**Saturday, October 22, 2016 09:00AM - 12:00PM**

**Session C; New Energy Sources and Technology, Emerald Hall C**

**Session Chair: Besir Sahin, Cukurova University, Turkey**

**9:00AM C.01 Malik Badshah, Qurratulain Rana, Mian Laiqur Rehman, Qauid e Azam U, Islamabad; *Bioremediation of vegetable oil industry wastewater and biodiesel production from taramira oil*** – With the increase in population, an increase in demand of essential food commodity vegetable oils has led to intensification of vegetable oil industries which are polluting naturally occurring water bodies by discharging their untreated oil contaminated wastewater in them. On the other hand, rapid depletion of fossil fuels has led the researchers to fend for an alternative renewable energy source. Simultaneous bioremediation and biodiesel production is one of the best solution to both these problems. Efficient lipase producing bacteria were isolated from the wastewater obtained from a local vegetable oil industry. One of the strains Q1 isolated was were then investigated for their potential to remediate wastewater containing oil obtained from vegetable oil industry by observing their percentage COD reduction. The isolated strain Q1was then further evaluated for their potential to synthesize biodiesel from taramira oil utilizing methanol for the transesterification of oil. Selected strain was identified using 16s rRNA sequencing to be Bacillus subtilis strain Q1. Biodiesel production from non-edible taramira oil was optimized using strain Q1. Finally, a simultaneous bioremediation of vegetable oil contaminated wastewater and then microbial production of biodiesel from non-edible taramira oil was carried out using efficient lipase producer Bacillus subtilis strain Q1.

**9:12AM C.02 Muhammad Mureed Tunio, Saleem Raza Samo, Kishan Chand Mukwana, Quaid-e-Awam U of Engineering Science &Technology, Nawabshah, *Practicability of Castor Biodiesel with Petro diesel for Application in Internal Combustion Engine* –** The study was conducted to examine the suitability of caster seeds for production of biodiesel, performance of I.C. engine using different blends with petro diesel. Castor biodiesel was produced from indigenous seeds through transesterfication process. The crude oil was extracted by mechanical expeller. Consequently, produced biodiesel was blended with petro diesel fuel (D100) at the volumetric ratios of 10% (CB10), 20% (CB20), and 30% (CB30). The fuel properties of produced castor biodiesel and its blends were investigated and compared with petro diesel properties as per ASTM standards. The fuel properties of produced biodiesel were found within permissible limits. The blends of castor biodiesel gave lower brake fuel consumption and brake specific fuel consumption, and higher thermal efficiency as compared to petro diesel. The exhaust emissions were found much lower than that of petro diesel fuel. It was discovered from the study that castor biodiesel is feasible fuel to be blended with petro diesel at various ratios in internal combustion engine without modification.

**9:24AM C.03 Sana Sadaf, Javed Iqbal, Sahar, InamUllah, U of Agriculture, Faisalabad, *Utilization of waste cooking oil as a source of bio-energy: Environmental recycling process* –** The present investigation deals with the utilization of waste cooking oil (WCO) for the synthesis of biodiesel. The major bottleneck in the utilization of WCO for biodiesel production is the presence of high free fatty acid (FFAs) contents which leads to the soap formation. The acid value of tested frying WCO was found to be 5.5 mg KOH/g which indicated high FFA content. The pretreatment was done to reduce FFAs by using three different acid catalysts (HCl, H2SO4 and H3PO4) and H2SO4 catalyzed reaction was found to be the most efficient as it significantly reduced the FFAs up-to 88.8 % at 60 oC temperature with 1:2.5 methanol to oil molar ratio. The esterified oil was subjected to acid and alkali catalyzed trans-esterification. 94 % Fatty acid methyl ester (FAME) yield was achieved by using 1 % catalyst and 50 oC temperature. The synthesized biodiesel was characterized by determining different physic-chemical parameters and results indicated that alkali catalyzed trans-esterification was an efficient method to synthesize good quality biodiesel which meets all the ASTM standards. Hence, waste cooking oils are a good option for synthesis of transportation fuel and its utilization is also helpful for reducing the environmental pollution.

**9:36AM C.04 Imrana Khushk, Abdul Sattar Qureshi, U of Sindh, Jamshoro, *Development of economical biorefinery process for bioethanol production using onsite produced cellulose from mutant Aspergillus fumigates* –** Fuel ethanol has promising market values on replacing petroleum derived gasoline. Currently, cellulosic ethanol produced from lignocellulose biomass started its commercialization in USA and EU countries, but there still exist many technical difficulties to be solved to make process feasible for large scale commercialization. Among various cost items in the biorefinery process from agricultural lignocellulose biomass, the cellulose enzyme cost used for saccharification of cellulose into glucose is considerably high in large scale commercial plants and the on-site cellulose production is preferred. In the present study, a mutant strain Aspergillus fumigatus FCC 0101 was evaluated for cellulose production. Optimization of cultural conditions enhanced 6 folds in cellulose activity to 3.2 FPU/mL after 5 days’ culture at 30 °C. Crude cellulose was characterized in terms of pH, temperature, pH stability and thermostability. Maximal activity was found at pH 5.5 and 50 °C. Enzyme retained 68, 53 and 36 % activities after 48, 72 and 96 h incubation at 50 °C, respectively. Hydrolysis efficiency of the crude cellulose was comparable to the commercial cellulose enzyme. Utilization of the on-site produced cellulose in bioethanol production saved the costs of enzyme purification, packing and transportation and consequently reduces ethanol production cost.

**9:48AM C.05 Saleem Raza Samo, Muhammad Mureed Tunio, Abdula Qayoom Jakhrani, Kishan Chand Mukwana, Quaid-e-Awam U of Engineering, Science & Technology, Nawabshah, *Production of Biodiesel from Indigenous Renewable Energy Source Jatropha to Combat Energy Crisis in Pakistan –*** Biodiesel is being considered as best substitutes of diesel fuel as it emits less air pollutants and toxic substances. It can be produced from variety of sources (edible and nonedible vegetable oils). This research work was conducted to find out potential of non-edible feedstock for biodiesel production (Jatropha). Mechanical expeller was used for oil extraction in Biofuel Laboratory of QUEST, Pakistan. Blends were prepared with 90%, 80% and 70% of petro diesel and 10%, 20% and 30% of biodiesel (Jatropha JB10, JB20 &amp; JB30). After examining characteristics of samples, blends were used in Internal Combustion Engine for performance analysis and emission level. Results revealed that diesel has lower thermal efficiency as compared to biodiesel blends. Highest thermal efficiency of 22.32% was observed in JB10 as compared to 15.94% of Diesel oil D-100. Moreover, NOx concentration found by researchers such as Chauhan was 2200 ppm, 2500 & 2700 for JB10, JB20 & JB30 respectively, this study shows concentration of 25-39 ppm only in blends of Jatropha, which is remarkable. It may be concluded that if 30% diesel is replaced with blended biodiesel of non-edible oils, than amount up to Rs.138.6 billion could be saved annually at national level in Pakistan.

**10:00AM C.06 Syed Asad Ali Naqvi, Salman Noshear Arshad, M Taqi Mehran, Lim Tak Hyoung, Lahore U of Management Sciences, Lahore, *Integration of Steam Gasification of Carbonaceous Fuels with Tubular Solid-Oxide Carbon Fuel cells: A Performance Study –*** Solid oxide carbon fuel cells (SO-CFCs) are promising candidate to meet the current demands of electrical energy at higher conversion efficiency and lower flue gas emissions. We integrated SO-CFCs with steam gasifier by using activated carbon and biomass driven charcoal. Steam gasification was employed to produce syngas from aforementioned carbonaceous fuels. The effect of gasification temperature, steam flow rate and catalyst (K2CO3) addition on the electrochemical performance of SO-CFC were evaluated. The anode supported tubular SO-CFC consisted of nickel-8 mol.% yttria stabilized zirconia (Ni-8YSZ) anode support, 8YSZ electrolyte and lanthanum strontium manganite- lanthanum strontium cobalt ferrite (LSM-LSCF) composite cathode was fabricated The electrochemical performance of SO-CFC was studied at 700-850oC. Syngas compositions for all carbonaceous fuels were deduced using an online gas chromatograph. At 850oC the power densities obtained for activated carbon, biomass charcoal and K2CO3 mixed activated carbon, were 108, 161 and 180 mW/cm2, respectively. This study concludes that steam gasification integrated with SO-CFC is useful for energy production at minimal carbon footprint and higher efficiency.

**10:12AM C.07 Anam Khalid, Mariyam Zameer, Faiza Tahir, Muhammad Noman Younis, U of the Punjab, Lahore, *Potential of Bio Slurry to Replace Market Fertilizer through Anaerobic Digestion of Food Waste* –** The study was based on by the co digestion of food waste and sludge in anaerobic bio digester to find the potential of bio slurry. The process was successfully operated at mesophilic temperature. It is resulted in the biogas production of 0.03 m/kg of food waste. The biogas with high methane content of 60% was burnt with a transparent flame. The process resulted in the production of nutrient rich slurry with high NPK content and C/N ratio. This slurry can be used as a natural fertilizer after drying. Thus the food waste provided to be a valuable alternate source of energy. The reduction of odors, insect pest and other environmental problems are additional advantages of this technology. The setup confirmed to be cost effective as it was not only a cheap source of energy but also a source of nutrient rich organic fertilizer. In the long run it will help in minimization of solid waste disposal and ultimately the reduction in greenhouse, gas emissions from the waste. Therefore, the application of biogas technology has economic, environmental, health and social benefits. It ultimately contributes towards sustainable development.

**10:24AM C.08 Shah Muhammad Haroon, Arooj Fatima, Humaira Khan, U of Management and Technology Lahore, Pakistan, *Alternative Energy Resources a Brief Overview* –** In order to accelerate research and development in Pakistan there is urgent need of awareness about energy resources and their wise use. Both industry and living standard are dependent on availability of energy resources. As fossil fuel is limited and non-renewable, so, alternative energy resources must be explored and utilized to tackle extremely large energy crises of Pakistan. The requirement and importance of alternative energy resources at national and well as international level resources is thus felt greatly. This paper presents a brief overview about alternative energy resources that are currently utilizing in Pakistan as well as those which are not still used but can be successfully utilized for development.

**10:36AM C.09 Hamid Raza, Sammia Shahid, Shah Muhammad Haroon, U of Management and Technology Lahore, Pakistan, *Ethanol is an excellent fuel solution for energy crisis in Pakistan* –** In this 21st century one of the burning issue of Pakistan is the shortage of energy and fuel that is badly affecting industrial sector production and creating hurdles in the progress of Pakistan. In past our economy was mainly depending on agriculture and textiles but now a days we are moving mostly towards the imported products. Energy is the key factor for the growth of any country. Petroleum is the major source in our country for providing the energy. Now the need of national substitute energy resources is felt to the great extent. There are many natural ways to obtain the alternative energy resources in Pakistan. One of them is sugar cane industry which has a potential to supply such substitute fuel. This paper provides deeper insight towards usefulness of ethanol as one substitution that can lessen burden and cost of petroleum fuels and will provide the cheaper energy.

**10:48AM C.10 Nadeem Ahmed, CMO Punjab, Pakistan, *Efficiency and Power output of Alkali Metal Thermal Electric Converter using some New Material for Electrodes* –**The performance of Alkali Metal Thermal Electric Converter (AMTEC) depends on the material properties of its components, primarily of electrolyte and electrodes, temperature and time duration of its operation. Recently a material, Molybdenum-Titanium Nitride (Mo-TiN) composite has been prepared and tested under high temperature. It has been observed that the grain size of the material did not substantially increase as to affect its electrical conductivity adversely under high temperature. We computer simulate the efficiency and power output of AMTEC with this new Mo-TiN composite with various ratio of the materials combinations as its electrodes at high temperatures. While the results show no significant increase in the power output and efficiency with different ratios of Mo and TiN, there is no appreciable reduction in the power output and efficiency at high temperatures either. However, there is a significant improvement in efficiency and power output of AMTEC using Mo-TiN composite for electrodes when operated at high temperature.

**11:00AM C.11 H.U. Khan, Anees-ur-Rehman, M. Shafiq, Balochistan U of Engineering and Technology Quetta, Pakistan, *The Numerical Study of Theta Pinch Plasma by Varying β Parameter and Applied Current* –** The implosion dynamics of theta pinch is studied by simulation technique through snow plow model with the help of MATHEMATICA software. The differential equation of motion for plasma implosion is derived and solved numerically by using this software. The variation effects of parameter (plasma kinetic pressure to plasma magnetic pressure ratio) and applied current is examined on normalize radius of imploded plasma by variations in normalized time. The graphs between normalized radius and normalized time of imploded plasma indicates that theta pinching effect can be improved by decreasing value and increasing in the magnitude of applied current.

**11:12AM C.12 Faizullah Mahar, Balochistan U of Engineering and Technology Quetta, Pakistan, *An Investigation of Wind Power Potentials available in Gwadar Balochistan* –** The day-to-day increasing population, decreasing conventional sources for power generation needs to think on renewable energy resources. There is a need to resolve the crises as they are directly affecting the quality of life. The operators of energy are trying to explore economical renewable energy resources. One such renewable energy resource available in abundance is wind. Different potential sites for harnessing wind energy in Pakistan have already been identified. Presently, Pakistan is facing severe electricity crisis of its history. Recent statistics show a shortfall of above 7000 MW between energy supply and demand. If the situation is not addressed, the supply and demand gap of energy would even widen in the future. This paper presents analysis based on three years wind data along with the wind generated electricity form wind power potential available in Gawadar, Baluchistan. Wind data with 5-minute average speed and direction are collected at 15 meters and 25 meters height. Wind generated Electricity has also been computed on 500 KW wind turbine.

**11:24AM C.13 Rummana Khan Sherwani, Muhammad Umair, Muhammad Ahmad Al-Rashid, U of Management and Technology Lahore, Pakistan, *Analyzing Environmental Impacts of Conventional Fuel Usage by Transportation sector along Mass Transit Corridors in Lahore Metropolitan* –** Energy, either from non-renewable or renewable sources, is of paramount importance as the progress of a country is gauged on economic development. However, with the use of non-renewable energy resources, the environmental degradation is exacerbating with every passing day in developing countries like Pakistan. On the contrary, the developed countries are resorting to sustainable and renewable energy resources to achieve sustainable development goals. The primary consumer of the non-renewable energy sources is transportation sector in Pakistan, with the total consumption amounting to almost two-third of the total utilization. Keeping in view the existing energy expenditures and its share in environmental pollution by transportation sector, Lahore Metropolitan area has been selected for this research paper. The study will analyze the environmental data collected from multiple transport junctions of Lahore City. In light of the existing data, the study will exhibit improvements in overall environmental quality by comparing the existing and proposed energy solutions in transportation sector. The comparison will be carried out by utilizing International and National Environmental quality standards. Additionally, research will also address the energy savings with the transition from non-renewable energy sources to renewable and innovative energy solutions.

**11:36AM C.14 Saima Shaheen, Ali Raza, Asfa Javed, Xu Dianguo, University of Management and Technology Lahore, Pakistan, Harbin Institute of Technology Harbin, China, *Multi-terminal VSC based HVDC Link to integrate large Offshore Wind Farms* –** This paper deals with the design, operation and control of three terminals voltage source converter (VSC) based high voltage direct current (HVDC) transmission system. A novel control technique for steady state and dynamic multi terminal VSC based HVDC (MTDC) system is presented based on droop control. Anticipated mechanism controls the active/reactive power flow maintaining the dc link voltage constant. IEEE 493-2007 reliability standard for offshore wind farms is satisfied. Simulation for a three terminal HVDC system having one offshore wind farm connected to two onshore grids is developed in PSCAD/EMTDC. Dynamics of the system is tested by applying symmetrical ac fault on connected ac network and for abrupt change in consumed power. Analysis shows good agreement.

**11:48AM C.15 Muhammad Talha Anwar, Muhammad Arfin Khan Lodhi, U of Management and Technology Lahore, Pakistan, Texas Tech U Lubbock USA, *The effect of grain growth of electrode material on power output of Alkali Metal Thermal Electric Converter* –** The Alkali Metal Thermal Electric Converter (AMTEC) is perhaps one of the most desirable devices for directly converting heat into electrical energy. The two major components responsible for power output of AMTEC are the electrolyte and the electrode. In this work we focus research on the AMTEC electrodes, which could be improved further to reduce the power degradation as the time goes by in using the AMTEC. This study refers to the grain growth involved in the grain mobility model for electrode materials TiN. The parameter areahas been usually treated as constant for all practical purposes. It is proportional to a product of M\_0 and. The mobility parameter area remains constant to some extent. However, when the temperature goes very high the parameter area may not remain constant as the proportionality of area to M\_0 is not of the same order. At high temperatures one may out weight the other and thus area may not remain constant at advanced temperatures.