 % with high values of short-circuit photocurrent density, open-circuit photovoltage, and fill factor. Under the same conditions, the cell sensitized with D1 dye showed a very poor performance due to the lower values of short-circuit photocurrent density and open-circuit photovoltage. In order to provide insight into poor performance of the DSSC sensitized by D1, molecular structure of D1 was analyzed by density functional theory. Its frontier orbitals were calculated to investigate effectiveness of charge transport and reasons of the poor performance. This computational study revealed that the photovoltaic performance of the benzothiadiazole based DSSCs can be enhanced significantly by inserting a phenyl ring between the benzothiadiazole unit and the anchoring group.</p>
<p><b>YASMIN RAZA</b> GICICRST1607063</p>	<p style="text-align: center;"><b>OCCURRENCES OF GEOTHERMAL RESOURCES AND GEOCHEMICAL CHARACTERISTICS OF THERMAL WATER OF SOTHERN INDUS BASIN, PAKISTAN</b></p> <p style="text-align: center;"><b>YASMIN RAZA</b> Geological Survey of Pakistan yasmeen_raza2211@hotmail.com</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>Most of the high grade geothermal resources of the world are found within seismic belts of weak crustal plate margins and centers or volcanic activity. Similarly, geotectonic framework of Pakistan directs towards a region which poses a commercially exploitable sources of geothermal prospects of energy. Presence of alteration zones and fumaroles, hot springs as well as Quaternary volcanism are all indication of good prospects.</p>



	<p>The Southern most Indus basin of Pakistan are lie in the Geo-Pressurized Thermal zone system. Geothermal activities are thermal spring, geysers such as in Karachi and Dadu area, as well as abnormal high temperature in drilling oil/gas wells, is due to the great thickness and geo-pressured water of sedimentary basins. The presence of two thermal springs at Mangho Pir and Karsaz, Karachi specify a Cl - HCO<sup>3</sup> and Cl-SO<sub>4</sub> types of water chemistry. Reservoir temperature also reported comparatively low by the Silica geothermometers due to mixing of sea water and rock water interaction in subsurface. However, geochemistry of thermal water indicates further to conduct a detailed survey of the area for exploring future prospects of geothermal resources. <b>KEY WORDS:</b> Geothermal water, Reservoir temperature, Geothermometers, Lower Indus basin</p>
 <p><b>Gayoung Yoo</b> GICICRST1607065</p>	<p><b>EFFECTS OF HIGH SOIL CO<sub>2</sub> DUE TO THE LEAKAGE FROM CCS SITE ON PLANT GROWTH</b></p> <p><b>Wenmei He</b> Department of Environmental Science and Engineering, Kyung Hee University, South Korea wenmei@khu.ac.kr</p> <p><b>Youjin Kim</b> Department of Environmental Science and Engineering, Kyung Hee University, South Korea ujin@khu.ac.kr</p> <p><b>Mohammad Moonis</b> Department of Environmental Science and Engineering, Kyung Hee University, South Korea moonis.mohammad@gmail.com</p> <p><b>Haegeun Chung</b> Department of Environmental Engineering, Konkuk University, South Korea hchung@konkuk.ac.kr</p> <p><b>Kyung Hee Shin</b> Environmental Assessment Group, Korea Environment Institute, South Korea khshin@khu.ac.kr</p> <p><b>Gayoung Yoo</b> Department of Environmental Science and Engineering, Kyung Hee University, South Korea gayoo@khu.ac</p> <p><b>ABSTRACT</b> It is important to understand the potential impacts of CO<sub>2</sub>leakage from carbon capture and storage (CCS), because CCS would be widely used in the future to reduce CO<sub>2</sub> emission.We set up the greenhouse experiment to investigate the plant response to high soil CO<sub>2</sub> due to the leakage.Grapes (Vitis coignetiae) were planted in three treatments which included pure CO<sub>2</sub> injection (CG), pure N<sub>2</sub> injection (NG) and no injection control (BG). NG was used to differentiate the effects of O<sub>2</sub> depletion from CO<sub>2</sub>enrichment in theCG. Soil CO<sub>2</sub> concentration were 41-65% at 5-</p>

	<p>15 cm depth in the CG. And soil O<sub>2</sub> concentration were 7-14% at 5-15 cm depth in the CG and NG. Soil pH were 6.9, 7.4 and 7.3 in the CG, NG and BG, respectively. The water uptake of root and chlorophyll a content were lower in the CG than other treatments. And after 32 days, plants turned yellow, red and dry in the CG but normally grown in the BG and NG. Plant biomass, shoot water and root starch content were significantly lower in the CG than other treatments. High soil CO<sub>2</sub> combined with low O<sub>2</sub> was more toxic to plants compared to low O<sub>2</sub> only. We propose a mechanism of CO<sub>2</sub> toxicity to plants as follows: 1) Effects of high soil CO<sub>2</sub> on plants start from the root cells of which intercellular pH gets lower and which send a signal to the leaf to close stomata. 2) Due to the closed stomata, water and nutrients are not transported from the soil to the leaves, and it will result in low photosynthesis. 3) Although plants try to compensate the lower photosynthates by solubilizing starch, plants will finally consume the storage and fail to grow.</p> <p><b>Keywords:</b> Carbon capture and storage, impact assessment, CO<sub>2</sub> toxicity, plant growth</p>
<p>Sunyoung Bua GICICRST1607066</p>	<p><b>DETECTION TECHNIQUE FOR SELECTING ADAPTIVE STEP SIZE IN THE PARAREAL ALGORITHM</b></p> <p>Sunyoung Bua aHongik University, A407, sejong campus Hongik University, Sejong, 30016, South Korea syboo@hongik.ac.kr</p> <p><b>ABSTRACT</b></p> <p>A practical strategy is constructed to select an adaptive step size for solving stiff initial value problem in the parareal framework. For this, we propose a technique to detect stiffness of a given system and its solutions since the time step size can be chosen according to the extent of stiffness. Numerical experiments demonstrate the theoretical results.</p> <p><b>Keyword:</b> Stiffness, Initial value problems, parareal method</p>
<p>Chang-Ho Hyun GICICRST1607064</p>	<p><b>HIFU output control of Beauty Care Systems for The Prevention of Overheating</b></p> <p>Jongseok Kim IRS Lab., Dept. of Electrical Electronic and Control Engineering, Kongju National University, Republic of Korea jskim@daihan-biomedical.com</p> <p>Chang-Ho Hyun IRS Lab., Dept. of Electrical Electronic and Control Engineering, Kongju National University, Republic of Korea hyunch@kongju.ac.kr</p> <p><b>ABSTRACT</b></p> <p>This paper proposes Practical HIFU output control method in order to prevent the overheating of cartridges in HIFU beauty care systems. HIFU has been widely adapted for skin care such as tightening. It is generated by HIFU transducer generates. HIFU transducer is a main component to decide the durability of HIFU beauty care systems. One of major causes to harm the durability is the overheating of the HIFU transducer. Hence, as the practical method to prevent the overheating of the HIFU transducer, the control method for duty ratio of turning it on or off is</p>

	<p>proposed. The proposed method has the effect not only to maintain the same power as the conventional method in HIFU output but also to reduce the time that HIFU transducer heats itself. Since the HIFU transducer stays at the turn-off status, the overheating chance is reduced. This is verified by an actual experiment and acquired data.</p> <p><b>Keywords:</b> HIFU, durability, duty ratio, output control, overheating</p>
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