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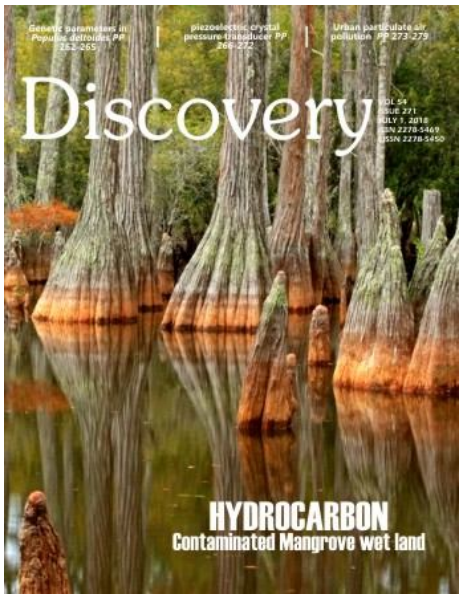
Discovery

About the Cover



ABOUT THE COVER

The study on quality assessment of surface waters and sediments of a hydrocarbon contaminated mangrove wetland that is between longitude ($6^{o}45'$, $6^{o}51'$)E and latitude ($4^{o}35'$, $4^{o}48'$)N in the Niger Delta, Nigeria was carried out using standard methods. The data obtained indicated variability in most of the quality characteristics in the sediments and surface waters of the area under investigation. Of all the parameters studied, it is only pH value 7.0±0.13, sulphate ions - 367.9±366.2mg/l, calcium ions - 0.911±0.630meq/100ml and magnesium ions - 3.244±2.350meq/ml that are significantly higher ($P<0.05$) in the surface water than in the sediments 4.4±0.65, 20.7±9.5mg/kg, 0.262±0.084138meq/100g and 0.736±0.138meq/100g respectively. Apart from salinity, all other parameters where significantly higher in the sediments than in the surface waters, seasonally (dry and wet) there were significant differences ($P<0.05$) of most of the parameters in both media apart from pH value and potassium ions in the surface water and phosphate and nitrate ions in the sediments. The results of the study have shown that most of the parameters in the sample stations are higher than the control station, related studies and some regulatory limits. The stations with higher values of these parameters are mostly stations with more anthropogenic activities. There is therefore need for continuous monitoring to be carried out to ascertain the long-term impact of anthropogenic inputs to take remedial measures so as to ensure the health of aquatic life. (Ref: Ehi-Douglas Omone Monica, Briggs Amonia Olulu, Howard Ibigoni Clinton, Abiodun Iyabode Khadijat. Quality assessment of surface waters and sediments of a hydrocarbon contaminated Mangrove wet land. *Discovery*, 2018, 54(271), 254-261).

MATERIALS SCIENCE

A suggestion for a good anode material synthesized and characterized

Udhaya Sankar G, Ganesa Moorthy C, RajKumar G

The porous nature of a hard carbon material has been synthesized using one of the familiar methods of nanotechnology. Those materials were taken from renewable material of fruit peels, especially, banana peels-*Musa Balbisiana*. This material will be activated to get good intercalation between anode and cathode. This was studied with the help of X-ray diffraction pattern (XRD). The porous nature of the material has been studied with the help of Scanning Electron Microscope (SEM).

Discovery, 2018, 54(271), 249-253

ENVIRONMENTAL SCIENCE

Quality assessment of surface waters and sediments of a hydrocarbon contaminated Mangrove wet land

Ehi-Douglas Omone Monica, Briggs Amonia Olulu, Howard Ibigoni Clinton, Abiodun Iyabode Khadijat

The study on quality assessment of surface waters and sediments of a hydrocarbon contaminated mangrove wetland that is between longitude ($6^{o}45'$, $6^{o}51'$)E and latitude ($4^{o}35'$, $4^{o}48'$)N in the Niger Delta, Nigeria was carried out using standard methods. The data obtained indicated variability in most of the quality characteristics in the sediments and surface waters of the area under investigation. Of all the parameters studied, it is only pH value 7.0±0.13, sulphate ions - 367.9±366.2mg/l, calcium ions - 0.911±0.630meq/100ml and magnesium ions - 3.244±2.350meq/ml that are significantly higher ($P<0.05$) in the surface water than in the sediments 4.4±0.65, 20.7±9.5mg/kg, 0.262±0.084138meq/100g and 0.736±0.138meq/100g respectively. Apart from salinity, all other parameters where significantly higher in the sediments than in the surface waters, seasonally (dry and wet) there were significant differences ($P<0.05$) of most of the parameters in both media apart from pH value and potassium ions in the surface water and phosphate and nitrate ions in the sediments. The results of the study have shown that most of the parameters in the sample stations are higher than the control station, related studies and some regulatory limits. The stations with higher values of these parameters are mostly stations with more anthropogenic activities. There is therefore need for continuous monitoring to be carried out to ascertain the long-term impact of anthropogenic inputs to take remedial measures so as to ensure the health of aquatic life.

Discovery, 2018, 54(271), 254-261

PLANT BIOLOGY

Genetic parameters studies in *Populus deltoides* full sib F_1 progenies under field condition

Sneha Dobhal, Sanjeev Thakur, Raj Kumar

Over the years, more than 600 clones and 266 open-pollinated seed families have been introduced into India from different parts of the world. The best clones after nursery and field screening were selected for control crossing using Line × Tester design with 8 parents to develop superior hybrids. The F_1 populations of the successful crosses were raised in the nursery in uniform environment to study the extent and pattern of variation in growth and morphometric characters. In case of overall performance, G-48 X L-17/92 hybrid progeny was found outstanding for most of the growth and morphometric traits. High heritability and genetic gain were recorded for leaf area. The superior hybrids after further field evaluation and parental verification will be commercially released covering wider climatic range from tropical to temperate regions of the country.

Discovery, 2018, 54(271), 262-265

ENGINEERING

Development of a predictive model for piezoelectric crystal pressure transducer for fluid flow in a pipe system

Ukpaka CP, Isaac OE

Research work was conducted to examine the characteristics of piezoelectric crystal pressure transducer for fluid in a pipe system. Mathematical model was developed in this case to monitor, predict and simulate the effect of time on pressure system, density of the system, velocity of the system and voltage of the system using Matlab computer language programme. Results obtained revealed decrease in voltage with increase in time, using the mathematical techniques of $DE = RCK\ {}^{u}/_{t}$. Increase in velocity was observed with increase in voltage using the mathematical expression of $U = {}^{tDE}/_{Rck}$. Decrease in density was observed with increase in pipe flow length using the mathematical approach of $P = {}^{Pdt}/_{Ldu}$ as well as decrease in pressure within time using the model of $P = k(u - u_o)/t$. The research work demonstrate the usefulness of the various models developed in this paper for monitoring, predicting and simulating the piezoelectric crystal characteristics of pressure transducer for fluid process flow in a pipe system.

Discovery, 2018, 54(271), 266-272

POLLUTION SCIENCE

Urban particulate air pollution induces lung inflammation in albino mice

Venkataramana GV, Azis Kemal Fauzie

The present study was designed to evaluate urban air pollution status and the effects of fine particulate matter ($PM_{2.5}$) on mice lung inflammation under controlled exposure conditions. Three weeks old mice were exposed six hours per day via whole-body inhalation of suspended particulate matter (SPM) and grouped according to different exposure durations of 5, 15, 21, 30 and 90 days. Particle characterization showed that SPM sampled in urban traffic area are rich in $PM_{2.5}$ and contain 50 to 60% black carbon, adequate amounts of silica and other metal elements. Bronchial biopsies studies have demonstrated that using bronchoalveolar lavage the elevated expressions of inflammatory mediators such as neutrophils, eosinophils, mast cells, monocytes and lymphocytes were found in the respiratory tract of mice after exposure to SPM. Experimental evidence of lung inflammation has been shown with the increase of SPM exposure. Our data supports the concept that levels of $PM_{2.5}$ may increase the risk of developing pulmonary injury.

Discovery, 2018, 54(271), 273-279

PHYSICS

Efficient quantum computation with a reversible logic circuit of Excess-3 Adder

Jeong Ryeol Choi

For a classical computer, the elements of computing circuits release heat according to Landauer's principle whenever they loses an information during a computing process. However, quantum computers do not emit such heat because there is no information loss in quantum computing due to the reversibility of its processes. Owing to this, the research for the reversible quantum computation has attracted considerable interest up until now. We suggest an improved reversible circuit of decimal Adder in quantum computation, which operates with Excess-3 code. It is shown that this circuit works well, while it has the fewest garbage operation lines among the circuits ever designed with the same purpose. Our circuit is composed of 14 operation lines; among them, four operation lines are garbage lines. We can carry out efficient arithmetic operations of addition with decimal numbers using this circuit.

Discovery, 2018, 54(271), 280-283

NETWORK SCIENCE

Network lifetime maximization in wireless sensor network with multiple sink nodes

Dheerendra Singh Gangwar, Sanjeev Tyagi, Sanjay Kumar Soni

This work investigates the performance statistics of event based data delivery model for Agro-ecological Sensor Network with multiple sink nodes. Agro-ecological sensors improve the task of farm management and helps in reduction of environmental as well as economical production cost. Due to the limited battery power of the sensor nodes it becomes necessary to design the architecture and operation of the wireless sensor network so as to optimize the energy consumption. It is crucial for the lifetime of the individual sensor nodes and finally for the overall network lifetime. Traffic and performance management in these resource constraint sensor networks depends on network design issues like, sensor deployment, sensor activity schedule, sink location problem and routing mechanism. Energy efficient multi path routing mechanism is the backbone of this study. It is a sink initiated route discovery process with the location information of the source node already known to the sink nodes. Carried out simulation work compares the performance of single sink and multi sink networking approaches.

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