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A comparative study of saline and non-saline water in application of tomato yield by using photonic sensor (Conference Paper)

Roy, S.K.[a] ✉, Harshitha, M.[b] ✉, Sharan, P.[c] ✉

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Abstract

A sensor based on 2D photonic crystal is proposed and designed in present work. Here the sensor can measure the small changes in dielectric constant of the samples. As the refractive index for fresh water and saline water varies, the sensor can easily differentiate between saline and non-saline water. The sensor is a Dual-hexagonal shaped Photonic crystalring resonator (PCRR) structure composed of Si rods embedded in air medium. Here the Photonic crystal is designed and modeled by using MIT electromagnetic equation propagation tool. Analysis is done using Finite Difference Time Domain (FDTD) method. The transmission spectrum is obtained after the simulation. From this spectrum, it is observed that there is a shift output in frequency and transmitted power. Hence it acts as a sensor. © 2016 IEEE.

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Topic: Fiber optic sensors | Optical fibers | Salinity sensor

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Author keywords

(FDTD) (MEEP) (Optical sensor) (PCRR) (Photonic crystal)

Indexed keywords

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Engineering uncontrolled terms	(2-D photonic crystals) (Comparative studies) (Electromagnetic equations) (MEEP) (PCRR) (Photonic sensors) (Transmission spectrums) (Transmitted power)
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A conceptual model of environmental, geological and geo-technical response of dredged sediment fills to geo-disturbances in lowlands (Article)

Rajaraman, J.[a], Thiruvenkatasamy, K.[a], Narasimha Rao, S.[b]   ⮑

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Abstract

In mineralogical evolution of clays, amongst the weathering phenomena, hydrolysis is very important. Clay minerals of 2/1, which first appear, are silica-rich with two tetrahedral silica sheets. The 1/1 clay minerals that follow have but one tetrahedral sheet and the last, gibbsite, has none at all. It is important to consider temperate and tropical environments. The kaolinite-gibbsite association is mostly characteristic of tropical environments. When all the silicates disappear to the gain of gibbsite, it is called total hydrolysis. Kaolinite and gibbsite are stable products in tropical environment. In temperate environment, weathering is often halted at the stage of 2/1 minerals (for example montmorillonite). This weathering can continue with kaolinite. In both cases it is partial hydrolysis only. This shows that the tropical environment is the only one to accumulate large quantities of gibbsite. In temperate climate only small amount of gibbsite is produced. In this paper a conceptual model of three layer system consisting of kaolinite, illite and montmorillonite is considered with symbols K, I, M respectively. The Geo- disturbance caused by dredging varies from pocket to pocket in the soil profile. The permutations and combinations of placed dredged materials are considered with different combinations of the three clay types (KIM). All possible combinations will yield 24 different Geo-Technical sequences. The above analysis is applied to important lowland Geo-technology problems in coastal areas such as sub-grade in pavement construction, land reclamation and fills to contribute to marine multi-inter-disciplinary research. © 2016, International Journal of GEOMATE.

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Topic: Soils | Liquid limit | Fine-grained soils

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Chemistry database information ⓘ

Substances

kaolinite   Montmorill
              onite

Author keywords

(Geo-disturbances) (Hydrolysis) (Lowland-Geo-technology) (Residual friction tropical) (Temperate environment)

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A Proposed System of Ship Trajectory Control Using Particle Swarm Optimization

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Abstract

This paper discussed the operation of Particle Swarm Optimization (PSO) to optimize a Fuzzy Model Reference Learning Controller (FMRLC) for ship. FMRLC is developed by synthesizing several basic ideas from fuzzy set and control theory. It can achieve the heading regulation of ship exposed to plant changes and disturbances by adjusting the rules in a direct fuzzy controller so that the overall system behaves like a "reference model". It is shown that PSO can provide a very promising technique for the design of FMRLC for its simplicity and ease of use. The promising results from the experiment provide direct evidence for the feasibility and effectiveness of PSO for the optimization of FMRL controller for ship heading regulation.

Keywords: Particle Swarm Optimization; Fuzzy Model Reference Learning Controller; ship trajectory control.:

1. Introduction

An autopilot is a ship's steering controller, which automatically manipulates the rudder to decrease the error between the reference heading angle and the actual heading angle. To improve fuel efficiency and reduce wear on ship components, autopilot systems have been developed and implemented for controlling the directional heading of ships. Often, the autopilots utilize simple control schemes such as PID control. However, manual adjustments of the PID parameters are required to compensate for disturbances acting upon the ship such as wind and currents. Once the PID parameters are fine-tuned manually, the controller will generally work well for small variations in the operating conditions. For large variations, the parameters of the autopilot must be continually modified. Such continual adjustments are necessary because the dynamics of a ship vary with, for example, speed, trim, and loading. In addition, it is useful to change the autopilot control law parameters when the ship is exposed to large disturbances resulting from changes in the wind, waves, current, and water depth. Manual adjustment of the controller parameters is often a burden on the crew. Moreover, poor adjustment may result from human error. As a result, it is of interest to have a method for automatically adjusting or modifying the underlying controller. The use of a Fuzzy Model Reference Learning Controller (FMRLC) to maintain adequate performance of a tanker ship autopilot when there are process disturbances and

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ANALYSIS ON THE STRUCTURAL, SPECTROSCOPIC, AND DIELECTRIC PROPERTIES OF BORATE GLASS

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Borate glasses were synthesized by the conventional rapid melt quench method. The XRD pattern confirmed the amorphous nature of borate glass. Optical properties of borate glass were studied using the Photoluminescence spectrum. IR spectrum was analyzed to determine and differentiate the various vibrational modes in the structural changes. Raman spectroscopy of borate glass was also carried out. According to TGA/ DTA and DSC analysis, decomposition pattern had been formulated to account for the weight losses observed. The dielectric properties such as the dielectric constant, the dielectric loss, and AC conductivity of the borate glass were studied in the different frequencies and temperature.

1. Introduction

The scientific and technological applications of glasses have encouraged researchers to custom-build the novel glasses for the industry. Glasses are receiving considerable attention due to their unique physical properties like hardness, good strength, transparency and excellent corrosion resistance. These properties of glasses to a large extent are controlled by the composition, structure and nature of the bonds of the glasses formed. Studies like X-ray diffraction (XRD), infra-red spectroscopy (IR), differential scanning calorimetry (DSC) studies have been extensively employed over the years to investigate the structure of glasses [1-4]. Borate glasses, in particular, have been the subject of numerous infra-red studies due to their structural peculiarities [5-8]. In B_2O_3 glass structure most of the boron is involved in B_3O_6 (boroxol) ring. Addition of a modifier breaks the boroxol ring, thereby producing BO_3 and BO_4 units [6, 8]. In addition, modifier also changes the physical properties. This paper reports the structural properties of the borate glasses that were determined by X-ray diffraction (XRD) analysis and FTIR and FT-Raman analyses. It was confirmed that the prepared glasses were amorphous. The bonding parameters of the glasses were analyzed by using FTIR and FT Raman analyses and were confirmed to be ionic in nature. The optical and electrical properties of borate glasses were studied.

2. Experimental Procedure

2.1. Preparation of Glass Samples

For the preparation of some glasses silica is not considered as a major component even though it is the basic raw material for glass preparation. Those glasses, which are called network

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Antibiotic Derivative as Corrosion Inhibitor for Mild Steel in Aqueous Environment

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Abstract: The inhibition efficiency of antibiotic derivative toward the corrosion behavior of mild steel using aqueous environment was studied using weight loss method and potentiodynamic polarization techniques. The obtained result revealed that the drug performed well as corrosion inhibitor in aqueous environment. The inhibition efficiency increased with increasing inhibitor concentration. The highest inhibition occurs through adsorption of the Inhibitor molecule on the metal surface without modifying the mechanism of corrosion process. The adsorption of these compound on mild steel follows Langmuir adsorption isotherm. Polarisation curves indicate that investigated antibiotic are mixed type inhibitor.

Key words: Mild steel, corrosion, antibiotic agent, neomycin tri sulphate, potentiodynamic polarization, inhibition

INTRODUCTION

Several methods used currently to reduce corrosion of mild steel. One of such methods is the use of pharmaceutical drugs. Chemical inhibitors play an important role in the protection and mitigation strategies for retarding corrosion. The most effective and efficient inhibitors are the organic compounds that have pi bonds, heteroatom (P, S, N and O) and inorganic compounds, such as chromate, dichromate, nitrite and so on (Shukla et al., 2009). However, the use of these compounds has been questioned lately, due to the several negative effects they have caused in the environment (Shukla and Quraishi, 2009). Thus, the development of the novel corrosion inhibitors of natural source and non-toxic type has been considered to be more important and desirable (Naggar, 2007). Because of their natural origin, as well as their non-toxic characteristics (Fouda et al., 2010) and negligible negative impacts on the aquatic environment (Ahamad and Quraishi, 2010), drugs (chemical medicines) seem to be ideal candidates to replace traditional toxic corrosion inhibitors. These molecules depend mainly on the certain physical properties of the inhibitor molecule such as functional group, steric factors, electron density at the donor atoms and electronic structure of the molecules. Regarding the adsorption of the inhibitor two types of interaction are responsible. One is physical adsorption which involves electrostatic charge between ionic charge and metal solution interface (Singh and Quraishi, 2011). Other which involves charge transfer from inhibitor molecule to the metal surface. The inclination towards eco-friendly corrosion inhibitors development intersects across several goals of pharmaceutical research, one of which is to discover or develop molecules with desired biological activity. The present study is aimed at investigating the inhibitory effect of neomycin tri sulphate for mild steel corrosion of in aqueous environment.

MATERIALS AND METHODS

Specimen preparation: According to ASTM method as reported already (Dubey and Potdar, 2009), cold rolled mild steel strips were cut into pieces of 5×1 cm having the following composition (in percentage) % C = 0.017; Si = 0.007; Mn = 0.196; S = 0.014; P = 0.009; Ni = 0.013; Mo = 0.015; Cr = 0.043 and Fe = 99.686 was used. The samples were polished, drilled a hole at one end and numbered by punching. During the study the samples were polished with various grades of SiC abrasive papers (from grits 120-1200) and degreased using Acetone.

Preparation of solutions: All the solutions were prepared using NICE brand analar grade chemicals in double distilled water and bubbling purified by nitrogen gas for 30 min to carry out de-aeration of the electrolytes.

Preparation of inhibitor: Various concentration of inhibitor was prepared on the basis Le Chatlier's principle.

Weight loss measurement: Mild steel specimens were immersed 1 M KCl for 2 h at room temperature (28±2°C) for each inhibitor concentration. Then the specimens were

Drinking Water

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Application of machine learning for real-time evaluation of salinity (or TDS) in drinking water using photonic sensors

Sandip Kumar Roy[1] and Preeta Sharan[2]

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Abstract. The world is facing an unprecedented problem in safeguarding 0.4 % of potable water, which is gradually depleting day-by-day. From a literature survey it has been observed that the refractive index (RI) of water changes with a change in salinity or total dissolved solids (TDS). In this paper we have proposed an automatic system that can be used for real-time evaluation of salinity or TDS in drinking water. A photonic crystal (PhC) based ring resonator sensor has been designed and simulated using the MEEP (MIT Electromagnetic Equation Propagation) tool and the finite difference time domain (FDTD) algorithm. The modelled and designed sensor is highly sensitive to the changes in the RI of a water sample. This work includes a real-time-based natural sequence follower, which is a machine learning algorithm of the naive Bayesian type, a sequence of statistical algorithms implemented in MATLAB with reference to training data to analyse the sample water. Further interfacing has been done using the Raspberry Pi device to provide an easy display to show the result of water analysis. The main advantage of the designed sensor with an interface is to check whether the salinity or TDS in drinking water is less than 1000 ppm or not. If it is greater than or equal to 2000 ppm, the display shows "High Salinity/TDS Observed", and if ppm are less than or equal to 1000 ppm, then the display shows "Low salinity/TDS Observed". The proposed sensor is highly sensitive and it can detect changes in TDS level because of the influence of any dissolved substance in water.

1 Introduction

Drinking water (or potable water) is considered to be safe enough to consume by humans or to use for domestic and medical purposes with a low risk of immediate or long-term harm. In most countries, the salinity of drinking water is restricted to less than 1000 ppm. Salinity is the measure of concentration of salts in water. Greater concentration of salts in water not only affects the taste of the water, but also causes health hazards. TDS include inorganic salts and organic matter dissolved in water, and a TDS level between 300 and 600 mg L^{-1} is considered to be good (Fawell et al., 1996). Hence there is a necessity for evaluation of water before it is allowed to be consumed (Walker and Newman, 2011). TDS

are water quality parameters which can be measured by water purity measuring devices.

There are several methods of measurement used for drinking water; however, we have studied the following methods for measuring water purity.

1.1 Electrical conductivity (EC) method for measurement of TDS in water

The electrical conductivity method is basically used in conventional TDS measurement devices. In this type of TDS meter, voltage is applied between two or more electrodes. Positively charged ions like sodium (Na^{+}), calcium (Ca^{++}), and magnesium (Mg^{++}) will get attracted towards the negatively charged electrode. Negatively charged ions like chlo-

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Biosynthesis and Antimicrobial Activity Studies of Salicylalchitosan Functionalized Zinc Oxide Nanoparticles and Comparative Studies with its Non-Functionalized Form

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ABSTRACT

Biofunctionalization of nanomaterial is one such topic which is an advancement of current nanotechnology and to produce the non-toxic and more efficient antimicrobial agents. It becomes incorporated for development of biosynthetic and eco-friendly technology for nanomaterials synthesis. Therefore, the present study describes a synthesis of bioactive salicylalchitosan functionalized zinc oxide nanoparticles through a biosynthesis method and comparative studies of those nanoparticles with zinc oxide nanoparticles were undertaken. The antimicrobial activities of non-functionalized and biofunctionalized zinc oxide nanoparticles were carried out against some well-known bacterial and fungal species. Synthesized materials were characterized by UV-Vis, FT-IR, SEM and TEM techniques and the results were reported.

Key words: Chitosan, Salicylalchitosan, Biosynthesis, Biofunctionalization, Antimicrobial activities.

INTRODUCTION

Biosynthesis of nanoparticles is a bottom up approach method where reduction/oxidation is the key reaction takes place. Plant extracts are rich sources of biomolecules, easily available, safe to handle and low cost which increases its part in the biosynthesis of nanoparticles. The microbial enzymes or the plant phytochemicals with anti-oxidant or reducing properties are usually the main reason for reduction of metal compounds into their respective nanoparticles[1].

Biofunctionalization of nanoparticles can provide them with good biocompatibility for the immobilization of biomolecules and high specificity for biological recognition which led to produce a considerable effect in biological systems. Therefore, biofunctionalized nanomaterials are being given considerable attention in a multiple way of emerging

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S. Kambli

Abstract

Land use and land cover classification is one of the important research areas to monitor the land cover of earth surface. It required research and findings in different parts of classification i.e. global classifiers, efficient classification algorithm, feature selection techniques and improvement in classification accuracy. So, by considering all these parameter here the combined approach of classifiers is proposed to improve the accuracy of the classification. The proposed technique is implemented with artificial neural network and K-nearest neighbour. The proposed work is trained and tested with the IRS P6 LISS-III satellite images of different regions of Mumbai area and the results are calculated using the confusion matrix results in terms of accuracy. The calculated result shows the improvements of accuracy at the maximum places where the accuracy of the individual classifier is less whereas in the case of combined it is showing the improved results. The proposed algorithms are implemented using the MATLAB2012 mathematical simulation toolbox.

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PAPER

Crystal growth, perfection, linear and nonlinear optical, photoconductivity, dielectric, thermal and laser damage threshold properties of 4-methylimidazolium picrate: an interesting organic crystal for photonic and optoelectronic devices

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Abstract

The 4-methylimidazolium picrate has been synthesized and characterized successfully. Single and powder x-ray diffraction studies were conducted which confirmed the crystal structure, and the value of the strain was calculated. The crystal perfection was determined by a HRXR diffractometer. The transmission spectrum exhibited a better transmittance of the crystal in the entire visible region with a lower cut-off wavelength of 209 nm. The linear absorption value was calculated by the optical limiting method. A birefringence study was also carried out. Second and third order nonlinear optical properties of the crystal were found by second harmonic generation and the z-scan technique. The crystals were also characterized by dielectric measurement and a photoconductivity analyzer to determine the dielectric property and the optical conductivity of the crystal. The laser damage threshold activity of the grown crystal was studied by a Q-switched Nd:YAG laser beam. Thermal studies established that the compound did not undergo a phase transition and was stable up to 240 °C.

1. Introduction

Organic crystals provide an excellent nonlinear optical (NLO) property due to the presence of π-bonds which satisfy the requirements in the emerging laser technology [1, 2]. Many opto-electronic and photonic industries need a stronger material for laser fabrication with the desired NLO property [3]. Organic crystals have a large NLO coefficient compared to inorganic crystals.

Crystallization of more than one component into a new compound, forming a new co-crystal, is a well-known and broad research area involving, for example, active pharmaceutical ingredients and crystal engineering [4, 5]. 4-methylimidazole is an often used pharmaceutical intermediate [6]. Picric acid is one of the stronger organic acids and is well renowned for its proton donating property. Picric acid can be easily adopted as an organic acid in the synthesis of co-crystallized complexes with other ingredients [7]. The crystal structure and hydrogen bonding of 4-methylimidazolium picrate (4-MIP) were reported in the investigation made by Xue-gang et al [8].

In the present investigation we focus on the crystal growth and various characterizations made on 4-MIP. Single and powder x-ray diffraction (XRD), UV–vis spectroscopy, optical limiting (OL), photoluminescence (PL) and birefringence, photoconductivity, dielectric and thermal studies are carried out and discussed. Second harmonic generation (SHG), z-scan and laser damage threshold (LDT) studies are also conducted on the crystal, and the obtained results are discussed in detail.

Design model on ship trajectory control using particle swarm optimisation

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This paper discussed about the design of Particle Swarm Optimization (PSO) to optimize a Fuzzy Model Reference Learning Controller (FMRLC) for ship trajectory control. FMRLC is developed by synthesizing several basic ideas from fuzzy set and control theory. It can achieve the heading regulation of ship exposed to plant changes and disturbances by adjusting the rules in a direct fuzzy controller so that the overall system behaves like a "reference model". However, the tuning of the fuzzy inverse model scaling gains is considered to be difficult and tedious due to the high nonlinearity of the ship dynamic model and the external disturbances. It is shown that PSO can provide a very promising technique for the design of FMRLC for its simplicity and ease of use. The promising results from the experiment provide direct evidence for the feasibility and effectiveness of PSO for the optimization of FMRL controller for ship heading regulation.

4·10

DETECTION OF GLAUCOMA BASED ON COLOR MOMENTS AND SVM CLASSIFIER USING K MEAN CLUSTERING

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Abstract

Glaucoma is the leading cause of visual disability in the world. As glaucoma develops, neural tissues die, the nerve fiber layer thins, and the Cup-to-Disc Ratio (CDR) increases. Hence in the proposed system the measurement of CDR is used to detect the glaucoma

To measure the CDR, the Optic Disk (OD) and Optic Cup (OC) regions must be segmented from the whole fundus image. In the preprocessing stage, Region of Inertest (ROI) is extracted from the fundus image which contains the OD region. This is done by selecting the maximum intensity pixels in the green plane as it provides best contrast than red and blue plane in the RGB fundus image. Before extracting the ROI region, the fundus image must be free from noise. Hence, median filtering is applied to de-noise the image.

To segment the OD region of the test image, we use K-Mean clustering technique. These features are fed into the trained classifier to segment the OD region. Then, the OC segmentation is done by again using k mean clustering techniques to the OD segmented image. The CDR is obtained from the diameter of segmented OD and OC region The presence of glaucoma is detected based on the value of the CDR. The performance of the proposed system i evaluated using 100 fundus image.

1. Introduction

Glaucoma is one of the eye diseases where pressure inside the eyes increases enough so as to damage the optic nerv fibers and cause permanent blindness. This increase in blood pressure happens due to the passages that actually allo fluid in eyes to dry become clogged or blocked. So Glaucoma is also called as "silent thief of sight," because th

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Investigations on Preparation and Characterization of Certain Copolyesters

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In this paper, we report on the synthesis and characterization of high molecular weight copolyesters from Terephthalic acid, 1, 4 butane diol and Succinic acid /Sebacic acid through a two step process of melt polycondensation using titanium tetra butoxide as catalyst. The synthesized aromatic-aliphatic random copolyesters were characterized by means of FTIR, ^{1}H NMR, ^{13}C NMR, Differential Scanning Calorimetry (DSC), X-ray Diffraction (XRD), Gel Permeation Chromatography (GPC) and Scanning Electron Microscope (SEM) studies. The effect of copolymer composition on the physical and thermal properties as well as degradation test was investigated. The degradation test was carried out in alkali medium. The phase behaviour of the polymers was studied by differential scanning calorimetry and optical polarising microscopy. The results revealed that the newly synthesized copolyesters exhibited degradability and thermotropic liquid crystalline behaviour with nematic texture which was revealed by optical polarising microscopy. The Novelty of this work is that the glass transition temperature and melting temperature are above the room temperature for the synthesized polymers. This shows the good thermal stability which results in early processing of liquid crystalline materials.

Key words: *Aliphatic - Aromatic copolyesters, Melt polycondensation, Degradation, Liquid crystalline*

1. INTRODUCTION

Polymers have contributed tremendously to human life from simple household items to high technological applications. The amount of plastic wastes has increased all over the world, which threatens to cause a serious environmental problem and has become a matter of great concern to the people throughout the world including scientists from different countries. Some steps such as reducing the use of plastic products and recycling the plastic waste have been taken to solve this problem. One of the feasible ways is to develop biodegradable plastics [1].Therefore, a series of biodegradable polymers were developed in the past decades, most of which were aliphatic polyesters, such as poly(lactic acid) (PLA), poly(ε-caprolactone) (PCL), poly(3-hydroxybutyrate) (PHB), poly(butylene succinate) (PBS), poly(propylene succinate) (PPSu), poly(propylene adipate) (PPAd) , poly(ethylene succinate) (PES),and poly(propylene sebacate) (PPSe) [2-7].

Much attention is being paid to aliphatic polyesters because of their degradability [8,9]. But the limitation of these polyesters is due to low thermal and mechanical properties. Copolymerization [10,11] and blending [12,13] with aromatic polyesters to modify the properties of aliphatic polyesters are better choices in both mechanical and thermal aspects. Meanwhile, a study shows that there is degradability for aromatic polyesters when they are copolymerised with aliphatic

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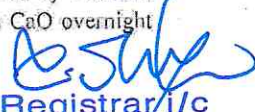
polyesters [14]. In recent years thermotropic liquid crystalline polyesters have received a great deal of attention [15,16]. Some interesting attempts were made in the 1980's to synthesize thermotropic random copolymers by introducing two different lengths of flexible spacers in the main-chain [17,18]. Liquid crystalline aliphatic-aromatic random copolyesters are becoming increasingly important as they are used as structural materials in various fields whose particular properties make them ideally suited to high precision mouldings, as well as for high performance fibres. Bearing in mind the high commercial potential of aliphatic-aromatic copolyesters and their interesting properties, the work focused on the synthesis and characterization of certain random aliphatic-aromatic copolyesters [19]. The structure of their repeating units and the effect of copolymer composition on the physical and thermal properties, optical polarising microscopic studies as well as degradation were investigated in alkali medium.

2. MATERIALS AND METHOD

2.1 Materials

Sebacic acid (Merck AR grade), Succinic acid (Lancaster AR grade) and Terephthalic acid (Lancaster AR grade) were recrystalised from deionised water and used. 1, 4 Butane diol (Lancaster AR grade) was dried with CaO overnight

Desalination and Water Treatment

Effective removal of Methylene Blue dye from water using three different low-cost adsorbents

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Fuzzy C Strange Points Clustering Algorithm

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Abstract— The Fuzzy C Strange (FCS) points clustering algorithm takes a broad view of the Enhanced K Strange points clustering algorithm to permit a point to partly fit in to various clusters thereby generating a soft categorization for a given set of elements. To achieve this, the objective function of the hard Enhanced K Strange has been drawn-out by incorporating fuzzy membership degrees in clusters into the formula and an additional parameter p was brought in as a weight proponent in the fuzzy membership. The proposed algorithm was found to give a better quality of clusters than the Fuzzy C Means and the K Means clustering methods.

Keywords— *clustering, Fuzzy C Means, enhanced k strange points clustering, Fuzzy C Strange, membership function, Euclidean distance.*

I. INTRODUCTION

Cluster exploration involves an expansive gamut of procedures which try to subdivide an element set E into C subsections known as clusters which are mutually exclusive pairwise, each non vacant, and replicate E by the use of union operation on subsections. Such clusters are called hard or nonfuzzy C-segmentations of the element set E. A noteworthy point about these kinds of methods is the shortcoming in the fundamental self-evident model that each element in E is indisputably cluttered with members of its own cluster, and allows no obvious similarity to members of other clusters of E [1]. In 1965, Zadeh introduced the concept of a singular element's resemblance to all the clusters. Zadeh's main idea was to represent the resemblance an element shares with each cluster by using a membership function whose values called memberships ranged from zero to one [2]. Every element would have a membership in each cluster, membership values near one would indicate a high degree of resemblance between the element and a cluster while membership value near zero implied negligible resemblance between the element and that cluster. The result of the membership function for clustering was to yield fuzzy c-subdivisions of a given element set. Thus a fuzzy c-subdivision of E exemplifies the membership of each element in all the clusters by a membership function which takes values between null and one. Furthermore, the addition of the memberships for every element must be one [3].

II. IMPETUS AND SIGNIFICANCE OF THE PROPOSED ALGORITHM

The impetus for the Fuzzy C Strange Points Clustering algorithm originates from the fuzzy c-means clustering technique. The orthodox fuzzy c-means clustering algorithm arbitrarily selects c initial prototypes called means, placing individual elements of the input to the assortment whose prototype mean is nearest in terms of membership functions given in equation (1), then updating using equation (2), the prototype mean of the element set given to each cluster and using them as fresh prototype means in repetitions until all points gather into the appropriate clusters or a convergence criteria shown in equation (3) is reached [4]. The proposed algorithm uses the Enhanced K Strange points clustering algorithm articulated in the following section. The significance of the proposed algorithm is that it eradicates the need for repeatedly probing for updated prototype means close to which elements are clustered using the fuzzy c- means algorithm. This in turn reduces the time needed for computation and formation of the clusters.

$$\mu_{C_s}(x) = \cfrac{1}{\sum_{t=1}^{k} \left(\cfrac{\|x - u_s\|^2}{\|x - u_t\|^2} \right)^{\frac{1}{p-1}}} \qquad 1 \leq s \leq k, x \in E \quad (1)$$

$$u_s = \frac{\sum_{x \in E} (\mu_{C_s}(x))^p \times x}{\sum_{x \in E} (\mu_{C_s}(x))^p} \qquad 1 \leq s \leq k \qquad (2)$$

III. THE FUZZY C-MEANS ALGORITHM

The Fuzzy C-Means clustering algorithm works by allocating membership values to each data element corresponding to each cluster mean with respect to the distance between the cluster mean and the data element. Nearer the element is to the cluster mean more is its membership towards the particular cluster mean. The degree of membership and cluster means are recomputed after each and every iteration. This process is repeated till the convergence criterion is fulfilled.

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Evaluation of the Antibiofilm Properties of Arthrobacter defluvii AMET1677 Strain Isolated from Shrimp Pond Sediment against Marine Biofilm Forming Bacteria (AbstractView.aspx? PID=2016-9-4-9)

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ABSTRACT:

Biofouling is the undesirable accumulation of a biotic deposit on a wetted surface. The whole marine biofouling problem begins with the adhesion of microorganisms which form a microbial biofilm to which other organisms may adhere, settle, and grow. Marine biofouling is a costly problem as it reduces the speed of ship and increase the fuel consumption. The main driver for legislation that has outlawed some highly effective AF paints, notably the use of tributyltin oxide. Green alternatives to biocide-based technologies are therefore urgently sought by the marine coatings industry, and there is considerable interest in developing biocide-free coatings. The present studies investigate the possible role of bacterial strains of Shrimp Pond sediment which were productively screened for antifouling activity against marine biofilm-forming bacteria. Biofouling bacteria were isolated from fouling sample collected from ships and other marine structures at Ennore harbour (Latitude 13°15' 48" N, Longitude 80°20' 28" E) and its population was estimated as 9.13×106 CFU/gram. The biofilm forming potential of the bacterial cultures were tested by tube method and potential biofilm forming strains BFB3, BFB5, BFB 6, BFB9 and BFB 12 were selected based on the OD Values. Morphologically different Bacterial strains were isolated from the Shrimp Pond water and 5 were selected based on the percentage of occurance. Antibacterial activity was performed with different solvent extracts of bacterial isolates against the Marine biofilm forming bacteria. The ethyl acetate extract of AMET1677 showed maximum zone of inhibition. The potential strain AMET1677 was identified as Arthrobacter defluvii by 16S rDNA gene sequence analysis submitted in genbank with the accession number KT072093. Thin Layer Chromatography was performed with the ethyl acetate extract and compound separated at Rf Value 0.28. The separated compound was evaluated for antibiofilm activity and showed maximum inhibition 0.142 ± 0.002 at 100 µl concentration. Further studies on this compound from Arthrobacter defluvii AMET1677 raise the possibility to produce eco-friendly antifoulants.

KEYWORDS:

Biofouling, Biofilm, Shrimp pond Sediment, Arthrobacter defluvii

98

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Genetic Algorithms based Enhanced K Strange Points Clustering Algorithm

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Abstract— Genetic algorithms are randomized search and optimization techniques guided by the principles of evolution and natural genetics. The algorithm proposed in this paper uses the enhanced K Strange points clustering algorithm instead of its classical K Means counterpart. The algorithm presented in this paper successfully addresses the issues related to longer execution time and formation of inaccurate clusters due to abrupt terminations in the GA based K Means clustering algorithm.

Keywords— *clustering, evolutionary algorithms, enhanced k strange points clustering, Euclidean distance.*

I. INTRODUCTION

Genetic Algorithms belonging to the class of evolutionary computations are founded on the principles of biological mechanisms like natural genetics, evolution and heredity. Genetic Algorithms form the central paradigm of evolutionary computations and comprise of steps which include population initialization, genetic looping and convergence. It models operations like evaluation and emulates natural biological processes like selection, crossover and mutation. It also simulates the phenomenon of continued existence of the fittest amidst entities over successive generations for disentangling any given problem statement. The initial population consists of probable solutions to the problem. The genetic looping step consists of various sub processes and genetic operations like evaluation, selection, crossover and mutation [1]. The evaluation process uses a fitness function that quantifies the relative "fitness" of a given solution. The value for fitness is allocated to individual solutions subject to its actual closeness to solving the problem. For clustering, the score function which is the distance measure is a good fitness function for the problem of finding proximity or closeness. In the selection process the solutions that are most fit are selected to survive, and go on to the next generation. These solutions correspond to chromosomes and each component of a solution (chromosome) is known as a gene. The next generation is formed by selecting the surviving chromosomes based on the fitness function and added to the population. Dual changes can occur to the surviving chromosomes which are realized by the two genetic operations of crossover and mutation. Off springs

of the surviving chromosomes are created by applying these genetic operators [2]. A crossover operation occurs between two surviving chromosomes and is facilitated by exchanging components (bits) of the two survivors. The mutation process occurs by inverting randomly selected bits in a surviving chromosome. To elucidate this we can consider a situation where the first surviving chromosome is denoted as 1001001 and the second is designated as 0110110. An arbitrary point such as three is then selected, and the first child is derived from the first three bits of the first parent and the last four bits of the second parent. The second child is derived from the first three bits of the second parent with the last four bits of the first parent. After crossover the two new children are 1000110 and 0001001 [3].

Mutations then occur with a static probability by arbitrarily examining each gene of every surviving chromosome. The probability with which mutation occurs is a factor of the genetic algorithm. The rule for the crossover and mutation probability is "the larger, the sooner" or "the lesser the later" In simulations of genetic algorithms, the genes are denoted as bits and a mutation results in a single bit complementing its value. An arbitrary mutation in the most significant bit of the first child in the example above results in the first child changing its value from one to zero giving 0000110. This process converges when the fitness function for the next generation or series of generations is no better than it was for the earlier generation [4]. In simple terms it means that if the new generation comprises a solution that yields a result that is near enough or identical to the anticipated answer then the problem is said to have been resolved otherwise the new generation will undergo a process similar to what their parents underwent and this continues till a solution is finally achieved.

II. CLUSTERING

Clustering aims to categorize objects into groups called clusters according to the notion that there is a very high similarity between objects of the same cluster and a very low similarity to objects of other clusters. Partition based clustering algorithms group n-dimensional data into K discrete clusters [5]. These techniques use a common dual structure of a score function that computes how well any given set of clusters

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Glaucoma detection using fuzzy C-Mean (FCM) (Article)

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Abstract   ⌄ View references (7)

Glaucoma is a serious eye disease,overtime it will result in gradual blindness. Early detection of the disease will help
prevent against developing a more serious condition. A vertical cup-to-disc ratio which is the ratio of the vertical
diameter of the optic cup to that of the optic disc,of the fundus eye image is an important clinical indicator for
glaucoma diagnosis. This paper presents an automated method for the extraction of optic disc and optic cup using
fuzzy C Means clustering technique combined with thresholding. Using the extracted optic disc and optic cup the
vertical cup-to-disc ratio was calculated. The validity of this new method has been tested on 365 colour fundus images
from two different publicly available databases DRION,DIARATDB0 and images from an ophthalmologist. The result
of the method seems to be promising and useful for clinical work. © 2016,International Journal of Pharmacy and
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SciVal Topic Prominence ⓘ

Topic: Ophthalmology | Eye protection | Glaucoma detection

Prominence percentile: 98.660   ⓘ

Author keywords

(Cup-to-disc ratio) (Fundus image) (Fuzzy C means clustering) (Optic cup) (Optic disc)

Indexed keywords

EMTREE medical
terms:

(algorithm) (analytic method) (Article) (calculation) (fuzzy c mean) (fuzzy system)
(glaucoma) (image analysis) (image segmentation) (methodology) (optic cup extraction)
(optic disc extraction) (thresholding) (validity) (vertical cup to disc ratio)
(visual system parameters)

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Green Synthesis, Characterization and Antimicrobial Activity Studies of Curcumin Aniline Functionalized Iron Oxide Nanoparticles

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We report the synthesis and characterization of biofunctionalized iron oxide nanoparticles by interacting with curcumin aniline and its antimicrobial activity studies against standard bacterial and fungal pathogens. Firstly, iron oxide nanoparticles and curcumin aniline were synthesized separately and finally biofunctionalization process was carried out to get the deserved product. The whole process was performed in the green process method by using plant materials. Synthesized materials were characterized by UV-visible, FT-IR, SEM and TEM analysis. Antibacterial and antifungal tests were carried out against S. aureus, B. subtilis, E. coli, S. typhi bacterial species and C. albicans, C. lunata, A. niger, T. simii fungal species. Comparative studies of iron oxide nanoparticles with biofunctionalized form were carried out in every aspects and proved the efficiency of biofunctionalized iron oxide nanoparticles.

Keywords: Nanoparticles, Iron oxide, Magnetization, Biocompatibility, Curcumin aniline, Bioavailability.

INTRODUCTION

Iron oxides have attracted a great deal of attention among specialists because of their multivalent oxidation states [1]. They have worse magnetic properties, lower saturation magnetization and lower specific loss of power than Fe nanoparticle but several advantages such as better oxidative stability, compatibility in non-aqueous systems and non-toxicity which have just started to gain attention for biomedical purposes [2,3]. Some of the oxide nanoparticles e.g., Co and Ni are also highly magnetic materials, they are toxic and easily oxidized. Recently, an extensive research has been focused on iron oxide nanoparticles because it possess biocompatibility and unique magnetic, electric properties [4], which shown applications in variety of areas such as electronics [5], catalysis [6], food preservation [7], biomedical applications like cancer treatments [8], targeted drug delivery [9] and antimicrobial activity [10]. Though the nanotechnology industry is growing in a very fast way, there is a crucial urgency to perform further studies on this subject, especially about the risks and benefits of the many manufactured nanomaterials for ecosystem [11].

Green synthesis of nanoparticles is cost effective, environment friendly and non-toxic methods [12]. The use of plant extracts for synthesis of nanoparticles is an advantageous as it contains biomolecules that can function as both reducing and capping agents, eliminating the use and generation of substances hazardous to human health and the environment [13]. The main benefit of this method is to overcome the limitation of other conventional methods and its ability to control the size, shape, properties of nanoparticle. Plant extracts contains phenolic compounds such as flavonoids, terpenoids, alkaloids, etc., which may play an important role in the formation of extract mediated nanoparticles [14].

Lemons (Citrus limon) are the primary commercial sources of citric acid and ascorbic acid, easily available material and also known for its water softening properties [15,16]. It has been used in variety of industries like food, medicinal, as electrodes in battery, as invisible ink, as an acid in educational purposes, cleaning and culinary uses. Particularly, the extracts of lemon is low pH which makes it antibacterial active source and other useful medicinal purposes [17-19]. Lemons contain numerous phytochemicals, including polyphenols and terpenes [20]. This extracts act as a good metal reductant in the nanoparticle preparation according to various research works [21-23].

The improvement of new resistant strains of bacteria has become a severe issue in environment and health aspect and there is an emergence to develop new bactericides from various methods and sources [24]. Biofunctionalization of nanoparticles is an advancement of current nanotechnology and biotechnology fields which provided attractive method for synthesizing alternative antimicrobial agents. It becomes

Green Synthesis, Characterization and Antimicrobial Activity Studies of Curcuminaniline Biofunctionalized Copper Oxide Nanoparticles

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Abstract

Background/Objectives: Biofunctionalization of nanoparticles is the recent and advanced technology in the fields of nanoscience and biotechnology which produces the environmentally benign and more efficient antimicrobial agents. Therefore, present study reported a simple, convenient and cost effective method of preparation of bioactive antimicrobial agents by the biofunctionalization process of copper oxide nanoparticles with curcuminaniline through a green process method. **Methods/Statistical analysis:** In this green process two important medicinal quality plant materials, i.e., lemon extract as a reducing agent and turmeric curcumin as stabilizing agent were used to prepare the copper oxide nanoparticles. On other hand, biomaterial curcumin was utilized to prepare the curcuminaniline for the functionalization with copper oxide nanoparticles. The synthesized curcuminaniline, copper oxide nanoparticles and biofunctionalized nanoparticles were characterized by UV- Vis, FT-IR, SEM and TEM techniques. The antibacterial activity of the samples were tested by disc diffusion method against two gram positive bacteria (S.aureus, B. subtilis), two gram negative bacteria (E.coli, S.typhi) and antifungal activity was tested by agar well diffusion method against four funguses (C.albicans, C.lunata, A.niger and T.simii). **Findings:** The size of synthesized copper oxide nanoparticles was in the ranges around 60-100 nm with dot and needle shaped morphology and biofunctionalized nanoparticles were about 100 nm with spherical shaped morphology. The antimicrobial activities of biofunctionalized copper oxide nanoparticles were observed significant inhibition activity than the non-functionalized nanoparticles and curcuminaniline against S.aureus, B.subtilis, C.lunata and A.niger species. Particularly, the results of antimicrobial activity showed higher efficiency than the standard drugs tested here. **Application/Improvements:** From this investigation, the green synthesized biofunctionalization method what we have suggested is exposed promise results in the antibacterial and antifungal activity tests. Moreover, biofunctionalized copper oxide nanoparticles are shown better performance in the resistant of microorganisms than the non-functionalized CONPs and also modified curcumin material. This report helps further for the future scope in the preparation of effective antimicrobial agents.

Keywords: Antimicrobial Activity, Biofunctionalization, Copper Oxide, Curcuminaniline, Green Synthesis, Nanoparticles

1. Introduction

In recent years nanotechnology is being given considerable attention in a multiple way of emerging fields of science and technology over the last decades due to their interesting and potential applications in many areas of industry. Nanoparticles possess high surface to volume ratio due to its small size, which gives very distinctive features to nanoparticles and thus attracts the researchers expressively. Metal nanoparticles have been widely used

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Green Synthesis, Characterization and Antimicrobial Activity Studies of Curcuminaniline Biofunctionalized Copper Oxide Nanoparticles

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Green Synthesis, Characterization and Antimicrobial Activity Studies of Salicylalchitosan Biofunctionalized Copper Oxide Nanoparticles

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In the present work, we reported the green synthesis of biofunctionalized copper oxide nanoparticles with salicylalchitosan derived from chitosan. Salicylalchitosan, copper oxide nanoparticles and biofunctionalized nanoparticles were characterized by UV-visible, FT-IR, SEM and TEM techniques and antimicrobial activity studies of those were undertaken. The size of synthesized copper oxide nanoparticles was in the ranges around 60 to 100 nm and bio functionalized particles were about 100 nm. The antimicrobial activities of biofunctionalized copper oxide nanoparticles were observed higher inhibition activity than the non-functionalized nanoparticles and salicylalchitosan against standard microbial species.

Keywords: Chitosan, Salicylalchitosan, Copper oxide, Nanoparticles, Green synthesis, Antimicrobial activities.

INTRODUCTION

In the last few years bionanotechnology has attracted large number of scientists from biology, physics, chemistry, materials sciences and also from applied sciences such as medicine and biotechnology. Biofunctionalization of nanoparticles can provide good biocompatibility for the immobilization of biomolecules, tissues or cells and high specificity for biological recognition which led to produce a considerable effect in biological systems. Therefore, biofunctionalized nanomaterials are being given considerable attention in a multiple way of emerging fields of science and technology [1-5].

However, seeking suitable biomaterials for the functionalization of nanomaterials is one of the key issues in this hottest field. Chitosan is natural, eco-friendly potential bioactive polymer. The development of new applications for chitosan and its derivative is due to the fact that these are renewable source of natural biodegradable, biocompatible polymers. Currently, chitosan has been attracted more attention for its unique physico-chemical characters, versatility, non-toxic, economical, easy availability and bioactivities [6-8].

Copper nanoparticles have concerned considerable attention because they are very reactive and their high surface-to-volume ratio helps to interact with bacterial surface effectively. Moreover its low-cost, high yields and short reaction times under normal reaction conditions are the advantages in green-nano preparation. The copper nanoparticles were prepared through various green methodologies and proved its superior antimicrobial activity against various bacterial and fungal strains from many researches [9-12].

From environmental point of view, plant extracts used reduction methods can be considered as more effective green approaches for synthesizing metal nanoparticles, because of employing plants towards synthesis of nanoparticles are emerging as advantageous compared to others [13]. In the present investigation, we have utilized lemon extract and curcumin extract in the preparation of copper oxide nanoparticles. Lemons are a rich source of citric acid and ascorbic acid, easily available material and also known for its water softening properties. This extracts act as a good metal reductant in the nanoparticle preparation according to some research works [14,15]. Curcumin are polyphenols, an active component of turmeric plant and curcumin stabilized metal nanoparticles have been shown to have a wide range of therapeutic effects [16-18].

Based upon the above discussion, this study was investigated to find the highly active microbial agents in the different way of synthesis by the biofunctionalization of salicylalchitosan with copper oxide nanoparticles. Firstly, we have prepared the bioactive salicylalchitosan by using chitosan and on other hand copper oxide nanoparticles have been prepared by using lemon extract as a reductant and curcumin as a capping agent. Finally

Growth, optical and thermal studies on novel nonlinear optical crystal: Glycine–phthalic acid (GPA)

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ABSTRACT

Optically good and transparent glycine–phthalic acid (GPA) single crystals were grown by slow evaporation solution growth technique at room temperature. Single crystal X-ray diffraction analysis confirms that the grown crystal exhibits orthorhombic structure. The presence of functional groups was determined by FTIR analysis. Optical absorption studies reveal very low absorption in the entire visible region. The thermal stability of the title crystal was found by the TG/DTA analysis. Kurtz powder technique confirms that the SHG efficiency of the grown crystal is 0.55 times than that of KDP crystal.

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1. Introduction

In recent years, nonlinear optical (NLO) materials are widely used in various fields such as laser technology, Optical communication, optical processing, frequency shifting, optical disc storage and optoelectronics [1–5]. Organic materials can exhibit higher nonlinear optical efficiencies due to their large electro optic coefficient and higher optical susceptibilities [6]. Amino acids are characterized by proton – donating carboxylic group and proton – accepting amino group. Due to this dipolar nature, amino acids are individually exhibiting the nonlinear optical property [7]. When organic acid is added with amino acid, the NLO property gets enhanced [8,9]. A number of NLO crystals was grown by mixing various organic and inorganic acids with amino acids and were reported elsewhere [10,11]. Hydrogen bonding is one of the most strong interactions in crystals [12]. These strong interactions also promote the nonlinear optical property of the crystals [13]. Therefore many researchers synthesize novel nonlinear optical materials in this context [14–16]. Phthalic acid (di carboxylic acid) was mixed with Glycine (amino acid), a new material was synthesized. The structure of this glycine–phthalic acid crystal was solved and was reported [17]. The present study deals growth and characterization of glycine–phthalic acid (GPA) co-crystal. The sample crystals were grown by slow evaporation method. The crystals were undergone various characterization studies such as FTIR, UV–vis, TG/DTA and NLO studies.

2. Experimental procedure

2.1. Crystal growth

Solution growth method with slow evaporation technique was adopted to grow GPA crystals (Fig. 1). The saturated solution of a mixture of glycine and phthalic acid in the ratio of 1:1 was prepared with doubly distilled water. The solution was stirred constantly for about 4 h using a magnetic stirrer. Then the solution was filtered and kept at room temperature (30 °C). The solution was allowed to evaporate the water into the atmosphere. After 2 weeks, GPA crystals were obtained from the mother solution. Those crystals were recrystallized to get high quality large size crystals. The reaction is took place as follows.

$$H_2NCH_2COOH + C_6H_4(COOH)_2 \rightarrow NH_3^+CH_2COO^- \cdot C_6H_4(COOH)_2$$
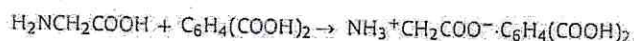
3. Results and discussion

3.1. Single crystal X-ray diffraction analysis

Single crystal X-ray diffraction analysis for the grown crystal was carried out using ENRAF NONIUS CAD4 X-ray diffractometer to analyse the crystal structure. The analysis confirms that the GPA crystal belongs to orthorhombic system having space group

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Improved Steganography using Enhanced K Strange Points Clustering

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Abstract

Steganography is an act of hiding information. It uses a cover medium to hide the secret information within itself. We perform the act of steganography using clustering. In this paper, we implemented the Enhanced K Strange Points Clustering Algorithm to achieve steganography. We then compare the results obtained with the K Means clustering algorithm and find that our methodology of implementing steganography works better with the Enhanced K Strange Points Clustering Algorithm. LSB technique is used to hide data in the cover medium. Any type of image can act as a cover medium. We propose an improved scheme which provides a better hiding capacity.

Keywords: Steganography, Clustering, LSB technique, Steganography using Clustering, k-Means clustering and Enhanced K Strange Points Clustering Algorithm.

Introduction

In this new era, most of the communication takes place through the internet. This data which is transferred is not secured and it can be attacked by any third party and decrypted. Thus we can use steganography to hide the secret data such that its existence cannot be detected. Steganography is the process of hiding the data into the cover medium. It hides the data in such a way that only the receiver knows the existence of the secret message. In earlier days data was hidden using wax tablet, writing tables, etc. Now, the data is transmitted in the form of text, image, audio with the help of the cover medium[1]. Before going deep into the core of each algorithm let us take a moment to define the terms which would be used to improve the readability, and make it easier to understand how each algorithm works with regards to others.

Stego-system: A stego-system in image steganography is the one in which we can hide secret message such that no third party will be aware of its existence [2]. The output image from this process is known as stego-image and this image is almost similar as the input image.

Encoder: The encoder is that part of the process who embeds the secret message into the cover medium.

Decoder: The decoder is the one who receives the image which contains the secret data.

Clustering: A group of similar object is known as a cluster [10]. Clustering is the process which forms these clusters [5]. They are created based on color, size etc. These clusters contain useful information [6]. We can get different sets of data using clustering [7]. The objects in one cluster are similar to each other and are different from the objects in other cluster [8]. This approach is very useful in image steganography. In this paper we perform clustering based on pattern matching using color (RGB). We first divide the image into n clusters based on color. After the process of clustering we select the largest cluster and embed the secret message in that cluster using steganography. This stego-image is then sent over some channel to the receiver. On the other end, we apply the inverse procedure wherein the input is the stego-image. After forming the clusters the largest cluster is identified and the secret message is extracted.

Enhanced K-Strange Clustering Algorithm

The Enhanced K-Strange Points Clustering Algorithm [3] projected in this paper is about discovering strange points which are maximally apart from each other. This algorithm also addresses the effect on the running time due to choice of two farthest points from the dataset. This algorithm first finds the minimum Kmin from the dataset. It finds this value by computing the Euclidean distance [9] between all the points from the dataset. The algorithm now finds the second point is farthest from Kmin. This point is represented as Kmax. This

in tissues and will have a different set of normal frequencies; but the frequencies are likely to be different between normal and cancerous cells. Besides this, a study on the combinational treatment of chemotherapy and irradiation at natural frequency may be useful.

Modal analysis indicates that the natural frequency obtained for normal cells is always higher than that of the cancer cells (both breast and prostate cancer cells) at each of the corresponding modes. Variation in cell dimension does not significantly alter the natural frequency of the cells. Modes of vibration of the cancer and normal cells show variation between them. Furthermore, the natural frequency increases with increasing Young's modulus and density of the cells. In conclusion, the study shows that by exploiting the natural frequency of the cancer cells as a tool for treatment, the burden associated with chemotherapy and drug resistance may be overcome by specifically targeting the cancer cells.

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Integrated role of SST, PAR and CDOM in summer reef bleaching during 2010 and 2011 along the Lakshadweep Islands

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The role of sea-surface temperature (SST), photosynthetically active radiation (PAR) and chromophoric dissolved organic matter (CDOM) on bleaching events along the Lakshadweep archipelago was studied for the summer of 2010 and 2011. The present study revealed similar SST pattern (30.8–31.9°C) and high PAR availability (48–50 E m^{-2} day^{-1}) during the summer weeks of 2010 and 2011. However, the CDOM content varied significantly between 0.5 and 7 during

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Investigation on growth and characterization of 3-methoxy-4-hydroxy-benzaldehyde organic single crystals

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3-methoxy-4-hydroxy-benzaldehyde (MHBA) single crystals were grown by slow evaporation method using ethyl acetate as a solvent. The grown crystals were pale yellow in colour. The obtained crystal was subjected to single crystal X-ray diffraction analysis to determine the cell parameters. The functional groups of the grown crystal have been identified by both FT-IR and FT-Raman analyses. Thermal analysis done on the crystal reveals the decomposition and melting point of the grown crystals. From the absorption study it was found that the lower cut off wavelength value is about 370 nm and hence it suggests that the crystal is transparent in UV-Visible region. Using Brewster angle's method the refractive index of MHBA was calculated. From the NLO results, it has been proved that MHBA is a promising candidate of frequency-doubling laser material. The dielectric constant and dielectric loss of the grown crystal also have been measured.

1. Introduction

In recent times, the second-order nonlinear optical materials play an important role in photonic technology [1].It has extended its applications in all optical and electro-optical devices like telecommunications, optical storage and optical computing etc. Generally organic materials have motivated several investigations in the nonlinear optical (NLO) field because of their attractive properties such as high damage threshold, low refractive indices, very high nonlinear efficiency and easy of growth [2]. By using the tools of synthetic organic chemistry, the optical property of molecule-based NLO materials can be easily fine-tuned through slight changes in the molecular structure. Hence the organic materials are seen to be a potential material for photonic devices such as optical power limiters, switches and modulators. Nonlinear optical crystals must be more transparent in both visible and UV region since in frequency doubling applications, the wavelengths around 800nm (fundamental) and 400 nm (doubled) are most frequently utilized and it is achievable by the cascaded sum frequency generation pumped by the output from Nd:YAG (1064 nm) laser. This property leads them in the field of generation of high power solid state lasers.

It has been reported that the organic crystals such as 2-methyl-4-nitroaniline (MNA),-2-(α-methylbenzy-lamino)-5-nitropyridine (MBANP), N-(4-nitrophenyl)-(L)-prolinol (NPP), N-(4-nitrophenyl)-N-methyl-2-aminoacetonitrile (NPAN), 3-methyl-4-nitropyridine-1-oxide (POM) and 3-(4-chlorophenyl)-1-(3-theinyl)-prop2-en-1-one (CTC) have lower cut off wavelength in the visible region around 400-450 nm where as lower cutoff value of MHBA crystals was around 370 nm i.e. close to UV region. It envisions MHBA as a potential nonlinear optical material.

MHBA crystal is the derivative of 4-hydroxy benzaldehyde (HBA) which has centrosymmetric molecular packing with the space group of P2₁/c. The substitution of methoxy group CH_3O at ortho position enhances the non-centrosymmetric packing with the space group P2₁ and forms the MHBA compound. The general molecular formula for MHBA is $C_8H_8O_3$ and the common name is Vanillin. The chemical structure of MHBA compound is shown in Fig. 1.
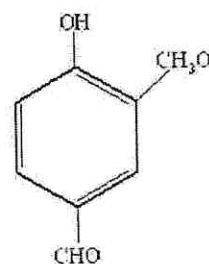

Fig. 1. Chemical structure of MHBA

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Investigation on Structural, Surface Morphological and Dielectric Properties of Zn-doped SnO₂ Nanoparticles

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Zinc doped Tin oxide (SnO₂) nanoparticles were prepared by co-precipitation method. The average crystallite size of pure and Zn-doped SnO₂ nanoparticles was calculated from the X-ray diffraction (XRD) pattern. The FT-IR spectrum indicated the strong presence of SnO₂ nanoparticles. The morphology and the particle size were studied using the scanning electron microscope (SEM) and transmission electron microscope (TEM). The particle size of the Zn-doped SnO₂ nanoparticles was also analyzed, using the Dynamic Light Scattering (DLS) experiment. The optical properties were studied by the UV–Visible absorption spectrum. The dielectric properties of Zn-doped SnO₂ nanoparticles were studied at different frequencies and temperatures. The ac conductivity of Zn-doped SnO₂ nanoparticles was also studied.

Keywords: *Zn-doped SnO₂ nanoparticles, Co-precipitation method, UV–Visible absorption, Dielectric studies*

1. INTRODUCTION

Tin oxide (SnO₂), a significant n-type broad direct band gap semiconductor has been the subject of much interest and discussion for researchers because of its numerous and wide ranging applications, such as in flat panel displays, catalysis, heat mirrors, transparent electrodes preparation, gas sensing, etc.[1-4]. Further, recently, this material has created a growing interest as a nanostructured material due to its interesting electrical and optical properties arising out of large surface-to-volume ratio, quantum confinement effect, etc.[5-7]. Owing to high surface-to-volume ratio, the surface atoms play a big role in the properties of nanomaterials, which usually have less adjacent coordinated atoms and can be treated as defects as compared with the bulk atoms. These defects bring on additional electronic states in the band gap, which can mix with the intrinsic states to a substantial extent and which may influence the spacing of the energy levels and the optical properties of nanopowders. A variety of methods were used to prepare SnO₂ nanostructures, such as hydrothermal method, polymeric and organometallic precursor synthesis, soncation procedure, microwave synthesis and surfactant-mediated method[8-18]. Zinc is a quite active element. It dissolves in both acids and alkalis. In moist air, however, it reacts to form zinc carbonate. The zinc carbonate forms a thin white crust on the surface which prevents further reaction. Zinc burns in air with a bluish flame. The second largest use of zinc is in making alloys. The mixtures might have properties different from those of the individual metals. In this paper, the preparation of Zn-doped SnO₂ nanoparticles and their structural, surface morphology, optical, dielectric and ac conductivity studies were investigated.

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2. EXPERIMENTAL PROCEDURE

Co-precipitation method is atomic scale mixing and hence the calcining temperature is required for the formation of final product to lower particle size. Homogeneous mixing of reactant precipitates reduces the reaction temperature. All chemical reagents were commercial with AR purity, and used directly without further purification. Zinc doped SnO₂ nanoparticles were prepared by co-precipitation method. The requisite amount of the starting raw materials tin (II) chloride dehydrate and zinc acetate dehydrate were weighed on the percentage of dopant (4 mol %) and dissolved into deionized water. The precipitation was achieved by slowly adding aqueous ammonium solution (8M) with the constant stirring until the pH value reached 10. The final product was washed several times with deionized water to remove any possible by-products. The filtrate was initially dried at 80°C for 12 hrs and calcined around the temperature of 600°C for 3 hrs in air atmosphere. The prepared powders were carefully subjected to the following characterization studies. The crystalline size and the structure of the Zn-doped SnO₂ nanoparticles was analyzed by X-ray diffraction (XRD) using a powder X-ray diffractometer (Schimadzu model: XRD 6000 with CuKₐ radiation and with a diffraction angle between 20° and 80°. The FTIR spectrum of the Zn-doped SnO₂ nanoparticles was obtained using an FTIR model Bruker IFS 66W Spectrometer. The surface morphology of the Zn-doped SnO₂ nanoparticles was observed by a scanning electron microscope (SEM) using JEOL; JSM- 67001. Transmission electron microscope (TEM) image was taken using an H-800 TEM (Hitachi, Japan) with an accelerating voltage of 100kV. UV-Visible absorption spectrum for the pure and Zn-doped SnO₂ nanoparticles was recorded using a Varian Cary 5E spectrophotometer in the range of 300-900 nm. The dielectric

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S1197

INVESTIGATIONS ON SYNTHESIS, STRUCTURAL, SURFACE MORPHOLOGICAL, OPTICAL, AND THERMAL PROPERTIES OF COPPER OXIDE NANOFLUIDS

by

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The copper oxide nanofluids were synthesized using a wet chemical technique. The crystal structure and the average grain size of the copper oxide nanofluids were determined by X-ray diffraction pattern. The strong presence of copper oxide was confirmed by the Fourier transform infrared spectroscopy spectrum. The morphology and the particle size were studied using the scanning electron microscope and transmission electron microscopy. Energy dispersive X-ray spectroscopy is an analytical technique used for the elemental analysis or chemical characterization of a sample. Dynamic light scattering was used to estimate the size of the copper oxide nanofluids. The UV-visible absorption spectrum was used to measure the optical property of the copper oxide nanofluids. The thermal conductivity of the copper oxide nanofluids was analyzed as well.

Key words: copper oxide nanofluids, X-ray diffraction, scanning electron microscopy, transmission electron microscopy, UV-visible spectrum, thermal conductivity

Introduction

Nanotechnology is one of the promising areas to be studied and has much to offer to the world of research and development. It has drawn the attention of researchers and academicians round the globe. Nanofluids are considered to be an alternate and lately invented liquid for transport of heat energy and can be engaged as heat transfer fluids in heat exchangers in place of pure single phase fluids. The applications of nanofluid heat transfer incorporate radiators in automobiles, chemical engineering and process industries, solar water heater, refrigeration, cooling of electronics devices, etc. Nanofluids are a latest category of heat transfer fluids containing nanosized particles, fibers, or tubes that are stably suspended in a carrier liquid and find potential applications related with heat transfer, mass transfer, wetting, and spreading [1-6]. In general, the conventional base fluids which are typically used in cooling are not enough to keep pace with the development and to meet the requirements in these fields, particularly in electronic chip and computing technologies. Intensive research on nanofluids was activated using various types of nanoparticles. As the particle size decreases, the surface area increases. This

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Investigations on the Synthesis, Optical and Electrical Properties of TiO₂ Thin Films by Chemical Bath Deposition (CBD) method

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Titanium dioxide (TiO₂) thin films were prepared by Chemical Bath Deposition (CBD) method. The X-ray diffraction (XRD) analysis was used to examine the structure and to determine the crystallite size of TiO₂ thin film. The surface morphology of the film was studied using Scanning Electron Microscopy (SEM).The optical properties were studied using the UV-Visible and photoluminescence (PL) spectrum. Optical constants such as band gap, refractive index, extinction coefficient and electric susceptibility were determined. The FT-IR spectrum revealed the strong presence of TiO₂. The dielectric properties of TiO₂ thin films were studied for different frequencies and different temperatures. The AC electrical conductivity test revealed that the conduction depended both on the frequency and the temperature. Photoconductivity study was carried out in order to ascertain the positive photoconductivity of the TiO₂ thin films.

Keywords: TiO₂ thin films, XRD, SEM analysis, Photoluminescence (PL), FTIR, Dielectric constant and Dielectric loss

1. INTRODUCTION

The study of semiconducting thin films is being pursued with growing interest on account of their established and useful applications in many semiconductor devices such as solar energy converters, optoelectronics devices etc [1]. In the recent decades, there has been an enormous deal of attention being bestowed upon the making of inexpensive thin films, due to their high varying characteristics. Such characteristics consist of high resistivity, heat reflecting windows, catalytic properties, photo thermal and photovoltaic [2]. Titanium dioxide (TiO₂) is an extensively used material for optical and protective applications because of its high transparency in the visible region, excellent mechanical durability and chemical stability in aqueous solution [3,4]. TiO₂ films are valuable for such applications as catalysis, optical coatings, gas sensors, and other electronic devices [5-7]. The physical and chemical properties of TiO₂ are such that it becomes suitable for a wide spectrum of applications. It is also an excellent electrode material that can be used for the conversion of light energy into electrical energy because of its semiconductor properties. Its wide applications such as supercapacitors, dye-sensitized solar cells, quantum-dot-sensitized solar cells, lithium ion batteries, photoelectrolysis, water splitting, biosensors, photochromic devices, self-cleaning, and extremely thin absorber (ETA) solar cells have already been explored [8-17]. TiO₂ films can be synthesized by many chemical and physical deposition techniques, such as chemical vapor deposition, spin coating or spin casting, atomic layer

deposition, molecular beam epitaxy, sputtering, cathodic arc deposition, electrospray deposition, sol–gel process [18]. It has been established by research that the preparation technique and processing conditions strongly impact the microstructure and physical properties of the material. Each technique has its own advantages and limitations. The CBD method has almost become the favourite of many researchers who see it as a comfortable alternative technique for the synthesis of metal chalcogenide thin films because of its advantages such as low cost and large-area deposition. CBD technique facilitates the formation of thin films of metal chalcogenides by spontaneous reaction in solution. TiO₂ thin films have also been prepared by sol-gel chemical bath deposition technique [19]. CBD technique has several advantages over the other ones. For instance, this method can be used for large area deposition at room temperature and the thickness of the deposited layer can be readily controlled by varying the length of the deposition time. Earlier investigations of the microstructural and optical properties of TiO₂ films synthesized by the CBD technique had shed much light. They have shown that the characteristics such as film thickness, bonding configuration, optical absorption and optical bandgap and structure are a function of deposition time [20]. Based on this fact we report the synthesis and the characterization of TiO₂ thin films. The prepared films were characterized for their structural, surface morphology, optical properties, photoluminescence, FTIR analysis, and electrical studies. The results of the characterization studies are discussed in the paper.

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Media Access Delay and Throughput Analysis of Voice Codec with Silence Suppression on Wireless Ad hoc Network

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Abstract

The rapid growth in internet has led to the emergence of different wireless technologies and simultaneously there has been a tough challenge to provide QoS over such wireless technologies.The demand for various real time multimedia application especially voice and video applications to be available on the internet has also increased. Multimedia applications need a lot more bandwidth and have different QoS requirements than the applications that were used in early years of the internet. The main reason for the poor quality of voice over IP is because we are transmitting the real time applications over the IP network which is mainly meant to transfer only data and not for voice transmission. The purpose of this paper is to check the performance of VOIP application under different CODEC's such as G.711, G.729 and G.723.1 over wireless network with and without silence suppression. Another issue addressed in this paper is the effect of increasing nodes on voice transmission for the different codecs. Parameters like media access delay and throughput are taken into consideration. Simulation is performed using OPNET modeler simulator.

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Keywords: VOIP; QoS; Voice Codec; Silence Suppression; OPNET

1. Introduction

The rapid growth in internet has led to the emergence of different wireless technologies and simultaneously a tough challenge to provide QoS over those wireless technologies. Wireless networking is an emerging technology that allows users to access information and services regardless of their geographic position. Wireless networks can be classified into the following two categories[3].

· Infrastructure based networks.
· Infrastructure-less (ad hoc) networks.

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Preparation and Characterization of the Structural, Optical, Spectroscopic and Electrical Properties of Pr$_2$O$_5$ doped Borate Glass

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We have successfully synthesized Pr$_2$O$_5$ doped borate glasses by conventional rapid melt quench method. The XRD pattern indicates the amorphous nature of Pr$_2$O$_5$ doped borate glass. An optical property of prepared borate glass was studied using the Photoluminescence spectrum. Determination and differentiation of the various vibrational modes were done using FTIR spectroscopy studies. Raman spectroscopy of Pr$_2$O$_5$ doped borate glass was also carried out. Thermal analyses of the glasses were done using the TGA/DTA and DSC analysis. The dielectric properties such as dielectric constant, the dielectric loss and AC conductivity of the Pr$_2$O$_5$ doped borate glass were studied in the different frequencies and temperature.

Keywords: *Pr$_2$O$_5$, XRD, Photoluminescence, FTIR, FT-Raman studies and Dielectric studies*

1. Introduction

Rare earth ions have numerous attractive spectroscopic properties in glasses in connection with laser research[1,2], related applications[3] and basic research[4]. The trivalent rare earth ions are easily incorporated in glasses. Pr^{3+} doped glasses have transition in the visible region. Some spectral studies have been reported for Pr^{3+} doped borate and phosphate glasses earlier[5-16]. Recent studies reported[17] on the applications of Pr^{3+} doped borophosphate glasses. In many optical devices like blue up-converters (^{3}P$_0$ – ^{3}H$_4$), solid-state lasers emitting visible (^{1}D$_2$ – ^{3}H$_4$) or near-infrared light (^{1}G$_4$ – ^{3}H$_5$) praseodymium – doped glasses are proved to be effective. In the present work, we report the structural properties of the Pr$_2$O$_5$ doped borate glasses that were determined by X-ray diffraction (XRD) analysis and FTIR and FT-Raman analysis. It was confirmed that the prepared glasses were amorphous. The bonding parameters of the glasses were analyzed by using FTIR and FT Raman analysis and were confirmed to be ionic in nature. The optical properties were characterized by using the photoluminescence studies. The electrical properties of Pr$_2$O$_5$ doped borate glasses were studied. Since being a member of Lanthanide, Prasuedomium shows efficient luminescence in triplet state. Hence, the prepared borate glass can be used for some applications like optical data reading, colour display etc.

2. Experimental Procedure

2.1. Preparation of Glass Samples

The Pr$_2$O$_5$ doped borate glass of composition [60.5B$_2$O$_3$+xLi$_2$CO$_3$+xZno+xSr$_2$O$_3$+xH$_0$NO$_4$P-x$_1$Y$_2$O$_3$ + x$_1$Pr$_2$O$_5$, (x in molecular % ranging from 10 to 50 and x$_1$ in molecular % of 0.5] was prepared by melt quenching method. The appropriate quantities of B$_2$O$_3$, Li$_2$CO$_3$, ZnO, Sr$_2$O$_3$, Y$_2$O$_3$ and Pr2O5 were weighed and mixed together with a morter, to get fine powders. All powders were taken in 99.99 % of purity. The batches were placed in a porcelin crucible and melted in electric furnace at 1300°C. After finishing the melting process, it transferred to a second furnace which maintained at 400 °C for annealing. The annealing process continued for 3-4 hrs and the sample was gradually cooled under room temperature. The prepared glasses were polished for performing different characterization.

3. Results and Discussion

3.1. XRD characterization

The X-ray diffraction pattern of the prepared borate glasses were recorded in the range of 20°- 80°. The results showed that the XRD pattern of the sample exhibited broad diffusion at lower scattering angles. It indicates the presence of long range structural disorder, which is characteristic of amorphous nature as shown in Figure 1. A broad diffuse scattering at different angles instead of crystalline peaks are exhibited confirming a long range structural disorder which is the characteristic of amorphous network.

3.2. Optical Properties

The photoluminescence studies given many information like the spontaneous emission of light from a material under excitation and the features of emission spectrum used to identify impurity level, emission

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Quantitative Performance Analysis for the Family of Enhanced Strange Points Clustering Algorithms

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Abstract
A cluster is expected to contain all elements that are of one kind and every element is supposed to be different from the elements of any other cluster. Any clustering algorithm which ensures the above is believed to output quality clusters. This paper gives a quantitative performance analysis for the family of enhanced strange points clustering algorithms and indicates how each algorithm in the family outputs a high quality of clustering results comparable to that of well-established clustering algorithms.

Keywords: clustering, k means, enhanced k strange points clustering fuzzy c means, fuzzy c Strange points clustering, bisecting min max clustering, genetic algorithms based enhanced k strange points clustering, quantitative analysis, performance analysis, Euclidean distance.

Introduction
Cluster examination and analysis comprises a plethora of techniques which splits an element itemset R into J parts known as clusters which are absolutely different from each other, each with no unoccupancy and reproduce R by unifying the subsegments [1]. Any standard clustering technique will yield and exhibit excellent cluster quality with high intrinsic cluster likeness and low extrinsic cluster likeness [2]. The aim of clustering is to find categories of similar objects [3]. The figure of merit which decides how similar or dissimilar objects are to each other is described by the distance measure [4]. Clustering is widely used in various applications such as intelligent business systems, assessment support sysytems, target audience advertisement systems, genetic sciences, bio-medical engineering and applications, astro physics and so on [5]. The family of enhanced strange points clustering algorithm includes the enhanced k strange points clustering algorithm, the genetic algorithms based enhanced k strange points clustering algorithm, the fuzzy c strange points clustering algorithm and the bisecting min max clustering algorithm.

Quantitative Performance Analysis For Clustering
A cluster is assumed to have all objects that are alike to each other and each object is required to be dissimilar from the objects of other clusters [6]. Cluster cohesion provides an indication of how similar the objects are to each other in a cluster and cluster separation gives an indication of how diverse a cluster is from other clusters. Some of the useful metrics are Purity, Precision, Recall, F-Measure, Accuracy and Error Rate [7].

Purity:
This is a figure of merit which gives an amount of the magnitude to which a cluster consists of objects belonging to one cluster. For example, let us assume there are 3 clusters – cluster1 with twenty 's' objects and four 't' objects, cluster2 with eighteen 's' objects and two 't' objects and cluster3 with four 's' objects and twenty 't' objects. Then the purity can be measured as

$$Purity = \frac{1}{TE} * (SMEC) \qquad (1)$$

where
TE = total elements and
SMEC = Sum of the majority elements of all clusters

Purity measures range from 0-1 and is high when clusters have more coherent values.

Precision, recall and accuracy in clustering:
These useful metrics indicate the fraction and the level of a specific class present in a cluster. Precision of an element indicates how many other elements in the same cluster belong to the same category as the element under consideration. Recall of an element reflects how many elements of the same category are assigned to the same cluster. F-Measure computes some mean value of Precision and Recall
TP = True Positives
TN = True Negatives
FP = False Positives
FN = False Negatives

$$Pr\,ecision = \frac{TP}{TP + FP} \qquad (2)$$

$$Re\,call = \frac{TP}{TP + FN} \qquad (3)$$

Structural and electrical properties of organic stilbazolium single crystal of DSCHS

S. John Sundaram, A. Antony Raj, Jerald V. Ramaclus, and P. Sagayaraj

STRUCTURAL, MORPHOLOGICAL, OPTICAL AND ELECTRICAL PROPERTIES OF NICKEL SULPHIDE THIN FILMS

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Chemical bath deposition (CBD) technique was used for the synthesis of the Nickel Sulphide (NiS) thin films. The prepared NiS thin films were found to be polycrystalline and the crystals had hexagonal structure as revealed in the X-ray diffraction (XRD) analysis. The surface morphology of these films was studied by means of scanning electron microscopy (SEM). The optical properties of the NiS thin films were determined using UV-Visible absorption spectrum. The electrical studies were carried out at different frequencies and at different temperatures for the prepared NiS thin films. Further, electronic properties, such as valence electron plasma energy, average energy gap or Penn gap, Fermi energy and electronic polarizability of the NiS thin films were calculated. The AC electrical conductivity measurements revealed that the conduction depended on both the frequency and the temperature. Photoconductivity measurements were carried out to reveal the positive photoconductivity of the NiS thin films.

1. Introduction

Metal chalcogenide thin films are particularly interesting for the fabrication of large area photodiode arrays, solar selective coatings, solar cells, photoconductors, sensors etc [1]. Nickel Sulphide belongs to VIII –VI compound semiconductor materials. Nickel Sulphide is a transition metal compound and an interesting material, showing metal-insulator transition by doping or as a function of temperature and pressure. Nickel Sulphide compound shows antiferromagnetic semiconductor and paramagnetic properties in low and high temperature phases, respectively. Nickel sulphide thin films have a number of applications in various devices such as solar selective coatings, IR detectors and as a storage electrode in photoelectrochemical storage devices [2, 3]. A variety of methods including electrodeposition, SILAR, pulsed laser ablation, metal-organic chemical vapour deposition, thermal and photochemical chemical vapour deposition can be used for the preparation of nickel sulphide thin films [4-8]. We have selected chemical bath deposition (CBD) method owing to its many advantages like low cost, large area production, simplicity in instrumental operation and low elaboration temperature. This paper presents the synthesis of NiS thin films prepared by using CBD technique. Prepared films were characterized for their structural, surface morphology, optical properties, and electrical studies.

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Structural, morphological, optical and electrical properties of PbSe thin films grown by chemical bath deposition

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ABSTRACT

Lead selenide (PbSe) thin films were processed by chemical bath deposition (CBD) technique. To analyze the structure and the crystallite size of PbSe thin film X-ray diffraction (XRD) analysis was used. Using Scanning Electron Microscopy (SEM) the surface examination of the film was conducted. With the help of UV-Visible absorption spectrum investigation of the optical properties were held. All the optical constants were determined from UV-Visible absorption spectrum. The dielectric examination of PbSe thin films were analyzed for various frequencies and various temperatures. The AC electrical conductivity analysis brought to light that the conduction depended on both the frequency and the temperature. Photoconductivity analysis was carried out to the PbSe thin films. Copyright © 2016 VBRI Press.

Keywords: Lead selenide (PbSe); XRD; SEM analysis; optical; electrical studies.

Introduction

Thin films have received great consideration and serious attention from the research community because of their numerous applications. The main attraction of the thin films is due to their significant properties that differ from those of the bulk. As the film becomes thinner, newer properties are exhibited and these properties become vital in the miniaturization of elements such as resistors, transistors, capacitors and solar cells. For the next generation of low cost substitute, Nanocrystalline based solar cells are well-known as the traditional silicon based solar cells [1]. Electronic devices such as IR-detectors, photographic plate, laser selective and photoconductive absorber and analyzers have established increased because of their practical use in the IV–VI semiconductors [2-4]. The small energy gap is one of the most essential properties of lead chalcogenide semiconductors leading to the huge experimental exploration in these materials. At present, many researchers seem to have a sustained interest on lead chalcogenide nanocrystalline semiconducting materials because of their potential applications [5]. For cooling and power generation applications among the existing lead chalcogenides, PbSe thin film is broadly used as thermoelectric materials [6]. Lead selenide thin films can be analyzed by various techniques [7-10]. We have selected, for our examination, chemical bath deposition (CBD) method. This paper introduces the mechanism of analysis and characterization of PbSe thin films.

Experimental

The PbSe thin films were deposited via simple CBD technique at room temperature using lead nitrate, sodium selenosulphate and sodium hydroxide as the starting materials. For thin film deposition starting materials of (0.5 M) of lead nitrate and (0.5 M) of sodium hydroxide were dissolved in 50 ml of distilled water in a glass vessel. The vessel with reactive solution was kept in the room temperature. The (0.5 M) of Ethylene Diamine Tetra acetic Acid (EDTA) was added into the solution, which easily binds with metal ions. 50 ml of sodium selenosulphate solution was used. The solution was blended well with the help of a magnetic blender to get a homogeneous mixture. At the temperature of 80 °C the deposition was accomplished and the growth time was 3h. Inside the vessel a glass substrate was vertically placed. After some time interval, to clean the glass slide before washing with deionized water, the slide was detached from the bath and dried inside a hot oven. Finally, the homogeneous nature of the end films was observed.

Results and discussion

Structural studies

The phase combination and the structure of the film were determined by X-ray diffraction examination. The XRD patterns of PbSe thin films are shown in Fig. 1. The formation of crystallized PbSe thin films was indicated by the strong and sharp diffraction peaks. It could be seen that the other peaks were dominated by the major peak (200). The well-defined peaks were observed in the XRD pattern. The peaks at (200), (111), and (220) showed that the polycrystalline thin film exhibited itself in the cubic phase and, therefore, were indexed according to the cubic structure. The crystalline size was found to be about 22.3 nm using Scherrer formula.

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Review of nanostructures for thermal energy applications   (Article)

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Abstract   ⌄ View references (39)

Nanoscale structures significantly alter the surface reaction rates and electrical transport throughout the material, causing a dramatic improvement in energy storage, conversion, and generation. Furthermore, the design of nanoscale materials to be applied in alternative energy devices is a predictable way to develop a wide range of new technologies for a more sustainable future. Heat transfer influences the performance and reliability of a variety of electronic micro- and nanostructures, ranging from nanopillar transistors and high-density thermomechanical data storage devices. Therefore, the goal of this paper is to present basic fundamentals and the most relevant properties of nanostructured materials in order to improve thermal energy devices. The performance of these devices ultimately depends on successful interfacial engineering between wide varieties of materials at the nanometer length scale. This review summarises recent studies of thermal transport in nanoscaled materials. Different from bulk materials, new physics and novel thermal properties arise in low dimensional nanostructures, such as the abnormal heat conduction, the size dependence of thermal conductivity, phonon boundary/edge scatterings. Based on manipulating phonons, we also discuss envisioned applications of nanostructures in a broad area, ranging from thermo electrics and heat dissipation to phononic devices. © 2016, Scibulcom Ltd. All rights reserved.

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Thermal rectification reversal in
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Structural, Optical, Morphological and Dielectric Properties
of Cerium Oxide Nanoparticles

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Cerium oxide (CeO_2) nanoparticles were prepared by the precipitation method. The average crystallite size of cerium oxide nanoparticles was calculated from the X-ray diffraction (XRD) pattern and found to be 11 nm. The FT-IR spectrum clearly indicated the strong presence of cerium oxide nanoparticles. Raman spectrum confirmed the cubic nature of the cerium oxide nanoparticles. The Scanning Electron Microscopy (SEM) analysis showed that the nanoparticles agglomerated forming spherical-shaped particles. The Transmission Electron Microscopic (TEM) analysis confirmed the prepared cerium oxide nanoparticles with the particle size being found to be 16 nm. The optical absorption spectrum showed a blue shift by the cerium oxide nanoparticles due to the quantum confinement effect. The dielectric properties of cerium oxide nanoparticles were studied for different frequencies at different temperatures. The dielectric constant and the dielectric loss of the cerium oxide nanoparticles decreased with increase in frequency. The AC electrical conductivity study revealed that the conduction depended on both the frequency and the temperature.

Keywords: *Cerium oxide, XRD, FTIR, FT-Raman, SEM, TEM, Dielectric studies*

1. Introduction

Nanoscience deals with matter at nanoscale dimension, typically in the size range between 1 nm and 100 nm. Unique phenomena/novel properties that are found in materials at the nanoscale enable nanotechnology to be applied in various fields and form a solid basis towards technological breakthrough. Interestingly, such properties are not observed at the atomic/molecular scale or at the bulk scale, thus making nanotechnology an emerging technology of the 21st century. The surface to volume ratio is much higher in nanoparticles compared with their respective bulk materials. Therefore, surface atoms that are known to be in an energetic state different from that of the bulk atoms make significant contribution to the total free energy. Cerium oxide (CeO_2) is a semiconductor with wide band gap energy (3.19eV). In the recent years, much effort has been made towards the development of new synthetic routes for preparing nanostructure cerium oxides due to their potential uses in many applications, such as high-storage capacitor devices, buffer layers for conductors, fuel cells, polishing materials, UV blocks and optical devices [1-7]. The cerium oxide nanoparticles are prepared by various methods [8-12]. This paper deals with the preparation of cerium oxide nanoparticles using the precipitation method. The prepared nanoparticles were characterized by powder X-ray diffraction analysis, FTIR, Raman spectrum, Scanning Electron Microscopy (SEM), Transmission Electron Microscope (TEM) UV-analysis and dielectric studies.

2. Experimental Procedure

Cerium oxide (CeO_2) nanoparticles were prepared by the precipitation method using cerium sulfate ($Ce_2(SO_4)_2$), oxalic acid ($H_2C_2O_4$). In a typical synthesis procedure, 1 g of cerium sulfate dispersing was put into 100 mL distilled water to form a clear solution, which was stirred strongly at room temperature for about 5 h. The obtained clear solution was added drop-wise to 10 ml ammonia water under constant stirring condition for 2 h. The resultant synthesis precipitate was washed with deionized water and dried at 70°C for 24 h. The X-ray diffraction analysis (XRD) pattern of the CeO_2 nanoparticles was recorded by using a powder X-ray diffractometer (Schimadzu model: XRD 6000 using CuKα (λ=0.154 nm)) radiation, with a diffraction angle between 20 and 80°. The crystallite size was determined from the broadenings of corresponding X-ray spectral peaks by using Scherer's formula. The FTIR spectrum of the CeO_2 nanoparticles was taken using an FTIR model Bruker IFS 66W Spectrometer. Raman spectrum was obtained using a

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Studies on electrical properties of MgO/Pr₆O₁₁ nanocomposite

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Abstract

Magnesium Oxide/Praseodymium Oxide (MgO/Pr₆O₁₁) nanocomposite was prepared by sol–gel method. X-ray diffraction analysis confirmed the cubic structure. The morphology was studied using high-resolution scanning electron microscopy picture. The AC/DC conductivity and dielectric properties were investigated in the frequency range of 1–4 KHz and in the temperature range of 303–573 K. The results showed that the dielectric constant and the tangent loss were frequency and temperature dependent. The AC/DC conductivity at different temperatures indicated that the conductivity was thermally activated. The activation energy for AC/DC conductivity was calculated using Arrhenius plot.

Introduction

In recent years, nanocomposites have been the subject of renewed attention, due to their enhanced physical, chemical and biological properties and a wide range of applications. It has been found that the properties of nanomaterial differ from those of their individual atoms and molecules or bulk matter. The added advantage of nanocomposite is that the unstable bulk material can be rendered stable in the composite form. Ferrite–Magnesium Oxide (Fe–MgO),[1] Nickel–Titanium di-oxide (Ni–TiO₂),[2] Aluminium–Aluminium Oxide (Al/Al₂O₃),[3] Aluminium/Silicon carbide (Al/SiC)[4] and Copper/Neobium (Cu/Nb)[5] are some of the nanocomposites that were used in various automotive and general industrial applications, such as aerospace, electronic and military,[6] battery cathodes,[7,8] microelectronics,[9] non-linear optics,[10] sensors[11] and so on. Rare earth-doped metal oxides are potentially attractive because such materials exhibit unique physical and chemical properties used for various optical and electronic applications. In this work, we synthesized the MgO/Pr₆O₁₁ nanocomposite through a sol–gel method. 'Sol–gel'

route has proved to be a viable technique involving hydrolysis and polycondensation of a molecular precursor, such as metal alkoxides, to yield hydroxides or oxides under different conditions. Other advantages of sol–gel synthesis are that the final products prepared are homogeneous and products are relatively higher in purity.

In the present work, the AC conductivity, dielectric constant and dielectric loss measurements have been performed for MgO/Pr₆O₁₁ nanocomposites. The temperature and

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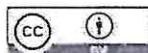[3] Department of Physics, Velammal Engineering College, Chennai, Tamil Nadu, India
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Studies on Growth, Spectral, Thermal, Mechanical and Optical Properties of 4-Bromoanilinium 4-Methylbenzenesulfonate Crystal: A Third Order Nonlinear Optical Material

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4-Bromoanilinium 4-methylbenzenesulfonate (4BPTS) single crystal was successfully grown from ethanol by slow evaporation method at room temperature. The structure of grown crystal was confirmed by single crystal X-ray diffraction studies. The presence of functional groups of grown crystal was confirmed by the Fourier transform infrared spectroscopy (FTIR) spectral analysis. UV–Visible absorption study was performed on the grown crystal to determine the cut-off wavelength. The thermal stability of the grown crystal was investigated from the Thermogravimetric analysis (TGA)/ Differential thermal analysis (DTA) analysis. The mechanical behaviour of grown crystal was studied by using Vicker's microhardness test. The third order non-linear optical properties of 4BPTS were investigated by Z-scan technique with He–Ne laser radiation and the corresponding non-linear refractive index and absorption coefficients were also calculated.

Keywords: *Single crystal, XRD, Thermal, Micorhardness and Z-scan Technique*

1. Introduction

In the present day technologically changing society, non-linear optical (NLO) materials are generally useful in the area of optical data storage, lasers, optical signal processing, second harmonic generation etc. Even though varieties of NLO materials exist, their applications are limited due to physical and chemical properties[1]. NLO applications require good quality single crystals which have large NLO coefficient coupled with improved physical parameters. One potentially attractive system, where there is a potential for realizing very large second order non-linear coefficient is based on organic crystals. Organic materials have been receiving much consideration because the NLO responses in this broad class of materials is microscopic in origin, offering a chance to use theoretical modeling coupled with synthetic flexibility to design and produce novel materials[2,3]. Further studies on organic NLO materials have accordingly produced very good materials with highly attractive characteristics. Organic crystals have been widely studied owing to their non-linear optical coefficients being often larger than that of inorganic materials. In addition to large NLO coefficient, an organic NLO crystal should be transparent in the UV region[4,5]. NLO applications require materials with very large macroscopic second order susceptibilities which are usually constituted from molecules with large molecular first hyperpolarizability and oriented in a non-centrosymmetric arrangement[6]. The majority of the commercial materials for second order applications are inorganics, particularly for high power use. Organic materials are apparent as being structurally more diverse and therefore are believed to have more long term promise than inorganics. In the present work, we have investigations on the 4-Bromoanilinium 4-methylbenzenesulfonate (4BPTS) crystals that were grown by slow evaporation technique. The grown crystals were subjected to various characterization methods such as XRD studies, FTIR studies, UV-Visible measurements, TGA/DTA, microhardness and Z-scan technique.

2. Synthesis and crystal growth

The analytical grade reagents were used for synthesis of 4BPTS compound. 4- Bromoaniline (C_6H_6BrN) and paratonesulfonate acid ($C_8F_{17}SO_3H$) in the equimolar ratio (1:1) were dissolved in ethanol at room temperature. The solution was stirred for about 5 hours for reaction to take place completely. The synthesized salt was further purified by repeated recrystallization in ethanol. The purified 4BPTS salt was dissolved in ethanol until saturation occurred at 40°C. The homogeneously grown solution was prepared by continuous stirring of the solution. The saturated solution thus obtained was further purified and allowed to evaporate at higher temperature. Using repeated recrystallization process the synthesized material was purified. Spontaneous nucleation that occurred led to the production of tiny seed crystals with good transparency. A flawless seed crystal was selected out of these crystals and suspended in the mother solution so as to enable it to evaporate at room temperature. Single crystals with large size were obtained due to the formation of monomers at the seed crystal sites from the mother solution, after the completion of nucleation and

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Studies on synthesis, structural, surface morphological and electrical properties of Pr_6O_{11}–MgO nanocomposite

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Abstract We synthesized Pr_6O_{11}–MgO nanocomposites through sol–gel route using praseodymium acetate and magnesium acetate tetrahydrate. The grain size and the morphology of the synthesized nanocomposite were characterized using XRD and HRSEM. The elemental compositions of the synthesized samples were analyzed using EDAX spectra. The dielectric constant, tangent loss and AC conductivity of the synthesized samples were studied in the frequency range of 100 Hz–5 MHz at different temperatures (303–573 K) using impedance analyzer. The activation energy was calculated using Arrhenius plot. The results are discussed in this paper.

1 Introduction

Dielectric materials have gained great scientific importance owing to their applications in micro and nano-electronics. The good dielectrics are characterized by their high electrical strength and low dielectric loss. Vigorous research is being carried out to unearth the nature of the different types of dielectrics such as glass dielectrics [1–4], ceramic dielectrics [5, 6] polymer based dielectrics [7], etc., and their potential applications in mobile electronic devices, stationary power systems, hybrid electric vehicles, and pulse power applications [7–11]. High K-dielectric materials are used as memory devices like CMoS, SoC, DRAM, FeRAM capacitors etc. High K-dielectric materials such as Al_2O_3, Ta_2O_5, ZrO_2, BST (Ba–Sr–Titanate) are most commonly selected in order to ensure low leakage. Magnesium oxide (k $\approx$ 9.8, band gap $\approx$ 7.2 eV) and praseodymium oxide (k $\approx$ 26–30, band gap $\approx$ 3.9 eV) are highly K-dielectric materials and the composites prepared by using these two metal oxides find their applications in storage devices. MgO is an important dielectric material used as a buffer layer in ferroelectrics and superconducting materials, magnetic tunnel junction (MTJ) sensors, radiator in thermo photo voltaic (TPV) devices [12–14]. The finding of Jagannathan et al. [15] revealed that CMoS capped with MgO can more readily diffuse into the HfO_2 stack than Al_2O_3. Praseodymium oxide (PrO_x) has been found to be a promising rare earth oxide that can find many potential applications in nanodevices and microelectronic devices owing to its high K-dielectric nature. Crystalline praseodymium oxide film grown on Si (001) has been found to exhibit outstanding dielectric properties, ultra-low leakage current density and good reliability [16] with a capacity to play a prominent role in sensing material in the detection of ethanol vapor [17], organic light-emitting diode [18], oxygen-storage components of three-way automotive catalysts [19] and non-volatile ferroelectric random access memory (Nv-FRAM) devices [20]. Praseodymium oxide (Pr_6O_{11}) shows exceptionally high electrical conductivity due to electron hopping between the mixed metal ion valence states of the lattice [21]. Hence, we successfully synthesized MgO–Pr_6O_{11} nanocomposites through a simple sol–gel route and investigated their dielectric properties. The physical properties of synthesized powder sample were studied by using different

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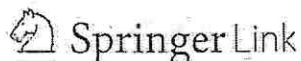
Synthesis and characterization of CoWO$_4$ nanoparticles via chemical precipitation technique

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Abstract

This paper has for its content the synthesis and the findings of structural, surface morphological, optical and electrical studies of CoWO$_4$ nanoparticles. Precipitation method was employed for the synthesis of CoWO$_4$ nanoparticles. To determine the average grain size of CoWO$_4$ nanoparticles the X-ray diffraction pattern was used. The presence of CoWO$_4$ nanoparticles was confirmed by the FT-IR spectrum. The scanning electron microscopy analysis revealed the facts about the surface morphology of CoWO$_4$ nanoparticles. The transmission electron microscopic analysis helped to measure the size of the particle formed. The absorption spectrum and photoluminescence spectrum made it possible to analyze the optical properties of CoWO$_4$ nanoparticles. The contribution of this work is that the dielectric properties such as the dielectric constant, the dielectric loss, and the AC conductivity of the CoWO$_4$ nanoparticles were studied at different frequencies and temperatures.

Keywords

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Synthesis and Characterization of Yttrium Stabilized Zirconia Nanoparticles

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Yttria stabilized zirconia (YSZ) nanoparticles were synthesized by the co-precipitation method. The crystallinity, morphological and optical properties of the YSZ nanoparticles were studied by using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), FT-Raman, photoluminescence (PL) spectrum analyses. The grain size and crystal structure of the YSZ was confirmed by XRD. SEM and TEM analyses showed that the synthesized samples were composed of the size of nanometers. The optical property of the synthesized nanoparticles was studied from the photoluminescence spectrum. The dielectric properties such as the dielectric constant, the dielectric loss and AC conductivity of the YSZ nanoparticles were studied in the different frequencies and temperature.

Keywords: *Yttria stabilized zirconia, Nanoparticles, FT-Raman, SEM, TEM, and Dielectric studies*

1. Introduction

Zirconia (ZrO_2) nanoparticles have been reported to have unique properties such as excellent refractoriness, chemical resistance, good mechanical strength, high ionic conductivity, low thermal conductivity at high temperature together with relatively high thermal expansion coefficient and good thermal stability[1,2]. A wide-ranging industrial applications including fabrication of dense ceramics, sensors, batteries, capacitors, corrosion-resistant and thermal barrier coatings, solid electrolytes for fuel cells, catalysts, etc. have been established[3-5]. It is therefore vital to study the ZrO_2 nanoparticles. Pure ZrO_2 has three main polymorphs-monoclinic, tetragonal and cubic. The monoclinic form is thermodynamically stable at room temperature but transforms reversibly to the tetragonal structure above 1170°C. High temperature polymorphs (tetragonal and cubic) have to be stabilized at lower temperature because of their application in various fields, either by adding stabilizers such as Y_2O_3, MgO, and CaO or by reduction in grain or particle size into nanometer regime[6]. Owing to its wide applications and exceptional properties such as high mechanical strength, good chemical stability, high level of oxygen-ion conductivity, corrosion resistance, low thermal conductivity, and interesting luminescent functions, yttria stabilized zirconia (YSZ) plays an important role among the doped alloys of ZrO_2[7-12]. In the present study, co-precipitation method was employed to prepare the Yttria stabilized zirconia nanoparticles. The structural, spectral optical and electrical properties of the Yttria stabilized zirconia nanoparticles were determined in depth by means of XRD, FT-IR spectroscopy, PL, SEM, TEM, and Dielectric measurements.

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2. Experimental Synthesis

For the preparation of Yttria stabilized zirconia (YSZ) powders by co-precipitation method, zirconium (IV) acetate hydroxide ($C_6H_{10}O_7Zr$), yttrium (III) acetate tetrahydrate ($C_6H_9O_6Y\cdot4H_2O$) and oxalic acid dehydrate ($C_2H_2O_4$) were used. The stoichiometric amounts of zirconium (IV) acetate hydroxide and yttrium (III) acetate tetrahydrate were dissolved in diluted acetic acid. The obtained solution of Y and Zr salts was slowly poured into aqueous solution of oxalic acid under active stirring at 60°C for 20 min. As a result, white opaque colloidal solution was formed. To promote sedimentation, concentrated ammonia solution was added drop-wise to the reaction mixture up to pH 9–10. The precipitate was filtered, washed with distilled water and acetone and then dried for 24 h at 100°C in air. The dried precipitate was ground to fine powder using agate mortar and pestle. The powders were calcined at 700°C for 3 h. The XRD pattern of the Yttria stabilized zirconia (YSZ) nanoparticles was noted by using a powder X-ray diffractometer (Schimadzu model: XRD 6000 using CuKα ($\lambda = 0.154$ nm) radiation, with a diffraction angle between 20° and 80°. Scanning Electron Microscopy (SEM) studies were carried out on JEOL, JSM-67001. Image of Transmission Electron Microscope (TEM) was taken using an H-800 TEM (Hitachi, Japan) with an accelerating voltage of 100kV. Raman spectrum was obtained using a Bruker RFS 27: stand-alone model Raman spectrometer. The photoluminescence (PL) spectrum of the Yttria stabilized zirconia (YSZ) nanoparticles was recorded using the Perkin-Elmer lambda 900 spectrophotometer with a Xe lamp as the excitation light source. The dielectric - and the dielectric loss of the pellets of Yttria stabilized zirconia nanoparticles in disk form were examined for various frequencies and temperatures. The dielectric properties of the Yttria stabilized zirconia (YSZ) were analyzed over the frequency range 50Hz-5MHz using a HIOKI 3532-50 LCR HITESTER.

PAPER

Synthesis and Study of Optical properties of MgO based TM oxide (TM=Cu, Mn and Zn) nanocomposites

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Keywords: ZnO/MgO, MnO/MgO, CuO/MgO

Abstract

A nanocomposite of MgO based transition metal (TM) oxide (TM=Zn, Mn, and Cu) was synthesized using sol-gel method. The powder x-ray diffraction confirmed the phase purity and particle size. The surface morphology and elemental composition were examined by High resolution scanning electron microscopy and energy-dispersive x-ray spectroscopy. The change in optical band gap of the synthesized nanocomposites, by increasing the Mg content was determined using UV–vis spectra and the luminescent properties were analyzed using photoluminescence spectra.

1. Introduction

Transition metal oxides (TMO) such as MnO_2, RuO_2, TiO_2, ZnO, $BaTiO_3$, ReO_3, NiO_2, CuO, CrO, etc have unique properties which have led to many technological applications such as microelectronics, gas and bio-sensors, batteries, solar cells, fuel cells, super capacitors, pigments, magnetic data storage devices and multi-ferroics [1–5]. These materials have unusual and useful electronic and magnetic properties. In particular, the luminescent properties of the TMO were used in optoelectronic and photonic applications, that is, dye sensitized solar cells [6], photo chromic and photo electrochromic system for digital display [7, 8], optical sensor [9, 10] etc. The elements doped with TM oxides result in the synthesis of new compounds of different properties. This paper discusses the synthesis of ZnO/MgO, MnO/MgO, and CuO/MgO nanocomposites by sol-gel method and their morphological and optical properties. ZnO is an important semiconducting metal oxide ($E_g = 3.37$ eV) [11] with high exciton binding energy (60 meV) that makes it a promising material for solar cells and lighting devices [6]. Manganese oxide is another very attractive inorganic material whose band gap is 2.23 eV [12] with excellent physicochemical properties. It finds its applications in bio-sensors, catalysis, Li-ion batteries and so-called super capacitors for energy conversion and storage [13–15]. Copper oxide is a narrow band gap ($E_g = 1.8$–2.5 eV) [16] TM oxide semiconductor with a variety of applications such as photovoltaic device fabrication, sensors, electrode material in Li-ion batteries and superconductors [17–19]. MgO is an important dielectric material whose band gap is 7.8 eV [20]. This material attracts its use as humidity sensors [21]. MgO is a good dosimeter, which absorbs the x-rays, γ-radiations and Ultra violet region in the spectrum [22, 23]. It is used as a radiator in Thermo Photo Voltaic devices because of its high thermal stability [24]. In this research, we attempt to modify the band gap and luminescent properties of some TM oxides (TM = Zn, Mn, and Cu) using magnesium oxide.

2. Experimental details

2.1. Materials

Analytical grade Magnesium acetate tetra hydrate, Zinc acetate, Manganese acetate and copper acetate were used as starting materials; double distilled water was used as a solvent. Acetic acid was taken as chelating agent.

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Synthesis of lead titanate nanoparticles via sol–gel technique and its characterization

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Abstract This paper reports on the preparation and study of the structure, surface morphology, optical and electrical properties of lead titanate ($PbTiO_3$) nanoparticles. The preparation of $PbTiO_3$ nanoparticles was done by the sol–gel method. X-ray diffraction pattern was used to calculate the average crystallite size of $PbTiO_3$ nanoparticles. Scanning electron microscopy and atomic force microscopy analyses were used to study the surface morphology of $PbTiO_3$ nanoparticles. The transmission electron microscopic analysis was used to measure the particle size of $PbTiO_3$ nanoparticles. Absorption spectrum and photoluminescence spectrum were used to analyze the optical properties of $PbTiO_3$ nanoparticles. The study of the dielectric properties of $PbTiO_3$ nanoparticles like the dielectric constant, the dielectric loss and the AC conductivity were studied at different frequencies and temperatures.

1 Introduction

Nanostructure materials have attracted a wide attention due to their unique properties and immense potential applications for optodevice fabrication besides distinct geometries, and novel physical and chemical properties from those of their bulk counterparts. The physical properties and the potential applications of nanostructures and nanomaterial are studied intensively [1]. The special properties of materials at the nanoscale like a large surface-to-volume ratio and increased surface activity are subjects of higher interest as compared with those of the bulk material. The bulk material properties mostly depend on the size of the primary particles. This size confinement in the radial direction of materials of the nanostructures is the influencing and promising characteristic of the candidates to be studied and considered for use in nanoscale electronic optical and magnetic devices. The ferroelectrics with perovskite structure (ABO_3), for example, barium titanate ($BaTiO_3$) and lead titanate ($PbTiO_3$) are mostly studied ferroelectric oxides due to their flexible properties that can be used in thin film capacitors, actuators, electronic transducers, pyroelectric sensors, high-k dielectrics, and nonlinear optics. The unconventional chemical and physical properties of the particles with nanoscopic dimensions are the driving force for research endeavors. $PbTiO_3$ with tetragonal perovskite structure at room temperature contains ferroelectric compound with Curie temperature of 490 °C, high spontaneous polarization, high pyroelectric coefficient and low dielectric constant [2]. Due to a large pyroelectric coefficient and a relatively low permittivity, $PbTiO_3$ is widely applied in electronics such as multilayer capacitor, resonators, and ultrasonic transducers [3–5]. The determination of the crystalline structure of $PbTiO_3$ is done by neutron diffraction and presented tetragonal symmetry [6, 7]. For high frequency applications, $PbTiO_3$ ceramics modified by rare earth elements and alkaline earth elements are extremely good [8, 9]. These properties of the ceramics are strongly related to stoichiometry. Intermediate phase significantly damages the electrical properties [10]. The formation of perovskite is delayed and hindered by the formations of lead deficient phase [11]. This paper deals

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The Role of Geo-Disturbances on the Geotechnical Behavior of Dredged Sediments

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Abstract: Dredging creates geo-disturbances to the formations. This geo-shock modifies the Geotechnical properties of the original formation. Soil location, area, classification and moisture content are primary drivers of the dredging activity. In this chaotic condition the effect of water content (moisture) in the dredged materials is considered in four stages. In the first stage the effect of water (hydrolysis) in the evolution stage of clay minerals and their weathering processes before dredging is discussed. In the second stage the documented and published research papers which deal with moisture content variation (low, medium or high) on clay minerals are analysed. In the third stage a conceptual model of three layer system with equal thickness consisting of kaolinite, illite, and montmorillonite with different sequences after placing dredged materials is considered. In the fourth stage the effect of torrential rainfall on different sequences of layers is considered and linked to consolidation settlement and differential settlement, to bring out multi-disciplinary approach to solve complex soil/dredged sediments problems. The shrinkage indexes of clay minerals play a major role in deciding the stability and geo-technical behaviour of dredged sediments.

Keywords: Coefficient of consolidation, Differential settlement, Geo-disturbances, Hydrolysis, Shrinkage index.

INTRODUCTION

In mineralogical evolution of clays, (Jean-Paul Legros,2013) amongst the weathering phenomena, hydrolysis is very important. Clay minerals of 2/1 type, which first appear, are silica-rich with two tetrahedral silica sheets. The 1/1 clay minerals that follow have but one tetrahedral sheet and the last, gibbsite, has none at all. It is important to consider temperate and tropical environments. The kaolinite-gibbsite association is mostly characteristic of tropical environments. In temperate climate only small amount of gibbsite is produced. This creates basic difference in dredged material in different environment. A conceptual model of three layer system consisting of kaolinite, illite and montmorillonite (each unit thickness)is considered with symbols K, I, M respectively. The Geo- disturbance caused by dredging varies from pocket to pocket in the soil

Trend in Coral-Algal Phase Shift in the Mandapam Group of Islands, Gulf of Mannar Marine Biosphere Reserve, India

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Abstract The present study revealed proliferation of macro-algae modifying coral reef ecosystems in a different manner due to diseases and sedimentations in the Mandapam group of islands in the Gulf of Mannar. Benthic surveys were conducted with major attack of seven coral reefs diseases with high sedimentation rate, nine species of fleshy macro-algae (*Turbinaria ornata, Turbinaria conoides, Caulerpa scalpelliformis, Caulerpa racemosa, Kappaphycus alvarezii, Padina gymnosphora, Sargassum wightii, Ulva reticulata* and *Calurpa lentillifera*) proliferation against major corals life forms (Acropora branching, Acropora digitate, Acropora tabulate, coral massive, coral submassive, coral foliose and coral encrusting). The results confirm that diseased corals most favor to macro-algae growth (15.27%) rather than the sedimentation covered corals (8.24 %). In the degradation of coral life forms, massive corals were more highly damaged (7.05%) than any other forms. Within a short period of time (May to September), coral coverage shrank to 17.4% from 21.9%, macro-algae increased 23.51% and the average sedimentation rate attained 77.52 mg cm^{-2}d^{-1} with persisting coral reef diseases of 17.59%. The Pearson correlation showed that the coral cover decreased with increasing macro-algae growth, which was statistically significant ($r=-0.774$, $n=100$, $P<0.0005$). The proliferation of the various macro-algae *C. scalpelliformis, T. ornata, C. racemosa, T. conoides, U. reticulata, S. wightii, K. alvarezii, P. gymnosphora* and *C. lentillifera* increased with percentages of 6.0, 5.8, 5.7, 4.9, 4.2, 3.7, 2.7 and 1.9, respectively. If this trend continues, the next generation of new recruit corals will undoubtedly lead to a phase shift in Gulf of Mannar corals.

Key words climate change; sedimentation; disease; proliferation; recovery; macroalgae; Mandapam; Gulf of Mannar

1 Introduction

Coral reef ecosystem is space limited and known for their precious resources. Worldwide most of the corals are declining because of increased frequency of climatic pressures coupled with other natural and anthropogenic stresses (Hughes and Connell, 1999). This includes habitat destruction, pesticide and heavy metal accumulation; nutrient loading paves way to shifts in competitive interactions, direct mortality, reproductive failure, and insufficient recruitment in coastal reefs (Richmond, 1993).

Coral reef decline and subsequent recovery in Indo-Pacific regions is only 29% compared to 57% in Western Atlantic (Connell, 1997) and the Great Barrier Reef degradation is noticed at the level of 0.53% yr^{-1} during the period 1985 to 2012 (De'ath *et al.*, 2012). The majority of coral reefs on the globe are facing phase shifts in terms of dominating macro-algae, corallimorph, sponge and sea urchins (Maliao *et al.*, 2008; Mumby, 2009; Norstrom *et al.*, 2009), whereas Caribbean waters, especially in Jamaica, are noticed with phase shift reversal (Idjadi *et al.*, 2006). Phase shift phenomena can be triggered by various environmental disturbances such as diseases, predations, nutrients, hurricane, sedimentation load, reduced herbivores due to anthropogenic activities and coral bleaching.

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Unethical Practices and Values of Marketing Executives of Pharma Industries in the Present Corporate World

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ABSTRACT

The authors are convinced that business ethics in its present form is not sufficient to overcome the reluctance of a large number of companies and owners to adopt ethics in their business. A more activist and direct approach is needed, and this paper intends to find the origin of such an activist ethics in business. In addition to reviewing mechanisms for promoting an ethical climate, where appropriate reference will be made to prior research and specific organizations where these practices have been used successfully. Pharmaceutical companies when they promote branded ethical products to doctors simultaneously they dispatch branded generic products directly to the wholesaler to push it to the retail chemists. The many retail chemists, they sell or substitute both the branded products for the same diseases which are indicated for diseases by the doctor. They welcome the free bees given to them by the stockiest and simultaneously they substitute the generic products with the patients' concurrence even. The pharmaceutical industry should consider adopting more ethical business strategy that benefits patients rather than supermarket pushing the products to the consumer. The paper concludes with a set of summary recommendations for managers embarking on the introduction of an ethical programme to their organization.

Keywords: Unethical Practices, Values, Marketing, Executives, Pharma Industries, Business and Behaviour.

INTRODUCTION

The consumers' international reports say, drug companies use unscrupulous and ethical marketing tactics not only influence doctors to prescribe their products but also to persuade consumers that they need them. Drug companies are not permitting to advertise products to the public. But companies are increasingly looking to influence consumers through funding patients group and launching disease awareness campaign which do not name a product but are likely encourage patients to seek treatment. This type of friendly making is often disguised as a corporate responsibility and has been shown to create a need among consumers to demand drugs for the conditions. Consumers are in the dark about how their medicine consumption choices out or the results of valid relationships between doctors and pharmaceutical companies. "Rather than doctors personal profit, patients' interest should be the priority.

Brief Overview of Ethical Practices of Professionals

The philosopher Schopenhauer believed in the eventual triumph of truth, despite the disappointments engendered by his indifferent contemporaries. Today, we live in a time of accelerated changes, and we do not have the long life to wait for the truth. Activist business ethics, business ethics with a more activist militant approach, is needed in order to remedy the wrongdoing committed to the stakeholders and minority shareholders. This can be achieved by cooperation between ethical businessmen and businesswomen, academics, educationists and associations of stakeholders and minority shareholders.

The Professionals claims that the moral statute of an action should not be judged by its consequences, as the utilitarians advocate, but by its intention, as the consequences cannot be predicted. Therefore, we should treat others as we would want them to treat us, not through interest, but by conviction. Yet this principle is not the guideline of many companies in the modern business world, although most of religions and philosophers have professed it in the last so many years.

When we talk about ethics, the three words comes to our mind i.e. honesty, integrity and values. Earlier days, we used to talk about professional ethics which were understood in the context of Doctors and Advocates. Like a doctor, will take the oath before entering into profession to follow the laid-down principles. The ethics were very much attached with the value system of a person. Following the path of honesty and maintaining integrity while undertaking the professional jobs was the way of life. The medical profession was considered as the most noble profession, similarly, the teaching profession was also highly respected, the advocates followed the ethics of doing justice with the client by way of defending the case with best of their capability.

When we talk about the business the definition was something different. If marketing was to be defined, it was "making the product available from manufacturer to

Design and Performance Analysis of MIMO- OFDM System Using Different Antenna configurations

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Abstract—The key challenge faced by future wireless communications systems is to provide high-data-rate wireless access at high quality of service (QOS). Multiple-input multiple-output (MIMO) wireless technology seems to meet these demands by offering increased spectral efficiency through spatial multiplexing gain, and improved link reliability due to antenna diversity gain. OFDM may be combined with antenna arrays at the transmitter and receiver to increase bandwidth efficiency and robustness using multipath signal propagation, resulting in a MIMO-OFDM configuration. The forward error correction (FEC) along with powerful interleaving algorithms plays an important role in the improvement of the performance of the MIMO-OFDM systems.. In this paper we have designed a simple MIMO OFDM system with convolutional coding with code rate ½ and analysed the performance of the system using different antenna configuration in AWGN channel. It was concluded higher antenna configuration give best performance.

Keywords—MIMO, OFDM, BER, FEC, QOS, high data rate, link reliability.

I. INTRODUCTION

The key challenge faced now days by future wireless communications systems is to provide high-data-rate wireless access at high quality of service (QOS). Combined with the facts that spectrum is a limited resource and propagation conditions are unfriendly due to fading and interference from other users, this requirement calls for means to radically increase spectral efficiency and improve link reliability. Recently MIMO-OFDM systems have gained considerable attentions from the leading industry companies and the active academic community. The MIMO system as a system with multiple antennas at the transmitter and the receiver theoretically allows linear growth of the link capacity. The capacity is proportional to the rank of MIMO channel. While high spectral efficiency can be obtained through spatial multiplexing, many other MIMO systems benefits such as improved signal quality and coverage can be achieved via spatial diversity, beam forming space time coding and interface cancellation.

Orthogonal frequency-division multiplexing (OFDM) is a digital modulation in which the data stream is split into N parallel streams of reduced data rate with each of them transmitted on separate subcarriers. In short, it is a kind of multi-carrier digital communication method [1]. OFDM has been around for about 40 years and it was first conceived in the 1960s and 1970s during research into minimizing interference among channels near each other in frequency. OFDM has been proposed as a transmission method to support high-speed data transmission over wireless links in multipath environments.

By combining MIMO system with OFDM technique the desired system requirements, such as good coverage in non-line-of-sight environment, reliable transmission, high peak data rates as well as high spectral efficiency, may be fulfilled. Multi-stream multi-carrier wireless transmission has been already standardized in IEEE 802.11n WLAN, IEEE 802.16 WMAN, IEEE 802.16 WiMAX as well as in 3GPP Long Term Evolution' (LTE) and it will be the key transmission technology for the upcoming 4G broadband wireless communication networks [2]. The forward error correction (FEC) mechanism plays an important role in the performance of MIMO-OFDM systems. One aspect of the MIMO-OFDM system that has not been investigated adequately is the use of different antenna configurations.

II. MULTIPLE INPUT- MULTIPLE OUTPUT SYSTEM

Most wireless communication systems use Single Input Single Output (SISO) systems where a single transmit (Tx) antenna is used for transmission to a single receive (Rx) antenna. Additional transmitting antennas and receiving antennas can be used to provide better result at the receiver. In the days this scenario is likely to change with the advent of Multiple Input Multiple Output (MIMO) communication systems. Commonly, MIMO techniques have three categories. First category uses the increasing of spatial diversity to enhance the power efficiency. While, the other category aims to increase the capacity by using layered method. Lastly, by knowledge the properties of the transmission channel; the third class analyses the coefficient matrix of the channel and uses these analyzing unitary matrices as filter in transmitter and receiver to improve the capacity.

MIMO wireless systems employ multiple transmitter and receiver antennas, and increase system capacity by means of

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ORIGINAL RESEARCH

Sequential cultivation of human epidermal keratinocytes and dermal mesenchymal like stromal cells in vitro

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Mohammad Mahboob Kanafi · Suniti Mishra · Krupa Shankar · Rajarshi Pal ·
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Abstract Human skin has continuous self-renewal potential throughout adult life and serves as first line of defence. Its cellular components such as human epidermal keratinocytes (HEKs) and dermal mesenchymal stromal cells (DMSCs) are valuable resources for wound healing applications and cell based therapies. Here we show a simple, scalable and cost-effective method for sequential isolation and propagation of HEKs and DMSCs under defined culture conditions. Human skin biopsy samples obtained surgically were cut into fine pieces and cultured employing explant technique. Plated skin samples attached and showed outgrowth of HEKs. Gross microscopic examination displayed polygonal cells with a granular cytoplasm and H&E staining revealed archetypal HEK morphology. RT–PCR and immunocytochemistry authenticated the presence of key HEK markers including trans-membrane protein epithelial cadherin (E-cadherin), keratins and cytokeratin. After collection of HEKs by trypsin–EDTA treatment, mother explants were left intact and cultured further. Interestingly, we observed the appearance of another cell type with fibroblastic or stromal morphology which were able to grow up to 15 passages in vitro. Growth pattern, expression of cytoskeletal protein vimentin, surface proteins such as CD44, CD73, CD90, CD166 and mesodermal differentiation potential into osteocytes, adipocytes and chondrocytes confirmed their bonafide mesenchymal stem cell like status. These findings albeit preliminary may open up significant opportunities for novel applications in wound healing.

Keywords Human skin · Primary keratinocytes · Mesenchymal stem cells and co-culture

Shyam Mahabal and Vijay Bhaskar Reddy Konala have contributed equally to this work.

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Introduction

The skin is the largest organ of the integumentary system in human composed of multiple layers of tissues such as epidermis and dermis. The principal

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An efficient design of serial and parallel memory using Quantum dot cellular automata

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Abstract— Quantum cellular automata (QCA) is a new technology in the nanometer scale and has been considered as one of the alternative to CMOS technology. In this paper, we describe the design and layout of a serial memory and parallel memory, showing the layout of individual memory cells. Assuming that we can fabricate cells which are separated by 10nm, memory capacities of over 1.6 Gbit/cm2 can be achieved. Simulations on the proposed memories were carried out using QCADesigner, a layout and simulation tool for QCA. During the design, we have tried to reduce the number of cells as well as to reduce the area which is found to be 86.16sq mm and 0.12 nm2 area with the QCA based memory cell. We have also achieved an increase in efficiency by 40% .These circuits are the building block of nano processors and provide us to understand the nano devices of the future.

Keywords— Quantum Dot, Serial memory and parallel memory

I. INTRODUCTION

The integrated chips in memory devices used currently are made of transistors using CMOS technology. Due to miniaturization and need for high performance, the IC chips are being embedded with millions of transistors. Since the Technology is approaching its scaling limit and practically there are lots of limitations in this technology due to frequent variations of parameters in the nano level design. So there is a need of efficient alternative to CMOS. This problem can be overcome by using a new nanotechnology Quantum dot Cellular Automata. The building block of every QCA circuit is majority gate and every QCA circuit can be built using Majority and inverter gate. The Majority Logic is the most important unit in QCA by which we can implement the basic Logic Gates like AND OR; and with the combination of the two (Majority and Inverter) we can implement NAND, NOR, XOR and other digital complex architecture. The memory which is a storage element is of two types: serial memory and parallel memory are implemented using QCAD and the design is implemented and simulated using QCA Designer software which gives an efficient output.

In this paper, the basics of QCA is explained in detail and the QCAD tool with its basic equations. A brief detail about the block diagram of serial and parallel memory is explained followed by the simulation results.

II. QUANTUM DOT CELLULAR AUTOMATA

A quantum-dot cellular automata (QCA) is basically a square nanostructure of electron wells which confines free electrons. Each cell has four quantum dots which can hold a single electron per dot and these dots are located at the corners of the cell and only two electrons are injected into a cell. By the clocking mechanism and interaction between electrons, the electrons can tunnel through neighboring cells during the clock transition. A potential barrier at the clock signal will lock the state and that results in a local polarization determined by Coulombic repulsion. Those two binary states can be used to make QCA cell a storage cell, a computing cell, or a wire. Quantum dot Cellular Automata is a paradigm where we can design nano level circuit. Electrons may move quantum mechanically through the channels, which are between the dots. Among the four quantum dots in a cell, two electrons are placed diagonally due to Columbic repulsion and the remaining two quantum dots are vacant. The tunnel helps the electron to move from one corner two other, thus helping in the flow of signal. There are two polarization states i.e. '+1' and '-1' depending on the placement orientation of the two electrons are given by:

$$P = \frac{(p_1+p_3)-(p_2-p_4)}{p_0+p_1+p_3+p_4}$$

Interactive Big Data Management in Healthcare Using Spark

J. Archenaa and E.A. Mary Anita

Abstract This paper gives an insight on how to use apache spark for performing predictive analytics using the healthcare data. Large amount of data such as Physician notes, medical history, medical prescription, lab and scan reports generated by the healthcare industry is useless until there is a proper method to process this data interactively in real-time. Apache spark helps to perform complex healthcare analytics interactively through in-memory computations. In this world filled with the latest technology, healthcare professionals feel more comfortable to utilize the digital technology to treat their patients effectively. To achieve this we need an effective framework which is capable of handling large amount of structured, unstructured patient data and live streaming data about the patients from their social network activities. Apache Spark plays an effective role in making meaningful analysis on the large amount of healthcare data generated with the help of machine learning components supported by spark.

Keywords Healthcare · Big data analytics · Spark

1 Introduction

In today's digital world people are prone to many health issues due to the sedentary life-style. The cost of medical treatments keeps on increasing. It's the responsibility of the government to provide an effective health care system with minimized cost. This can be achieved by providing patient centric treatments. More cost spent on healthcare systems can be avoided by adopting big data analytics into practice [1].

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Analysis of Malicious Behavior of Android Apps

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Abstract

As increasing in number of Android phones there is simultaneous increase in mobile malware apps which performs malicious activities such as misusing user's private information as sending messages i.e. SMS, reading users contact information and can harm user by exploiting the user's confidential data which is stored in mobile. Malware are speeded not only infecting the user's data but also harming several organizations in term of stealing of private and confidential data. Hence Malware classification and identification is a critical issue. Android users are unaware about several apps which they are using whether they are malware infected or not. Android applications require the concept of permission mechanism to show that apps are using certain permissions to get access to information from your device. Android apps which are installed in the smart phones get access to all the required permission during installation of apps. Google assure their customer in terms of security about the apps which are available to download from there play store. Android operating system is open system and it allows users to install any applications downloaded from any unsafe site. However permission mechanism is still very diminutive defense mechanism to assure that the applications can harm to user. Therefore in this paper we propose the Malware characterization from manifest file and allows user to improve the efficiency of Android permission to inform user about the risk of Android permission and apps.

Keywords: Andoid Security, permissions, maware apps

Combined Analysis Of Support Vector Machine And Principle Component Analysis For IDS

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Abstract— In the modern world we are using the smart devices for storing data, retrieving data and processing the data on the cloud which is energy users to manage a wide variety of subscribers, reading devices for measuring, billing, disconnection and connection of subscribers from the connection management is an important issue. The performance of these intelligent systems is based on information transfer in the context of storing Big data, so reported data from network should be managed to avoid the malicious activities that including the issues that could affect the quality of service the system. In this paper for control of the reported wireless data and to ensure the veracity of the obtained information, using intrusion detection system is proposed based on the support vector machine and principle component analysis (PCA) to recognize and identify the intrusions and attacks in the smart grid. Here, the operation of intrusion detection systems for different kernel of SVM when using support vector machine (SVM) and PCA simultaneously is studied. To evaluate the algorithm, based on data KDD99, numerical simulation is done on five different kernels for an intrusion detection system using support vector machine with PCA simultaneously. Also comparison analysis is investigated for presented intrusion detection algorithm in terms of time - response, rate of increase network efficiency and increase system error and differences in the use or lack of use PCA. The results indicate that correct detection rate and the rate of attack error detection have best value when PCA is used, and when the core of algorithm is radial type, in SVM algorithm reduces the time for data analysis and enhances performance of intrusion detection.

Keywords—PCA,SVM,Cloud,IDS,ART,ANN

I. INTRODUCTION

There are many advantages of using Wireless Sensor Networks (WSNs) to detect changes in the environment. Each individual node in the network can monitor its local region and communicate through a wireless channel with other nodes to collaboratively produce a high-level representation of the environment's states. By using such a network, large areas can be monitored to detect intruders with low cost. Furthermore, we enhance the detection process by adding autonomous mobile robots. Thus, the system becomes more flexible upon the detection of an intruder. The mobile robot can reach places and perform tasks that static sensors cannot. The sensor nodes first learn an initial model of the environment using a fuzzy ART neural network; we refer to this as the normal model of the environment. After the training period, any changes compared to the learned normal model are treated as anomalies possibly caused by an intruder [1]. Upon the detection of the anomaly, an intrusion alert is generated, and an autonomous mobile robot responds to the alert by traveling to the place where the sensor nodes have detected the anomaly. The robot uses its additional sensors (e.g., a camera) to verify if there is an intruder in the area. The mobile robot uses a camera to track moving objects. If there is a moving object, the robot declares that an intruder is detected. We have incorporated a machine learning technique into the WSN so that the networks can automatically learn to recognize normal and abnormal modes of operation. Our approach makes use of a fuzzy Adaptive Resonance Theory (ART) neural network, which was first implemented in a WSN by Kulakov and Davcev[2]. The fuzzy ART neural network system is an unsupervised Artificial Neural Network (ANN) that can perform dimensionality reduction and pattern classification. The network can continually learn from new events without forgetting what has already been learned. No off-line training phase is required. The algorithm is simple enough to be implemented in the tiny platform of the Crossbow motes [1], yet still achieve good performance. However, a shortcoming of the original fuzzy ART approach is that it does not detect time-related changes. We have, therefore, enhanced the basic fuzzy ART system to enable it to learn a time-series through the use of a Markov chain. The approach builds a state transition model on-line during the initial period of deployment, and considers the built model as the normal model. After the training phase is over, any events that occur in the environment that do not fit the existing transition model are considered as abnormal events. As can be seen in Figure 1 smart networks using telecommunications equipment and the context of information technology Star, that this area efficiently monitoring and control to complete protective measures and maintain security infrastructure is a critical need. Security in smart system throughout the measurement process from meter and DC to CAS, which are consists many of hardware and software systems must considered and all factors such as manufacturers, suppliers and regulators to increase awareness and ensure security measurement systems will participate together in the future.

The following elements can be considered for AMI :

Sensor: hardware or software components or systems for the analysis of network activity. In the case of AMI, sensors

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ENVIRONMENTAL SUSTAINABILITY EVALUATION FOR AN AUTOMOBILE MANUFACTURING INDUSTRY USING MULTI-GRADE FUZZY APPROACH

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Abstract. In recent days of competitive world industries are getting upward pressure to keep environment green to go for sustainable manufacturing with green manufacturing. Sustainable methods are expected to provide Triple Bottom Line benefits. To improve the performance of environmental conditions, sustainability of environmental desires to be reviewed. Multi grade fuzzy approach is used to get an effectual calculation. Environmental Sustainability Index (ESI) will be calculated and examined for enhancement. An automobile manufacturing industry is being exemplified for this study. The final calculated value of ESI of the manufacturing industry is 6.1 and is in the accepted level of 6 to 8, which shows the industry is Strongly Environmental Sustainable for improving the image of company and production efficiency.

Introduction

Green Manufacturing (GM) is a part of sustainable manufacturing and it can be enlightened as a type of pollution deterrence that integrates environmental deliberations in the production of goods, install the eco friendly manufacturing processes, preserve energy and natural resources, and reduce negative environmental collision [1]. Presently all the manufacturing industries are adopting environmental sustainability for accomplishing competitive advantage. Among the sustainability orientations, measurement of environment is getting the main importance. GM and Eco-innovation has positive relationship with corporate sustainability performance [2], which consists of environment, economy and society. Green Supply Chain Management (GSCM) is basically management implementation in the manufacturing environment. And Sustainable Supply Chain Management (SSCM) is improved version of GSCM. In literatures it is given that there are 22 definitions of GSCM & 12 definitions of SSCM [3].

Based on the literature surveys, green products and services are the needs of country which are possible only by environment friendly, energy conserving processes and optimum resource utilization [4]. Management commitment, government initiatives, green sourcing, green design, green operations, green packaging, reverse logistics, environmental management system, green innovation & customer awareness [5] are some basic drivers of GSCM system [6]. And these definitions are somewhat related with environment, economic and society. Yang and Li [7] discussed fuzzy logic approach and its concepts and recommended the usage of inguistic assessment instead of numerical values. Delgado et al. [8] insisted the usage of triangular and trapezoidal membership functions to overcome ambiguity associated with numerical values. The membership functions are used for transforming the linguistic variables into fuzzy numbers [9]. Culaba and Purvis [10] described a methodology for evaluating the environmental impact of a manufacturing process using decision making potential and flexibility of a knowledge based system. They developed a knowledge based model for sustainability assessment and applied the

Format: Abstract

The current landscape of the mesenchymal stromal cell secretome: A new paradigm for cell-free regeneration.

Konala VB[1], Mamidi MK[2], Bhonde R[2], Das AK[3], Pochampally R[4], Pal R[5].

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Abstract

The unique properties of mesenchymal stromal/stem cells (MSCs) to self-renew and their multipotentiality have rendered them attractive to researchers and clinicians. In addition to the differentiation potential, the broad repertoire of secreted trophic factors (cytokines) exhibiting diverse functions such as immunomodulation, anti-inflammatory activity, angiogenesis and anti-apoptotic, commonly referred to as the MSC secretome, has gained immense attention in the past few years. There is enough evidence to show that the one important pathway by which MSCs participate in tissue repair and regeneration is through its secretome. Concurrently, a large body of MSC research focused on characterization of the MSC secretome; this includes both soluble factors and factors released in extracellular vesicles, for example, exosomes and microvesicles. This review provides an overview of our current understanding of the MSC secretome with respect to their potential clinical applications.

KEYWORDS: cell therapy; exosomes; mesenchymal stromal cells; regeneration; secretome

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CERTIFICATE

This is to certify that the work in the project report entitled "Steam Turbine, Water Turbine, Tool & Gauge Foundry Shop" by HARVEER CHAUHAN has been carried out under my supervision in partial fulfilment of the requirement for the degree of Bachelor of engineering in "Mechanical Engineering" during session 2016-17 in the Department of "Mechanical Engineering", AMET UNIVERSITY, CHENNAI And this work has not been submitted elsewhere for a degree.

Date:

AMIT KUSHWAHA

(PROJECT GUIDE)

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This is to certify that Ms. ANUJA . G from VALLIAMMAL COLLEGE FOR WOMEN, Chennai has undergone a Short Term Project on "Antifouling potential of Halophilic bacteria from Solar salt pan" during the period 12-05-2017 to 12-06-2017 at the Department of Marine Biotechnology, AMET University. During the period she learnt techniques of Marine Microbiology and Bioacive metabolites.

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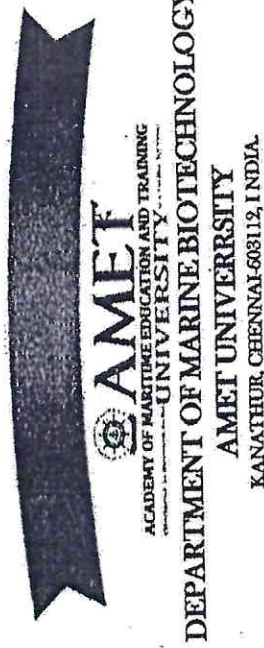
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This is to certify that Ms. PRIOTHI KING from Madras Christian College, Chennai has ... undertaken a study of Seaweed extracts against pathogenic bacteria during the period 15-05-2017 to 30-05-2017 at the Department of Marine Biotechnology, AMET University. During the period she learnt techniques of Marine Microbiology and Bioactive compounds ...

Dr. M. Sri Kumaran
Project Co-Guide

Dr. M Joseph Rushad
HOD Marine Biotechnology Project Guide

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Certificate

This is to certify that Mr./Ms. THANVI I.S. from Madras Christian College, Chennai has undergone a project work entitled "Antibacterial activity of Green Tea extracts against Fish pathogens" during the period 18-05-2017 to 09-06-2017 at the Department of Marine Biotechnology, AMET University for the fulfilment of the partial requirement of Marine Microbiology and Bioactive metabolite.

Dr. M. Jayaprakashvel
HOD, Marine Biotechnology/ Project Guide

Dr. N. Sri Kumaran
Project Co-Guide

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This is to certify that Mr. *PARRI FRANCIS VIVEK . K* from *D.G Vaishnav College, Chennai has undergone a Short Term Project on "Antifouling activity of Marine Actinomycetes against Biofilm forming Bateria" during the period 22-05-2017 to 15-06-2017 at the Department of Marine Biotechnology, AMET University. During the period he learnt techniques of Marine Microbiology and Bioactive metabolites.*

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This is to certify that Ms. *JANANISRI . L from D.G Vaishnav College, Chennai has undergone a Short Term Project on "Screening of Bioactive Metabolites from Marine Actinomycetes" during the period 22-05-2017 to 15-06-2017 at the Department of Marine Biotechnology, AMET University. During the period she learnt techniques of Marine Microbiology and Bioactive metabolites.*

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