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A Pre-Compression Algorithm for Optimal Acquisition of Modernized GNSS Signal

S. Mariappan[1]*, G. Sasibhusana Rao[1], Swarna Ravindrababu[2], S. Sinthuja[3] and S. Rajesh[4]

[1]Department of Electronics and Communication, AU College of Engineering, Visakhapatnam - 530003, Andhra Pradesh, India; jaymars_2000@yahoo.com, sasi_gps@yahoo.co.in
[2]Samsung India, Bangalore – 560037, Karnataka, India; swarna.babu@gmail.com
[3]Department of Tejas Research Centre of Excellence, AMET University, Chennai - 603112, Tamil Nadu, India
[4]Department of Electronics and Communication Engineering, Bharath University, Chennai - 600020, Tamil Nadu, India

Abstract

The acquisition of GNSS signal is the most challenging part of any GNSS receiver. With the modernized GNSS system having longer code length and wider bandwidth, the size of the data block becomes large. To reduce the computational load of the processor, the reduction in the size of the data block without compromise in the acquisition loop performance provides overall improvement to the system. Here, a model is developed for acquisition of GPS signal L1 and L2C by compressing the input raw GPS signal with sequences of perfect periodic autocorrelation properties such as the Ipatov sequence. A compression matrix of the required dimension is constructed for compressing the input GPS signal. The improvement in the acquisition performance of the model is discussed.

Keywords: Acquisition, Compression, GPS, L2C, Modernised GPS

1. Introduction

The acquisition loop is an important component of a GNSS receiver as it detects the presence of the satellite signal from the received composite GNSS signals. Huge uncertainties in Doppler frequency and code phase make this algorithm computationally intensive. Generally a frequency domain based FFT correlation using blocks of data is used for acquisition in an SDR platform. The block length depends on the code clock and the integration period, for instance, for C/A code acquisition as the code duration is 1msec with a clock frequency of 1.023MHz the minimum length of data block size is 2046 samples. For longer code lengths such as GPS L2C/CM code with duration of 20msecs and a clock frequency of 1.023MHz the data block size is 40920 samples. These large block sizes make the FFT correlation process very intensive. Any pre-processing of the data without degrading the correlation properties will therefore have a significant impact on the receiver implementation in terms of processing power and latency. Multi-rate algorithms have been proposed to reduce the complexity; however there is degradation in the correlation properties which results in a SNR reduction. Therefore, this paper proposes a compression algorithm that pre-compresses the GNSS signals before the acquisition leading to a significant reduction in the number of computations and latencies. Moreover, the correlation properties are retained without reducing the SNR.

With the compression algorithm, a compression matrix is constructed using the ternary sequences which possess the property of perfect periodic autocorrelation. The size of the matrix is determined by the data size before (N) and after (M) compression. For preserving the correlation properties the values of M has to be co-prime to that of N[4]. Such a Toeplitz structured compression matrix

*Author for correspondence

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A SOFT COMPUTING APPROACH ON SHIP TRAJECTORY CONTROL FOR MARINE APPLICATIONS

T. K. Sethuramalingam[1] and B. Nagaraj[2]
[1]Department of EEE, AMET University, Chennai, India
[2]Karpagam College of Engineering, Coimbatore, India
E-Mail: tksethuramalingam@gmail.com

ABSTRACT

The objective of this paper is to create a PID controller for the movement of the cargo ship containing with oil that is tuned using soft computing algorithms. Oscillation in liquids is called 'slosh' or 'slop' and is important because the movement of large quantities of liquid can strongly influence the movement of the container itself – this is usually undesirable and often dangerous. The liquid slosh system is notoriously difficult to control optimally using a PID controller because the system parameters are constantly changing. The movement of the cargo ship containing with oil is a complex nonlinear system. Due to its strong nonlinear behavior, the problem of identification and control of cargo ship filled with oil is always a challenging task. Usually the cargo ship filled with oil is controlled using linear PID control configurations. If the process is subjected to larger disturbance due to liquid slosh effect, the state cargo ship can considerably deviate from the aforementioned neighborhood and consequently deteriorates the performance of the controller. They are inherently nonlinear. In spite of the knowledge that one of the characteristic is inherent nonlinearity of the process, it is traditionally controlled using linear control design techniques. The ability of PID controllers to compensate most practical industrial processes has led to their wide acceptance in industrial applications. To aid with the development of this system was chosen at random and a PID controller was designed for it using conventional methods. A genetic algorithm was then created to evaluate the PID coefficients of the same system and the results of the two techniques were compared. A fourth order system was selected as the Ball and Hoop system.

Keywords: cargo ship, PID controller, genetic algorithm, non linear system.

INTRODUCTION

In most of the industrial applications use PID controllers because it is simple, flexible and robust. Proportional + Integral + Derivative (PID) controllers are widely used in various industrial applications in which set point tracking and disturbance rejection are necessary. This controller provides an optimal and robust performance for a wide range of operating conditions for stable, unstable and nonlinear processes. A PID controller directly operates on the error signal and this may produce a large overshoot in the process due to proportional and derivative kick. Therefore proper tuning of PID parameters becomes very important for a nonlinear Process. A properly adjusted controller gives excellent regulation of the measured variable, if poorly adjusted the controller can destabilize the system causing fluctuations, therefore the tuning of a controller becomes an important step in controlling of any loop. The control system becomes poor in characteristics and even becomes unstable, if improper values of the controller tuning constants are used. So it becomes necessary to tune the controller parameters to achieve good control performance with proper choice of tuning constant.

The conventional methods can't be used for complex processes such as the missile with liquid fuel system, slosh of aviation fuel in an aircraft, liquid load in a railway wagon tanker, movement of the fuel load in a Formula 1 car and for economical and/or safety reasons, these process loops to be operated in unstable steady state are unstable. Therefore the engineers have constantly been in search for automatic tuning methods and have come up with various solutions such as genetic algorithm.

SYSTEM MODELING

A cargo ship containing with oil resembles a Ball and Hoop System. The ball and hoop apparatus consists of a steel ball that is free to roll on the inside of a rotating circular hoop. This system illustrates the complex dynamics of liquid slosh i.e. the way liquid behaves in a moving container. The ball and hoop apparatus is difficult to control optimally using a PID controller because the system parameters are constantly changing.

Figure-1. Ball and Hoop Model.

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A Survey Of Big Data Analytics in Healthcare and Government

J.Archenaa[1] and E.A.Mary Anita[2]
[1]Research Scholar,AMET University,Chennai. [2]S.A.Engineering College,Chennai
E mail: archulect@gmail.com

Abstract

This paper gives an insight of how we can uncover additional value from the data generated by healthcare and government. Large amount of heterogeneous data is generated by these agencies. But without proper data analytics methods these data became useless. Big Data Analytics using Hadoop plays an effective role in performing meaningful real-time analysis on the huge volume of data and able to predict the emergency situations before it happens. It describes about the big data use cases in healthcare and government.

Keywords: Big Data,Hadoop,Healthcare,Map-Reduce

1. Introduction

The healthcare industry has generated large amount of data generated from record keeping, compliance and patient related data. In today's digital world, it is mandatory that these data should be digitized. To improve the quality of healthcare by minimizing the costs, it's necessary that large volume of data generated should be analysed effectively to answer new challenges. Similarly government also generates petabytes of data every day. It requires a technology that helps to perform a real time analysis on the enormous data set. This will help the government to provide value added services to the citizens. Big data analytics helps in discovering valuable decisions by understanding the data patterns and the relationship between them with the help of machine learning algorithms[1]. This paper provides an overview of big data analytics in healthcare and government systems. It describes about big data generated by these systems, data characteristics, security issues in handling big data and how big data analytics helps to gain a meaningful insight on these data set.

* J.Archenaa. Tel.: 9566156511 *E-mail address:* archulect@gmail.com

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An Efficient Approach for the Removal of Bipolar Impulse Noise using Median Filter

Kalyan Sagar Kadali[1]* and L. Rajaji[2]

[1]Department of Electrical and Electronics Engineering, AMET University, Chennai - 603112, Tamil Nadu, India; Kalyansagar.k@gmail.com

[2]Department of Electrical and Electronics Engineering, ARM College of Engineering and Technology, Chennai - 603209, Tamil Nadu, India

Abstract

Background/Objectives: A new decision based algorithm for the removal of salt and pepper noise, also known as bipolar impulse noise. **Methods/Statistical Analysis:** Comparison of matrices such as 3x3, 5x5, 7x7, 9x9 is performed using median filtering techniques. **Results/Findings:** The result obtained, it is found that 5x5 is better to produce the clear noise free image with high degree of salt and pepper noise elimination compared to previously proposed method. **Conclusion/Application:** It can be concluded that by comparing 3x3, 5x5, 7x7, 9x9 corrupted matrixes of an image using standard median filtering techniques proves that 5x5 is better than all other matrix combinations. This helps to eliminate the salt and pepper noise of corrupted pixel and provides better noise elimination capability. The amount of noise eliminated can be estimated by considering the PSNR values.

Keywords: Median Filter, Processing Element, Systolic Algorithm

1. Introduction

Digital image processing finds its application in many important fields such as satellite communication, business applications etc. Processing an image is a complex task. Any signal processing system, even though it is digital, it is not perfect due to the constraints of noise. Therefore, main problem in image processing is to reduce the effect of noise and present it with perceptible details. Median filter is a non-linear filter which highly eliminates the salt and pepper noise from the corrupted image. Here we have used standard median filter which effectively removes the noise from the corrupted image. The 3x3 window for an image is not that much efficient because when you consider the whole image and perform sorting for the corrupted pixel by using median filtering technique it results in blurred image. 3x3 windowing technique remove the noise effectively even at noise level as high as 90% and preserve the edges without any loss up to 80% of noise level.

2. Introduction to Existing Method

In 3x3 windowing technique, a particular set of pixels of corrupted image is taken and based on the median value sorting is performed. If the median value lies between (0,255) then sorting process is not necessary. If the median value is 255, then adjacent pixel value of the corrupted image is taken to eliminate noise. If the noise density is high, there is a possibility that the median value is also a noise value.

* Author for correspondence

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Analysis on Capillary Pressure Curves by Wettability Modification through Surfactants

Prince Julius[1*], P. N. Ananthanarayanan[1] and G. Anbazhagan[2]

[1]Department of Petroleum Engineering, Amet University, Chennai - 603112, Tamil Nadu, India; prince466@gmail.com

[2]Bharath University, Chennai - 600073, Tamil Nadu, India

Abstract

Wettability of a reservoir rock is closely related to capillary pressure curves. The status of wettability is an important factor for oil recovery, can be clearly seen through the variations in capillary pressure curves. The aim is to analyze the changes in capillary pressure curves and saturations by altering wettability. An oil wet core sample was tested to alter wettability. During alteration process it is difficult to analyze the status of wettability. Surfactants were applied to modify wettability. Additionally, parameters like connate water saturation, spontaneous oil and water saturations, residual oil saturation and type of wettability can be analyzed. The concentration of surfactants was selected by conductivity test. The changes in saturations with variations in capillary pressure curves were stated.

Keywords: Adsorption Anionic Surfactant, Capillary Pressure Curves, CMC, Wettability

1. Introduction

Wettability is a property of rock which will have tendency to adsorb its related phase. It is connected with capillary pressure, relative permeability and resistivity. Wettability of a reservoir rock can be altered by application of EOR surfactants. Normally surfactants will be applied on oil wet to make water wet or intermediate. The changes in wettability can be easily modeled in capillary pressure curves. By observing these curve we can easily analyze changes in wettability[1].

Capillary pressure is the in difference between nonwetting pressure and wetting pressures. The result of this difference analyzing with fluid saturations makes capillary pressure curves. These curves are in three stages. In first stage flowing of nonwetting phase as oil into capillary tubes with positive capillary pressure until wetting phase reaches its critical limit as connate water saturation S_{cw}. In second stage wetting phase pressure as water rises to displace oil reaching capillary pressure zero at spontaneous water saturation as S_{pw}. Beyond this artificial injection of water is required to displace oil by making capillary pressure negative reaching residual saturation of oil as S_{or}. In third stage pressure dominance will be seen by nonwetting phase oil on water reaching spontaneous oil saturation as S_{PO} at zero capillary pressure[2] Beyond this saturation artificial injection of oil will displace water and reaches to S_{ow} as shown in the Figure 1. Objective is to observe the changes in capillary pressure curves by altering wettabilty of an oil wet core through surfactants[3].

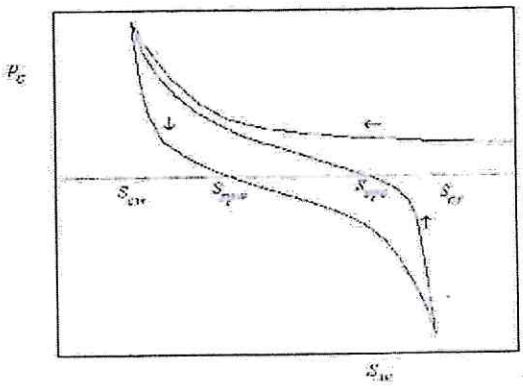

Figure 1. Capillary Pressure Curves.

* Author for correspondence

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Research Article Open Access

Attenuation of Negative Impacts by Micro Algae and Enriched *Artemia Salina* on *Penaeus Monodon* and *Litopenaeus Vannamei* Larval Culture

Karthik R[1]*, Ramalingam K[1], Yuvaraj D[2], Vanitha MC[1] and Muthezhilan R[1]

[1]*Department of Marine Biotechnology and Centre for Marine Bioprospecting, AMET University (Declared as deemed to be University U/S 3 of UGC Act 1956), Kanathur, Chennai–603112, Tamil Nadu, India*
[2]*Department of Biotechnology, Vel Tech High Tech Engineering College, Avadi, Chennai–600 062, Tamil Nadu, India*

Abstract

Providing a specific pathogen free (SPF) shrimps to the farmers is a big challenge that must be addressed to meet the demand. In general, microalgae are utilized in aquaculture as a live feed for the shrimps. However their importance in the attenuation of negative impacts of pathogenic microbial load, eutrophication and promotion of shrimps growth has to be delineated by experimental investigations to justify the above specific pathogen free shrimps. The present study was carried out to investigate the feeding of five different microalgae and algae enriched *Artemia salina*. Nauplii on digestive enzyme activity, growth, survival rate, microbial load on *Penaeus monodon* and *Litopenaeus vannamei* from Zoea to post larvae (20 stages) and other water quality. Microalgae such as *Isochrysis galbana*, *Cheatoceros calcitrans*, *Tetraselmis sp*, *Chlorella* sp and *Nannochloropsis* sp were obtained from AMET Microbial Culture Collection Centre, Department of Marine Biotechnology, AMET University. *Penaeus monodon* and *Litopenaeus vannamei* at PL 20 stage showed maximum protease and amylase (digestive enzyme) activity, maximum length and survival rate when fed with *Artemia salina* Nauplii enriched with *C. calcitrans* followed by *Chlorella* sp. On studying the water quality parameters such as, pH, temperature, salinity, dissolved oxygen and ammonia it was found better in tank II where the shrimps were fed with *Artemia salina* enriched with *C. calcitrans*. Regarding the vibrio load at different stages of *P. monodon* and *L. vannamei* larvae and cultured water it was comparatively lower in tank II where the shrimps were fed with *Cheatoceros calcitrans* and enriched *Artemia salina* than other groups.

Keywords: Shrimp seeds; Micro algae; *Artemia salina*; Digestive enzyme; Water quality

Introduction

Shrimp farming is one of the most important aquaculture practices worldwide especially in Asia due to their high economic value. It is estimated that approximately more than 5 million metric tons of shrimp are annually produced but the current global demand for both the wild and farmed shrimps is approximately more than 6.5 million metric tons per annum [1]. Artificial culture of shrimps in grow out ponds has been intensified to keep shrimp production on par to the demand. As a sequel semi intensive and extensive methods of culture brought various ecological, economical and social issues [2]. In general, during the shrimp growth after metamorphosis it is considerably affected by the gradual change from planktonic to benthic existence coinciding with changes in the alimentation. During early post larval development, high mortality was noticed due to the changes in the gut associated digestive enzyme production levels [3,4]. The first feeding during the growth of any cultivable organism is the most 'critical phase' of their life cycle for their survival. Hence developing a new technology and new live feed may offer great hope for the future with a promise for blue revolution in the century to match the green revolution. Protein is the major component in the natural food of penaeids shrimps. Thus, feeding the penaids with protein rich live diets such as, phytoplankton such as microalgae (2–20 µm) and zooplankton such as rotifers (50–200 µm) and brine shrimp, *Artemia salina* (200–300 µm) can increase the gut associated digestive enzymes [5].

Micro algae and *Artemia salina* like zooplankton help to stabilize and improve the water quality improve the oxygen production, promote pH stabilization (the action of some excreted biochemical compounds along with the induction of behavioral processes like initial prey catching) and regulate disease causing bacterial population and above all the probiotics and stimulate immunity in the host animal [6]. The microalgae most frequently used in aquaculture include *Chlorella*, *Tetraselmis*, *Isochrysis*, *Pavlova*, *Phaeodactylum*, *Chaetoceros*, *Nannochloropsis*, *Skeletonema* and *Thalassiosira* [7]. Moreover, *Artemia salina* are biologically uncontaminated readily available and acceptable larval feed and established as a standard live feed for over 85% of marine species. The present study was aimed to examine the digestive enzymes (amylase and protease) activity, survival rate (%), average growth (mm), water quality parameters and bacterial (Vibrio) load in *Penaeus monodon* and *Litopenaeus vannamei* shrimp culture from zoea to postlarvae 20 stages by feeding with five different microalgae such as, *Isochrysis galbana*, *Cheatoceros calcitrans*, *Tetraselmis sp*, *Chlorella* sp and *Nannochloropsis* sp and algae enriched *Artemia salina* nauplii.

Materials and Methods

Microalgae

The five different microalgae such as *Isochrysis galbana*, *Cheatoceros calcitrans*, *Tetraselmis sp*, *Chlorella* sp and *Nannochloropsis* sp were obtained from AMET Microbial Culture Collection Centre, Department of Marine Biotechnology, AMET Unidversity.

*Corresponding author: Karthik R, Department of Marine Biotechnology and Centre for Marine Bioprospecting, AMET University (Declared as deemed to be University U/S 3 of UGC Act 1956), Kanathur, Chennai–603112, Tamil Nadu, India, Tel: 9710030943; E-mail: karthik.1920rb@gmail.com

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Article

CODED EKSTRAP clustering algorithm

September 2015

T. Johnson · S.K. Singh · V. Menezes

Abstract

In the COsine Distance and Euclidean Distance based Enhanced K STRAnge Points (CODED EKSTRAP) clustering algorithm, an incremental strategy for cluster formation is put forward in which the minimum, maximum and K equidistant strangest values of the input set are calculated using the cosine distance measure. Once the furthest values of the input set equal to the user defined number of clusters K are found, the remaining values of the input set are then assigned into clusters formed by the K Strange input points using the Euclidean distance measure. The CODED EKSTRAP clustering algorithm is an extension of the Enhanced K Strange Points clustering algorithm and can be used in applications requiring the use of multiple distance measures based on the requirements of the operations involved.

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CONTROLLABILITY OF SECOND ORDER IMPULSIVE NEUTRAL FUNCTIONAL INTEGRODIFFERENTIAL INCLUSIONS WITH AN INFINITE DELAY

G. V. Subramaniyan[1], S. Manimaran[2], T. Gunasekar[3,*] and M. Suba[4]

[1]School of Science, Humanities and Education
Amet University
Chennai 603 112, Tamil Nadu, India

Present address
[1]Department of Mathematics
Sudharshan College of Engineering
Sathiyamangalam, Pudukkottai 622 001
Tamil Nadu, India
e-mail: tguna84@gmail.com

[2]Ramakrishna Mission Vivekananda College
Chennai 600 004, Tamil Nadu, India
e-mail: ponsumanimaran@gmail.com

[3]School of Advanced Sciences
Fluid Dynamics Division
VIT University
Vellore 632 014, Tamil Nadu, India
e-mail: gunasekar.t@vit.ac.in

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*Corresponding author

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Crop Rotation as a Better Sanitary Practice for the Sustainable Management of Litopenaeus vannamei Culture

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Karthik Ramachandran
Velbiotics Animal Healthcare Pvt Ltd

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Dual Side Water Pumping System using Scotch Yoke Mechanism

R. Praveen Kumar[1*], G. Navaneetha Krishnan[2], V. Venkadesh[2] and N. Premkumar[2]

[1]Department of Mechanical Engineering, AMET University, Chennai - 603112, Tamil Nadu, India; praveen71989@gmail.com

[2]Department of Mechanical Engineering, K. Ramakrishnan College of Technology, Trichy - 621112, Tamil Nadu, India

Abstract

The aim of the paper is to design and develop a dual side water pumping system using scotch yoke mechanism. The reciprocating motion of the plunger is utilized for the pumping action. The plunger is reciprocated with the help of a cam plate. By this action the water is pumped with very high pressure and to various heads. This can be utilized for various applications like lubrication in machines and water pumping in agriculture field. The cam plate gets the drive from the motor for its rotation and converts that rotary motion to useful dual side reciprocating motion. The motor is powered with the aid of electric power. Thus the water is pumped from source to various heads.

Keywords: Electric Power, Pumping Elements, Reciprocating Pump, Scotch Yoke

1. Introduction

Every one of us will need of some kind of water source for drinking, bathing, washing clothes, preparing food and for irrigation. We may get the water from various sources like, lake, river, ponds, open well, bore well. So we have to pump the water from the source and use the water for the various purposes.

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power which usually come in many sizes that vary from microscopic for use in medical applications to large industrial pumps.

Generally these mechanical pumps have numerous applications such as pumping water from wells, filtering of dust in the aquarium, filtering the ponds and aeration, also used in car industry for water-cooling and fuel injection, and finally in the energy industry for pumping oil and natural gas or for operating cooling towers.

This Scotch yoke mechanism could be used for conversion between rotational motion and linear reciprocating motion. In general this linear motion can take place in various forms depending on the shape of the slot, but mostly the basic yoke with a constant rotation speed produces a linear motion that is simple harmonic in nature.

2. Literature Review

X Wang et al.[1] have studied about the Scotch Yoke crank mechanism whose application could be used in a reciprocating internal combustion engine which will reduce the engine's size and weight in-turn generates sinusoidal piston motion that allows for complete balance of the engine. C. Gopal et al.[2] have reviewed the research developments with Renewable Energy Source Water Pumping Systems (RESWPSs). Alireza Rezae et al.[3] have studied about the technical and financial aspects of photovoltaic water pumping system for irrigation purpose in the GORGAN's farm fields (one of Northern Province of Iran) with the RET Screen software tools. Abdeen Mustafa Omer[4] has reviewed the means of using wind energy for water pumping in rural areas in Sudan. Ahmed Mohammedi et al.[5] has designed a model which will express about the water flow output (Q) that will be directly a function of

*Author for correspondence

Enhanced K Strange Points Clustering Algorithm

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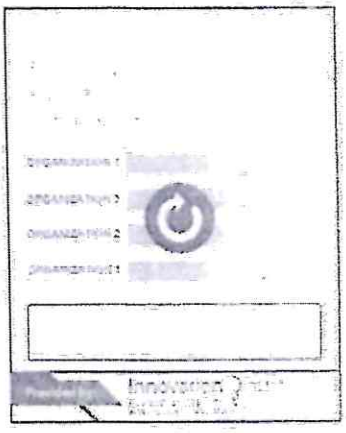
2 Author(s) Terence Johnson ; Santosh Kumar Singh View All Authors



Abstract

Document Sections

I. Introduction

II. K Strange Points Clustering Algorithm

III. Issues with k Strange Points Clustering

IV. Proposed Enhancement

V. Implementation of the Proposed Algorithm

Authors

Figures

References

Citations

Keywords

Metrics

Abstract: The algorithm proposed in this paper enhances the K Strange points clustering algorithm by selecting the first of unchanging K strange points as the minimum of the datase... View more

Metadata

Abstract:

The algorithm proposed in this paper enhances the K Strange points clustering algorithm by selecting the first of unchanging K strange points as the minimum of the dataset and then finds the next strange point as the point which is farthest from the minimum and continues this process till it finds the K points which are farthest and almost equally spaced from each other. It then assigns the remaining points in the dataset into clusters formed by these K farthest or Strange points. The algorithm presented in this paper successfully addresses the issues related to longer execution time and formation of inaccurate clusters seen in the K Strange points clustering algorithm.

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Experimental investigation on the performance and emission characteristics of diesel engine with the effect of Ferrocene as an additive to diesel fuel

AR.Manickam [a], K.Rajan [b], K.R. Senthil Kumar [c] & G. Kumaresan [d]

[a] Research Scholar, Department of Mechanical Engineering, AMET University, Chennai. Email: arunachalam.manickam@gmail.com

[b] Professor, Department of Mechanical Engineering, Dr.M.G.R. University, Chenna-95,India. Email: rajan.mech@drmgrdu.ac.in.

[c] Professor& Head, Department of Mechanical Engineering, RMK Engineering College, Chennai, India. Email:krskiitm@gmail.com

[d] Final Year student, Department of Naval architecture and offshore engineering, AMET University, Chennai, India.

Abstract

Diesel engines are widely used in automotive vehicles running with diesel fuel in world wide. The mail drawbacks of using diesel fuel in diesel engines are higher NOx and Smoke emissions. In this present study is to investigate the performance and emission characteristics of a four stroke twin cylinder diesel engine with the effect of metal based additive Ferrocene in the proportion of 25ppm and 50ppm added to diesel fuel at different load conditions. Additives improve ignition and combustion efficiency and reduce the engine emissions. The results showed that a significant increase in brake thermal efficiency and the reduction in carbon monoxide (CO), hydrocarbon (HC) and smoke emissions with slight increase in NO emissions for 50ppm of Ferrocene added to diesel fuel compared with diesel fuel at full load. It is concluded that the 50ppm of metal based Ferrocene additive added with diesel fuel, effectively reduced the exhaust emission and increasing the performance of the diesel engine.

Keywords: diesel, emission, performance, Ferrocene, additives.

1. INTRODUCTION

Diesel engines are important for automotive heavy-duty vehicles and agricultural machineries due to its high combustion efficiency, reliability, adaptability and cost-effectiveness. However, the drawback of the diesel engine is its emits particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), total hydrocarbons (THC) emissions. These emissions are seriously threaten the environment and are considered one of the major sources of air pollution. The common solution to this problem is clean combustion of diesel engines using diesel fuel reformulation or additive introduction [1, 2]. The method to reduce smoke and NOx emissions by higher injection pressure, turbo charging, and exhaust after treatments or the use of fuel additives [3-5].

Daly et al. [6] have conducted experiments to study the performance of the system which uses a copper – based additive to induce regeneration along with emission

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Experimental Investigations on the Performance of a Water Heater using Waste Heat from an Air Conditioning System

A. R. Sivaram[1*], K. Karuppasamy[2], R. Rajavel[3] and B. Arun Prasad[4]

[1]Department of Mechanical Engineering, AMET University, Chennai - 60004, Tamil Nadu, India; sivaramthermal12@gmail.com
[2]Department of Mechanical Engineering, Regional Centre of Anna University, Tirunelveli - 627007, Tamil Nadu, India
[3]Department of Mechanical Engineering, AMET University, Chennai - 600040, Tamil Nadu, India
[4]Department of Mechanical Engineering, Bharath University, Chennai - 600073, Tamil Nadu, India

Abstract

Energy is one of the basic requirements for the existence and development of human life. The focus is now shifting to energy conservation due to the problems associated with conventional energy sources. This project introduces a novel water heater product that can achieve the multi-functions with improved energy performance. This paper deals with experimental investigations on the performance of a water heater, which uses waste heat from a 1.5 tonne air conditioner. Thus incorporation of a water heater in the outdoor unit of a split-type air-conditioner would result in simultaneous room space cooling and water heating. The experimental results showed that the water heater is capable of producing 88 litres of hot water in one hour of time with a temperature of 52°C. It is seen that up to 37°C of hot water temperature, COP of the waste heat recovery system is more than the COP of conventional air conditioner. But after 37°C, with the increase in hot water temperature, the COP of the waste heat recovery system decreases and becomes less than the COP of conventional air conditioner.

Keywords: COP, Water Heater, Waste Heat Recovery, 1.5 Tonne Air Conditioner

1. Introduction

Waste heat from an air conditioning system can be used to heat domestic water. An enormous amount of waste heat is rejected from the air conditioner's condenser to the atmosphere. This waste heat can be recovered and utilized it to heat water, which could reduce water-heating costs. Shaowei Wang et al[1] have experimentally studied a split air conditioner with a new hybrid equipment of energy storage and water heater all year round (ACWES). Abu-Mulaweh et al[2] have analyzed the design and performance of a thermo siphon heat recovery system which recovers heat rejected from an air conditioner and it is described by presenting some experimental test data. Heat recovery from an air conditioner by thermosiphon is attractive because it eliminates the need for a circulating pump. Results indicate that the design of the thermosiphon heat recovery system was a success. The study has shown that such a system is technically feasible and economically viable. Di Liu et al[3] have developed a looped separate heat pipe as waste heat recovery facility for the air-conditioning exhaust system in this work. An experiment was implemented to validate the simulated results. The numerical predictions compare favorably with experimental results. Huimin Jiang et al[4] have carried out an experimental study on the waste heat recovery from the condenser of an air conditioner which experimentally studies a modified air conditioner that operates in the space-cooling and water-heating mode. Mostafa et al[5] have carried out a experimental investigation on heat pipe heat exchangers which are used in heat recovery applications to cool the incoming fresh air in air conditioning applications.

*Author for correspondence

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Geometry optimization, HOMO and LUMO energy, molecular electrostatic potential, NMR, FT-IR and FT-Raman analyzes on 4-nitrophenol

Rajendran Gandhimathi[1,2,a], Sethuraman Dheivamalar[3], and Ramasamy Dhanasekaran[2]

[1] Department of Physics, AMET University, Kanathur, Chennai 603112, India
[2] Crystal Growth Centre, Anna University, Chennai 600025, India
[3] Department of Physics, Government Arts College for Women, Pudukkottai, India

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Abstract. In the present work, the equilibrium geometry, HOMO-LUMO energy gap, chemical shifts, vibrational frequencies, IR and Raman intensities and thermodynamic parameters of 4-nitrophenol molecule was calculated using the methods of HF and DFT/B3YLP employing 6-311+G basis set. Theoretically calculated geometrical parameters such as bond length and bond angle were compared with the corresponding experimental X-ray diffraction values. The highest occupied (HOMO) and the lowest unoccupied molecular orbitals (LUMO) of the 4-NP molecule have been calculated. The study was extended to calculate the energy gap, ionization potential, electron affinity and chemical hardness. HOMO-LUMO electronic transition of 3.76 eV is obtained from the contribution of the bands. The reacting electrophilic and nucleophilic sites of the molecule were analyzed with the help of molecular electrostatic potential (MEP) surface analysis. The different proton and carbon environment of the grown crystal was analyzed by ^{1}H and ^{13}C NMR analyses. All vibrational frequencies were assigned and compared with the calculated frequencies in detail.

1 Introduction

The crystal structures of organic compounds are very hard to predict because of their weak intermolecular interactions [1]. However the study on organic crystal structures becomes more important to researchers and industrialists since understanding the complete structure of the compound will assist in synthesizing the materials with particular properties. In recent years, electron donor-acceptor (EDA) complexes play an important role in the field of organic semiconductors, photocatalysts and dendrimers [2–4]. 4-nitrophenol (4-NP) compound with push-pull electron interaction is an interesting intramolecular charge transfer system. 4-NP is a nitrated phenolic compound that has an nitro group at the opposite position of hydroxyl groups on the aromatic ring. 4-NP single crystals contain chains of hydrogen bonded molecules. The benzene ring is planar however the nitrogen and oxygen atoms are shifted from the benzene ring [5]. The purpose of the present work is to apply ab initio molecular orbital (MO) method to interpret the geometry of 4-NP crystals. Gaussian calculates the energies, molecular structures, vibrational frequencies of molecular systems, along with numerous molecular properties derived from these basic computation types [6]. Hartree-Fock is the basic ab initio model. Many quantum chemical calculations begin with the Hartree-Fock level of theory with subsequent corrections for coulombic electron-electron repulsions [7]. Generally the results obtained using ab initio methods are comparable with the results obtained with hybrid DFT/B3YLP because it uses corrections for both gradient and exchange correlations. The ab initio or density functional theory requires a basis set specification since it describes the shape of atomic orbitals. In this investigation, we have calculated the structural stability of the optimized geometry, HOMO-LUMO energy gap, NMR chemical shifts and the vibrational assignments of the title compound in the ground state with medium size basis set 6-311+G to produce qualitatively reliable results.

2 Experimental

X-ray diffraction intensity data were collected for 4-nitrophenol compound using Bruker SMART Apex II single crystal X-ray diffractometer equipped with graphite monochromated MoKα (λ = 0.7103 Å) radiation and CCD detector. The infrared absorption spectrum of the grown 4-NP crystal has been recorded in the range

[a] e-mail: crystgandhi@gmail.com

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Green synthesis and characterization of Manganese nanoparticles using natural plant extracts and its evaluation of antimicrobial activity

M. Jayandran[1], M. Muhamed Haneefa[2*], V. Balasubramanian[2]

[1]Department of Chemistry, Mahendra Engineering College, Namakkal-637503, India.
[2]Department of Chemistry, AMET University, Chennai-603112, India.

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ABSTRACT

Green synthesis of metal nanoparticles is an interesting and expanding research area due to the potential applications for the ecofriendly development of novel technologies. Generally, nanoparticles are prepared by a variety of chemical and physical methods which are yield environmentally benign wastages largely. Present study reported a simple, convenient and low cost method for the synthesis of manganese nanoparticles by reducing manganese acetate with the help of easily available natural products viz., lemon extract as reducing agent and turmeric curcumin as a stabilizing agent. The curcumin was isolated from turmeric by using solvent extraction method and used for manganese nanoparticle stabilization. The characterization of curcumin and manganese nanoparticles was done by using UV- Vis and FT-IR spectroscopic techniques. The morphology of manganese nanoparticles was confirmed by SEM and TEM techniques. The size of MnNPs was in the ranges about 50nm. The antimicrobial activities of synthesized Mn nanoparticles were observed higher antimicrobial activity than the standard drug against *S. aureus*, *C. lunata* and *T. simii* and also exhibited similar inhibition activity to standard drug against *E. coli*, *C. albicans*, and *A. niger*.

INTRODUCTION

Nanotechnology can be defined as the manipulation of at by atom from the material world by the combination of engineering, chemical and biological approaches. Application of nano scale material and structures are usually ranging from 1-100 nm and is emerging area of nanoscience and nanotechnology (Catauro *et al.*, 2004; Crabtree *et al.*, 2003). Metal nanoparticles have a high specific surface area and a high fraction of surface atoms; have been studied extensively because of their unique physicochemical characteristics including catalytic, optical, electronic, magnetic properties and antimicrobial activities (Krolikowska *et al.*, 2003; Zhao and Stevens, 1998). Most of the current strategies are usually working by the use of physical or chemical principles to synthesize metal nanoparticles. But both preparation methods are not environmental friendly because of many drawbacks such as the presence of toxic organic solvents, production of hazardous by-products and intermediary compounds and high energy consumption (Jana *et al.*, 2000; Bhattacharya and Rajinder, 2005). Nanotechnology is a revolutionary field just at its onset, the trend in the next decades being its integration with the green chemistry approach. Although nanoparticles can be synthesized through array of conventional methods green synthesis routes are good competent over the physical and chemical techniques. Green principle route of synthesizing have emerged as alternative to overcome the limitation of conventional methods (Salam *et al.*, 2012; Sharma *et al.*, 2009). Green synthesis mainly concerns the elimination of hazardous wastes and the utilization of sustainable processes, implementation of environmental friendly chemicals, solvents and renewable materials (Anastas and Warner, 1998; Matlack, 2001). In the green-nanotechnology, various metal nanoparticle synthesis have been reported using yeast, fungi, bacteria, algae, plant extract etc.

* *Corresponding Author*
M. Muhamed Haneefa, Department of chemistry, AMET University, Chennai-603112, India. Email: honey79101@gmail.com

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Improving Recovery by Altering Wettability from Oil Wet to Surfactant Wet

Prince Julius[1*], P. N. Ananthanarayanan[1], M. Gopikrishnan[1] and M. Thirumavalavan[2]

[1]Department of Petroleum Engineering, Amet University, Chennai, India; prince466@gmail.com
[2]Department of Mechanical Engineering, Bharath University, Chennai, India

Abstract

Surfactants play an important role to alter wettability in any reservoir. Adsorption of surfactants onto reservoir surface will reduce the contact between water and oil which indeed has less impact on Interfacial tension. Oil wet reservoirs are specifically preferred than water wet due to high oil saturation. At the same time extracting oil from oil wet reservoir is difficult due to its wetting nature. The only way to extract oil is by altering wettability from oil wet. The aim of this work is to extract more oil with less adsorption by altering oil wet to surfactant wet. Wettability of sandstone has been chosen to alter from oil wet to surfactant wet. Surfactants of low concentration, which is less than CMC (Critical Micelle Concentration) has been introduced before surfactant flooding during water flooding to make core surfactant wet. The recovery of oil during water flooding is 0.2 Pore Volume (PV). This has been increased to 0.5 pore volume by making it surfactant wet and adsorption has been reduced to 0.5 pore volumes.

Keywords: Adsorption, CMC, Surfactant Wet, Wettability

1. Introduction

Surfactant flooding is one of the most successful operations for altering wettability in cover Chemical Enhanced Oil Recovery. Surfactants carry polar head's and nonpolar tails in the form of hydrocarbon chain. While injecting surfactants the tail part will attach to the surface of reservoir where it is initially oil wet. After that polar heads are exposed at the surface making them water friendly[1]. The oil will be displaced by polar moieties. This process is considered to be altering reservoir from oil to somewhat water wet. During this process there is a great chance of adsorbing surfactants. Normally surfactants were applied in an oil wet reservoir to alter the wettability at the same time to reduce interface energy between oil and water and surface energy between reservoir surface and oil. But, due to adsorption it is difficult to make total interaction between surfactant solution and oil[2].

During surfactant flooding adsorption is a major parameter to be considered. As much surfactant concentration is in contact with reservoir fluids that much great chance is there to reduce Interfacial Tension IFT. Due to adsorption the remaining concentration of surfactants are not enough to reduce IFT[3]. Reservoir being oil wet it could able to attract surfactants more due to its organic tails. The concentration of Surfactants and salinity of brine could be selected by conductivity and emulsion tests. For wettability alteration this concentration should not get absorbed. The objective is to reduce the adsorption of concentration by making reservoir surfactants wet[4].

2. Methodology

2.1 Surfactant Wet

A dry clean core sample was considered to be aged with crude oil for 2 days. After 2 days the core was saturated with oil. Here we considered that core have been wetted

*Author for correspondence

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Investigation of Enhanced Oil Recovery (EOR) Surfactants on Clay Mixed Sandstone Reservoirs for Adsorption

Prince Julius*, P. N. Ananthanarayanan and V. Srinivasan

Department of Petroleum Engineering, AMET University, Chennai, 603112, India; prince166@gmail.com

Abstract

Adsorption of surfactants on sandstones leads to reduce in recovery efficiency of oil. This is caused mainly because of clay presence. Most of the water flooding projects has been stopped, when clay is present. Even surfactants are adsorbed due to clay. The aim of this research work is to reduce the adsorption of surfactants for different pH clay mixed sandstones. Three clay sandstones as crushed samples with different pH levels have been tested to observe the adsorption of Anionic surfactants Sodium Dodecyl Sulphonate (SDS) through bottle test. There was no significant adsorption found on pH 3 and above. Adsorption of SDS on pH 2 clay sandstone has reduced due to increase in alkalinity by application of Sodium Carbonate (Na_2CO_3).

Keywords: Adsorption, Clay Sandstone, Surfactants, SDS, Wettability

1. Introduction

In these days, chemical EOR challenges are developing and attracting researcher's interest. The major oil reserves were carbonates and sandstone reservoirs. Sandstones are the second dominant reservoirs next to carbonates worldwide[1]. Major concentration of chemical EOR research projects were conducted on sandstone reservoirs. The recovery of flooding method is related to residual oil saturation and mobility ratio.

Wettability is a property of adherence capacity, towards a matter. In sandstone reservoirs being naturally water wet, long term presence of oil can alter to oil or mixed wet. Recovering oil from oil wet reservoirs is not so easy. The most successful chemical to alter the properties of sandstone like wettability is anionic surfactants.

Sandstone is a reservoir where more concentration of minerals compared to carbonate plays an important role for wettability alteration. Silica is the main mineral in sandstone reservoir which posses negative charge at relevant pH as formation water. Clay minerals are the main sources for wettability alteration. Clay minerals are negatively charged and acts like cation exchangers. According to field examples BP has shown success by injecting low salinity water floods into clay contained sandstone reservoirs. Later low salinity flood has found to be successful in injecting into high salinity floods[2].

Clay is an important factor to be considered for loss of surfactant fluids inside reservoir[3]. Adsorption of surfactants will reduce the impact of wettability alteration. It is difficult to measure clay content completely inside reservoir.

The objective is to discover some EOR surfactants, which can alter wettability for clay mixed sandstone reservoirs.

*Author for correspondence

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Investigation of Structural, SEM, TEM and Dielectric Properties of $BaTiO_3$ nanoparticles

Suresh Sagadevan[1], Jiban Podder[2]

[1] *Department of Physics, AMET University, Kanathur, Chennai 603112, India*
[2] *Department of Chemical and Biological Engineering, University of Saskatchewan, Saskatoon, SK S7N 5A9, Canada*

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$BaTiO_3$ nanoparticles were prepared by solvothermal method. The X-ray diffraction (XRD) analysis was used to study the structure and crystallite size of $BaTiO_3$ nanoparticles. The morphology and the size of the $BaTiO_3$ nanoparticles were characterized using scanning and transmission electron microscopy (SEM and TEM). The optical properties were studied using the UV-Visible spectrum in the wavelength range of 300-800 nm. The dielectric properties of $BaTiO_3$ nanoparticles were studied for different frequencies and different temperatures. The AC electrical conductivity study revealed that the conduction depended both on the frequency and the temperature.

Keywords: $BaTiO_3$ nanoparticles, XRD, UV analysis, Dielectric studies and AC conductivity.

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1. INTRODUCTION

Barium titanate ($BaTiO_3$) is extensively used in electronic devices in the technological ceramic industry because of its ferroelectric, thermoelectric, and piezoelectric properties when it assumes the tetragonal structure [1]. As such, it can be broadly used in capacitors, positive temperature coefficient resistors, dynamic random access memories, electromechanics, and nonlinear optics [2, 3]. For the existence of the size effect of ferroelectricity and the potential application of bottom-up assembled novel nanostructures, the synthesis of ultrafine $BaTiO_3$ nanoparticles is theoretically and technologically important [4].Very high value of dielectric constant of $BaTiO_3$ [5, 6] makes it a particularly attractive material from which capacitors, condensers and other electronic components can be fabricated [7, 8]. $BaTiO_3$ with a perovskite structure is a strong dielectric material, which has far reaching applications in the electronics industry for transducers, actuators, and high-k dielectrics [9, 10]. With the growth of material science and technology, $BaTiO_3$ powders are expected to have characteristics of fine grain, few agglomerations and uniform composition, over and above higher dielectric constant. As $BaTiO_3$ offers the above characteristics, the synthetic methods of $BaTiO_3$ nanopowders have attracted extensive consideration. There are several reports available in the literature on the preparation of well crystalline $BaTiO_3$ by different methods, such as homogeneous co-precipitation [11, 12], hydrothermal synthesis [13, 14], the sol-gel method [15], etc. The prepared $BaTiO_3$ nanoparticles were characterized by powder X-ray diffraction analysis, scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV-analysis and electrical studies.

2. EXPERIMENTAL METHODS

Ba and Ti alkoxide precursor [$BaTi(OR)_6$] solutions were prepared by dissolving equimolar amounts of Barium metal and Titanium isopropoxide in a mixed solvent of anhydrous Benzene and anhydrous Isopropanol. The resulting mixture was mixed at 45 °C with a magnetic stirrer until the Barium metal was completely dissolved. The synthesis process of precursor solutions was performed under a nitrogen atmosphere. The mixture was stirred with a magnetic stirrer for 3 hours. The sealed autoclave was heated to 250 °C for 72 hours. After cooling to room temperature, the resultant precipitate was centrifuged and dried at 50 °C for 24 hours in an oven. The XRD pattern of the $BaTiO_3$ nanoparticles was recorded by using a powder X-ray diffractometer (Schimadzu model: XRD 6000 using CuKα with a diffraction angle between 20° and 80°. The crystallite size was determined from the broadenings of corresponding X-ray spectral peaks by using Debye Scherrer's formula. Scanning Electron Microscopy (SEM) was carried out on JEOL, JSM- 67001. The optical absorption spectrum of the $BaTiO_3$ nanoparticles was taken by using the VARIAN CARY MODEL 5000 spectrophotometer in the wavelength range of 300-800 nm. The dielectric properties of the $BaTiO_3$ nanoparticles were analyzed using a HIOKI 3532-50 LCR HITESTER over the frequency range 50 Hz-5 MHz.

3. RESULTS AND DISCUSSION

3.1 X-ray Diffraction Analysis

The phase composition and the structure of the nanoparticles were studied by X-ray diffraction analysis. Fig. 1 shows X-ray diffraction patterns of $BaTiO_3$ nanoparticles. The broadening of the diffraction peaks due to the size effect hinders us in estimating the crystal structure. FWHM of peaks corresponding to multiple planes is broader than that for a single plane (111), which implies that a tetragonal phase exists in the $BaTiO_3$ nanoparticles. $BaTiO_3$ nanoparticles synthesized in this study have a wide distribution of particle size, which means that the prepared nanoparticles have a cubic phase. The crystallite size was determined from the broadenings of corresponding X-ray spectral peaks by using Debye Scherrer's formula. The average nano-crystalline size (D) was calculated using the Debye-Scherrer formula,

$$D = 0.9\lambda/\beta\cos\theta, \quad (1)$$

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INVESTIGATION OF TENSILE PROPERTY OF NYLON – GLASS FIBER POLYMER MATRIX COMPOSITE

R. Srimurugan[1], B. Vijaya Ramnath[2] and N. Manoharan[1]
[1]AMET University, Kanathur, Chennai, Tamil Nadu, India
[2]Department of Mechanical Engineering, Sri Sairam Engineering College, Chennai, Tamil Nadu, India

ABSTRACT

In this work nylon 6 and E-glass fibre are combined together to get a polymer matrix composite. Nylon 6 gives the composite a high strength which is widely using in gears and in many automotive industries. Due to low cost, high strength and high stiffness, E-glass is used along with nylon 6. Twin screw extrusion process – an injection molding technique was used to fabricate the polymer composite with varying compositions with nylon 6 80% and Glass fibre with 20%. The tensile behavior of the composite was investigated.

Keywords: nylon 6, E-glass fibre, polymer matrix composite, twin screw extrusion process.

1. INTRODUCTION

Composite materials are generally used for buildings, bridges and structures such as boat hulls, swimming pool panels, race car bodies, shower stalls, bathtubs, storage tanks, imitation granite and cultured marble sinks and counter tops. The most advanced examples perform routinely on spacecraft in demanding environments. Hence, the wear normally controlled. Nylon-6, also known as "polyamide 6", is a synthetic polymer that has been used extensively in fiber synthesis and, according to recent findings, its incorporation into experimental dental composites has led to material reinforcement [1]. Carbon nanotubes (CNTs) are a hexagonal network of carbon atoms rolled up to form a cylindrical nanostructure. CNTs can be categorized as single-walled (SWNTs) and multi walled (MWNTs) nanotubes, where the former are the fundamental cylindrical structure and the latter are the layer-by-layer junction of two or more coaxial cylinders [2]. Among several unique properties, CNTs are extremely strong and stiff, and they display both excellent thermal and electrical properties [3]. In recent years, polymer nanofibers have been successfully modified by nanotubes with minimal or no agglomeration [4]. Moreover, following the proper chemical surface modification, nanotubes are able to strongly interact with the nanofiber, resulting in a hierarchical engineered nanocomposite [5]. Nowadays melt-mixing and injection molding process are widely used for fabricating polymer composites filled with nanoparticles. These nanoparticles are becoming replacements for conventional micro-composites. [6, 7]. Mechanical properties like tensile, flexural and impact are found on polymer composite made by selective laser sintering, melt compounding and injection molding. It was concluded that composites made by selective laser sintering shown 25% and 35% higher flexural and tensile modulus than other composites [8]. Mechanical properties of jute-flax based GFRP has been investigated and found that the hybrid composites have better tensile and flexural strength than single fiber natural composites [9]. Mechanical behavior of glass fibre based SiC polymer composites has been evaluated. [10, 11].

Nowadays most of manufacturing industries are using composite materials to replace their traditional materials. Recently in automobile industries composite materials have been used for many purposes. The gears used in automobile transmission system are made up of cast iron and it can be replaced by the composite material with the combination of Nylon 6 and E-glass. The noise level will be reduced by using the polymer composite material. The fatigue life can be increased and the wear rate can be reduced.

2. EXPERIMENTAL SETUP

In this work, injection molding machine was used to fabricate the nylon 6 and E-glass fibre polymer matrix composites. The injection molding machines consist of a material hopper, an injection ram or screw-type plunger, and a heating unit. Also, a standard two plates tooling was used as die. Initially the nylon 6 and E-glass fibre are fed into hopper of injection molding machine. The extruded material will be composite. The die consists of two parts one being injection mold (A plate) and other being ejector mold (B plate). Through sprue gate, resin is supplied to fill the mold cavity. The molten plastic flows through the runner and enters one or more specialized gates and into the cavity geometry to form the desired part.

3. TESTING OF COMPOSITE

In this work the fabricated polymer composite was tested for its tensile property. The specimen was prepared as per ASTM D638 as shown in Figure-1 and tested in a universal testing machine. The specimen was pulled till it broke. The break load, area of break, ultimate stress, and yield stress and percentage elongation are noted.

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INVESTIGATION OF THE OPTICAL AND ELECTRICAL PROPERTIES OF TIN SULFIDE THIN FILMS

G.GEETHA[a], M. PRIYA[b], S. SAGADEVAN[c*]
[a]*Research Scholar, Bharathiar University, Coimbatore, India*
[b]*Department of Physics, Saveetha Engineering, Chennai-600 123, India*
[c]*Department of Physics, AMET University, Chennai-603 112, India*

Tin sulfide (SnS) thin films were prepared by chemical bath deposition method. The XRD, SEM, UV-Visible absorption spectrum and dielectric studies were used to characterize the synthesized SnS films. The X-ray diffraction (XRD) analysis was used to study the structure and the crystallite size of SnS thin film. The surface morphology was studied using Scanning Electron Microscopy (SEM).The optical properties were studied using the UV-Visible absorption spectrum in the wavelength range of 400 - 900 nm. Optical constants such as band gap, refractive index, extinction coefficient and electric susceptibility were determined from UV-Visible absorption spectrum. The dielectric properties of SnS thin films were studied at different frequencies and temperatures. Further, electronic properties such as valence electron plasma energy, average energy gap or Penn gap, Fermi energy and electronic polarizability of the SnS thin films were calculated. Photoconductivity measurements were carried out to ascertain the positive photoconductivity of the SnS Thin films.

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Keywords: SnS Thin Films, XRD, SEM, UV analysis and Dielectric studies

1. Introduction

The recent examinations in the field of photovoltaics have been directed towards the development of cost effective and non-toxic materials that can be synthesized by an easy technology for solar cell fabrication. In recent years, thin films of SnS have received much consideration for the photovoltaic applications due to their high absorption coefficient and high conductivity [1]. SnS thin film has been used as an absorption layer in the manufacture of heterojunction solar cell due to its narrow band gap [2, 3]. It is one such compound that belongs to IV-VI group with orthorhombic structure. Tin sulfide is a semiconductor, which can be easily prepared by the chemical deposition method [4]. Its thin film is a promising material as an absorber layer for mass production of inexpensive photovoltaic cells, since it has an energy gap of ~ 1.3eV [5]. The film in this study was grown by chemical bath deposition (CBD) which creates a thin film on a solid substrate via a reaction in a liquid solution. The CBD method is inexpensive, easy to prepare and the necessary apparatus can be found in an ordinary chemistry laboratory. Therefore, this method has many advantages over others used to grow semiconductor thin films. This study reports the synthesis and characterization of SnS thin films. The SnS thin films were characterized by X-ray diffraction, scanning electron microscopy (SEM), UV analysis, dielectric studies and Photoconductivity measurement.

2. Experimental procedure

The chemical bath deposition method (CBD) is based on a chemical reaction between dissolved precursors in aqueous solution. The substrate cleaning is very important in the

* Corresponding author email: drgureshphysics@gmail.com

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Investigation of the Structural, Optical and Electrical Properties of Copper Selenide Thin Films

Soundararajan Thirumavalavan[a], Kolandavel Mani[b], Suresh Sagadevan[c]*

[a]*Department of Mechanical Engineering, Sathyabama University, Chennai-600 119, India*
[b]*Department of Mechanical Engineering, Panimalar Engineering College, Chennai-602103, India*
[c]*Department of Physics, AMET University, Kanathur, Chennai-603112, India*

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Copper selenide (CuSe) thin films were prepared by chemical bath deposition (CBD) method. X-ray diffraction (XRD) analysis was used to study the structure and crystallite size of CuSe thin film. The grain size and the surface morphology were studied using Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM). The optical properties were studied using the UV-Visible transmission spectrum. The dielectric properties of the synthesized CuSe thin films were studied at different frequencies and different temperatures. Further, electronic properties, such as valence electron plasma energy, average energy gap or Penn gap, Fermi energy and electronic polarizability of the CuSe thin films were determined. The AC electrical conductivity study revealed that the conduction depended both on the frequency and the temperature. The temperature dependent conductivity study confirmed the semiconducting nature of the films. Photoconductivity measurements were carried out in order to ascertain the positive photoconductivity of the CuSe Thin films. This paper covers what all has been stated above besides discussing the results of I-V characteristics.

Keywords: *CuSe thin films, XRD, SEM, UV analysis, dielectric studies*

1. Introduction

Copper selenide (CuSe) belongs to I–VI compound semiconductor materials. Copper (I) selenide exists in the cubic, orthorhombic, tetragonal or monoclinic forms[1]. Copper selenide heterojunction solar cells are cost effective and high-efficiency devices used in the solar energy conversions. CuSe is also used in the fabrication of photovoltaic devices such as window material, super ionic conductor, electro-optical devices, optical filter, thermo electric converter and photo electrochemical cell. CuSe alloys have been one of the most studied in recent years, with stoichiometric (α-Cu_2Se, Cu_3Se_2, CuSe, and Cu_2Se) and non-stoichiometric ($Cu_{2-x}Se$) compositions exhibiting a continuous change of physical properties. In addition, various crystalline phases have been reported with orthorhombic, cubic, hexagonal, and tetragonal structure, depending on the stoichiometry and the growth methods[2-4]. These features make the electrical and optical properties interesting for applications in solar cells[5], super ionic conductor[6], optical filters[7] and lasers[8]. The CuSe semiconductor could be a direct gap of 2.2 eV or 1.4 eV indirect[9]. Thin and continuous films with desired electrical and optical properties are required for the preparation of photoelectrochemical solar cells[10]. It is easier said than done to obtain continuous and single phase CuSe film with the above mentioned properties. Electrodeposition is one of the suitable methods to prepare thin and continuous semiconducting films. This technique provides numerous advantages such as low temperature processing, low cost of synthesis, no need of vacuum facility, no contamination to the surrounding. It is simply possible to control film thickness and morphology by readily adjusting the electrical parameters as well as the composition of the electrolytic solution[11].The CuSe thin films prepared by thermal evaporation and their structural, electrical and optical properties have been studied[12]. Preparation of CuSe thin films by vacuum evaporation technique and its annealing effect on structural, morphological, compositional and optical properties have been investigated[13].Growth of CuSe thin films using thermal evaporation method and their properties have been investigated using structural, optical absorption, and Raman spectroscopic techniques[14]. The grown CuSe thin films and their properties have been investigated using X-ray diffraction, scanning electron microscopy and optical absorption techniques[15]. To the best of our knowledge, no such detailed investigation is available for studying the properties of CuSe thin films which have been obtained using electrodeposition technique.

Copper selenide has such electrical and optical properties that are appropriate for a number of photovoltaic applications. Copper selenide induces much interest since it has been broadly used as solar cell applications[16]. CuSe thin films can be deposited by different techniques such as physical vapour deposition, pulse laser evaporation, electro deposition, spray pyrolysis, metal organic vapour phase epitaxy (MOVPE)/metal organic chemical vapour deposition (MOCVD), screen printing, successive ionic layer adsorption reaction (SILAR), RF sputtering, and chemical bath deposition (CBD)[17-22]. Thin film heterojunctions solar cells play asignificant role as low cost, large area and high

*e-mail: thiru_thiru@hotmail.com

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5.9

Investigation on structural, optical, mechanical and NLO properties of a new crystal from amino acid family

R. Senthil[1], S. Krishnan[2*] and R. Gandhimathi[1]
[1]*Department of Physics, AMET University Chennai-603112, India*
[2]*Department of Physics, B.S. Abdur Rahman University, India*
[*]*Corresponding author: email: skrishnanjp@gmail.com*

Abstract

In the present work we are reporting the synthesis and growth of single crystal of L-Ornithine phthalate mono hydrochloride by the solvent evaporation method. The grown crystals were characterized by spectroscopic and analytical methods. The crystal parameter was computed from powder x-ray diffraction analysis. The vibrational spectroscopy confirms the presence of functional groups and the thermal stability of the sample was analyzed by TG/DTA curves. The mechanical strength of the grown crystal was found out using a Vickers microhardness test. UV- Vis spectroscopy shows the optical property of the crystal. The lower cutoff wavelength observed around 282 nm indicates that the grown sample is a potential material for SHG application. The real and imaginary part of dielectric constant of the crystal were determined. Frequency conversion efficiency was tested by using the powder Kurtz method, keeping KDP as a reference material.

Keywords: Growth from Solutions; Thermal Analysis; Optoelectronic devices., Path.

1 Introduction

Nonlinear optical materials play a vital role in the modern technologies such as photonics, high speed optical communication, optical parallel information processing telecommunication and optical computing [1,2]. In recent decades, generation of coherent blue light through SHG from near infrared (NIR) region is a big technological challenge. Many researchers are working on this aspect to fabricate single crystal of nonlinear optical materials which give a dramatic contribution to this evaluation [3]. Amino acids are interesting and potential materials for nonlinear optical applications [4]. The salts of L-ornithine amino acids contain a deprotonated carboxylic group [COO^-] and two protonated amino group [NH^{3+}] [5, 6]. Generally in a crystal structure, L-ornithinium occupies as a charged zwitterion with two positive and one negative charge [7, 8]. L- Ornithine mono hydrochloride (L-OMHCl) and L-Ornithine Hydrogen Bromide (L-OHB) are the amino acids group which find applications in optoelectronics and photonics. NLO efficiency of L-OMHCl has been reported as 1.25 times that of KDP [9, 10]. Phthalate based crystals are well known for their high piezoelectric coefficients with acousto-optical interaction [11, 12]. It makes them incredibly useful material for data processing and intra laser modulation in various acousto-optical devices. In this present work, for the first time we have synthesized a new

Investigations on structural, optical, morphological and electrical properties of nickel oxide nanoparticles

Suresh Sagadevan*

Department of Physics,
AMET University,
Kanathur, Chennai – 603112, India
Email: drsureshnano@gmail.com
*Corresponding author

Jiban Podder

Department of Chemical and Biological Engineering,
University of Saskatchewan,
Saskatoon, SK S7N 5A9, Canada
Email: jpodder59@gmail.com

Abstract: Nickel oxide (NiO) nanoparticles have been prepared by chemical co-precipitation method. The synthesised nanoparticles were investigated by X-ray diffraction analysis (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV-visible spectroscopy and dielectric studies. The formation of NiO nanoparticles was confirmed by X-ray diffraction (XRD). The morphology and size of the NiO nanoparticles were characterised using scanning and transmission electron microscopy (SEM and TEM). The optical properties were studied by the UV-visible absorption spectrum. The dielectric properties of NiO nanoparticles were studied in the frequency range of 50 Hz–5 MHz at different temperatures. Further, electronic properties, such as valence electron plasma energy, average energy gap or Penn gap, Fermi energy and electronic polarisability of the NiO nanoparticles were calculated. The AC conductivity of the NiO nanoparticles increases with increase in temperature and frequency. The activation energy was calculated from AC conductivity studies.

Keywords: NiO nanoparticles; X-ray diffraction; XRD; scanning electron microscopy; SEM; transmission electron microscopy; TEM; UV analysis; dielectric studies; AC conductivity studies.

Reference to this paper should be made as follows: Sagadevan, S. and Podder, J. (2015) 'Investigations on structural, optical, morphological and electrical properties of nickel oxide nanoparticles', *Int. J. Nanoparticles*, Vol. 8, Nos. 3/4, pp.289–301.

Biographical notes: Suresh Sagadevan is currently working as an Assistant Professor in Department of Physics in AMET University, Chennai. He completed his MSc, MPhil and PhD degree in Physics from Madras University, Chennai, India. He has published 130 papers in reputed national and international journals. He had participated in many national and international workshops, seminars and conferences. He has been the convener for the symposiums in materials research conducted at national level. He has five years of experience in material research and two years in teaching. He has published a book chapter and seven international text books. His area of research includes material science, crystal growth and nanotechnology.

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ISOLATION, OPTIMIZATION AND PRODUCTION OF BIOPOLYMER (POLY 3-HYDROXY BUTYRATE) FROM MARINE BACTERIA

Muthezhilan R*[1], C.P. Kaarthikeyan[1,3], M. Jayaprakashvel[1], A. Jaffar Hussain[2]

[1]*Department of Marine Biotechnology, AMET University, Kanathur, Chennai 603112, Tamil Nadu, India,*
[2]*Centre for Marine Bioprospecting, AMET University, Kanathur, Chennai 603112, Tamil Nadu, India,*
[3]*Department of Aquaculture, James Cook University, Townsville, Australia* E-mail*: mycomuthu@gmail.com

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ABSTRACT

The synthetic polymer plastics become an integral part of contemporary life. Excess use of plastics and indiscriminate dumping of it in soil and water is polluting the environment and other living organisms. To overcome this problem, the production and applications of eco-friendly biodegradable products (such as bioplastics) from microbes are becoming inevitable from the last decade and also good alternatives of synthetic polymers. Keeping this point in mind the present study aimed at isolating and identifying the poly 3-hydroxybutyrate (PHB) producing bacteria from marine sources that can be effectively utilized for the synthesis of bioplastics. For isolation of poly 3-hydroxybutyrate producing bacteria, spread plate technique was followed using E2 mineral medium. After incubation, based on the morphological characteristics 32 strains were isolated and identified from the sand dunes plants of rhizosphere vegetation of Chennai coast. While staining with Sudan Black, six strains *viz.*, AMET 5103, AMET 5111, AMET 5113, AMET 5121, AMET 5124 and AMET 5128 were identified as poly 3-hydroxybutyrate producing bacterial strains. Based on the dry weight of total biopolymer content, the strain AMET 5111 showed the maximum accumulation and was selected for optimizing at different pH, temperature, salinity, carbon and nitrogen source, incubation period and peak time of poly 3-hydroxybutyrate accumulation. Based on the biochemical tests, the strain AMET 5111 was found to be *Pseudomonas* spp. The optimum pH, temperature and salinity were found to be 7.0, 30°C and 5%. The peak time of poly 3-hydroxybutyrate accumulation was found to be 36hrs. The best carbon and nitrogen sources were found to be sucrose and $(NH_4)_2HPO_4$. The selected strain was massively cultured using the optimized media and poly 3-hydroxybutyrate was extracted by solvent extraction.

Keywords: Marine bacteria, PHB (poly-(3-hydroxybutyrate)), Biosynthesis, Biopolymer

INTRODUCTION

Growth in the human population has led to the accumulation of huge amounts of non-degradable waste materials in the environment. The disposal of no degradable (plastics) synthetic polymers is the environment are the major pollution around worldwide. Recently, some alternative synthetic plastics are developed by using cellulose and starch like sources, but the production cost was found to be high (Qinxue Wen *et al.*, 2010). The researchers are searching a new source to develop a biodegradable polymers with plastic like properties as an alternative for synthetic polymers at the same time with ecofriendly and cost effective (Braunegg *et al.*, 2004; Akiyama *et al.*, 2003). So, there is an urgent need of biodegradable plastics (bioplastics) as an alternative with greater compatibility to the environment. Nowadays, the biodegradable plastics (group of biopolymers) from bacteria or archaea are usually defined as an existing new area of research (Das *et al.*, 2004; Akar *et al.*, 2006). In general, the poly hydroxybutyrate (PHB) found in prokaryotes, in which it acts as a reserve of carbon and energy. Especially bacteria have the ability to produce a broad range of polymers including co-polymers with varied functional groups and commonly found to be accumulating within the bacterial cell wall (Yavuz Beyatli *et al.*, 2006). Recently, it is estimated that, 75 different genera of bacteria have been known to accumulate PHB as intracellular granules and its production has most commonly been studied with micro organisms belonging to the genera *Alcaligenes, Azotobacter, Bacillus* and *Pseudomonas* (Reddy *et al.*, 2003; Chen and Wu, 2005a,b; Steinbuchel and Lu, 2003). The availability of nutrient, particularly phosphates, nitrates by marine bacteria which operates at high rate in summer and the ratio of die off rates of bacteria in the marine environment decreases. Mainly, the bacterial community from marine environment is not so far reported fairly compared to the terrestrial environment. Basically, the microbes belonging to marine environment will tolerate with the extreme conditions and they survive as long.

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KENAF FIBRE REINFORCED COMPOSITES: A REVIEW

V. R. Raman Bharath[1], B. Vijaya Ramnath[2] and N. Manoharan[1]
[1]AMET University, Kanathur, Chennai, Tamil Nadu, India
[2]Department of Mechanical Engineering, Sri Sairam Engineering College, Chennai, Tamil Nadu, India

ABSTRACT

Natural fiber composites are nowadays playing a vital role in automotive and construction industries. Various natural fibers namely, jute, sisal, kenaf, abaca, hemp and banana are widely used in industries for making composite which are fabricated by either hand layup method or by other mechanized methods. Among the various fibers, kenaf fibers have vast applications in automotive industries. They have indisputable advantages over synthetic reinforcement materials. They are economical, non-toxic with low density. They have very good strength and are associated with less waste disposal problems. This paper aimed to review the properties and applications of kenaf fibre reinforced polymer composites to provide a platform for further research in this area.

Keywords: kenaf, fibre, automotive industries.

1. KENAF FIBER REINFORCED COMPOSITES

Kenaf fiber is getting attention of industries and researchers to utilize it in different polymer composites due to environmental awareness of consumers, industries and government regulations in various countries. Kenaf fibres are reinforced with epoxy resin to form fibre reinforced polymeric composites which improves the strength of the composites. Nishino *et al.* [1] investigated the development of biodegradable composite materials using natural fibers and examined molding conditions, mechanical properties and interfacial bonding. They concluded that the shape, size and strength of natural fibers mainly depend on cultivation environment, region of origin and other characteristics which influence the mechanical properties of fiber composites. Mohanty et al [2] found that the Kenaf plant absorbs carbon dioxide approximately 1.5 times of its weight. It represents the highest level of absorption of all of the plants studied by them. Zaveri *et al.* [3] identified that kenaf plants can grow to a height of approximately 3.5m to 4.5m within 4 to 5 months with an annual fiber yield of 6 to 10 tons of dry fiber/acre. This is approximately four times greater than that of southern pine trees. A technical report TR-2101-ENV [4] of the Naval Facilities Engineering service center has evaluated Kenaf core as an absorbent material for cleaning oil spills. The research showed that the core particles outperformed other natural absorbent materials by a significant margin. Some studies have been conducted to characterize the basic tensile properties of kenaf bast fibers. The results indicate that the average tensile strength of kenaf fibers range from 157Mpa to 600Mpa [5-8]. According to ACI Committee 544 [9], the tensile properties of kenaf fibers are comparable to those of other natural fibers such as jute, flax and bamboo, which have been previously used to produce natural fiber reinforced concrete. Kenaf fiber is obtained from stems of plants genus Hibiscus, family of Malvaceae and the species of H.Cannibinus. It requires less water to grow because kenaf fiber has a growing cycle of 150 to 180 days with an average yield of 1700kg/ha [10]. Kim et al. [11] found that natural fiber composites are able to absorb moisture since they are hydrophilic in nature. The moisture penetrates into the micro gaps between polymer chains of composite material. Akil *et al.* [12] immersed kenaf fiber reinforced composite in sea water and observed the highest reduction rate in tensile modulus, followed by acidic rain water and distilled water. Srinivasan *et al.* [28, 29] investigated tensile and double shear properties of flax-kenaf hybrid composites and concluded that hybrid composites have better mechanical properties than mono fiber composites.

2. PROPERTIES OF KENAF FIBRE

Properties of kenaf fibre are shown in Table-1.

Table-1. Properties of kenaf fibre.

Fibre	Diameter (mm)	Ultimate stress (Mpa)	Density (kg/m^3)	Specific stress	Water absorption (in %/) for 24hours
Kenaf	0.15-0.30	350-600	1500	0.22-0.44	0.95

3. APPLICATIONS OF KENAF FIBRE

Manufacturer and scientists are attracted towards composites fabricated with natural fiber like hemp, flax, kenaf and jute which have high specific strength biodegradability and low density. They are light in weight and nontoxic. They possess low tool wearing rates, good thermal insulation properties and acoustic properties They are relatively stronger and being considered {being} for making various products which can be use in construction industry, automotive industry and for furniture production [13, 14, 15]. Anuar *et al.* [16] found that use of kenaf fibers are increasing as significant natural material sources contributing towards the development of eco-friendly assets for the automotive, sports industries, food packaging and furniture industries. Kenaf is in an advanced position when compared with other lignocelluloses fiber crops since it has a short plantation cycle, flexibility to environmental conditions and requires

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K-Strange Points Clustering Algorithm

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- Terence Johnson (1) Email author (yktcrence@rediffmail.com)
- Santosh Kumar Singh (2)

1. AMET University, , Chennai, India
2. Department of Information Technology, Thakur College of Science and Commerce, , Mumbai, India

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Abstract

The classical K-Means clustering algorithm yields means which can be called the final unchanging or fixed means around which all other points in the dataset get clustered. This is so because the K-Means clustering terminates when either the clusters repeat in the next iteration or when the means repeat in the next iteration. This reveals that if one is able to somehow calculate and find apriori the final unchanging means using the dataset, then the task of clustering reduces to only assigning the remaining points in the dataset into clusters, which are closest to these final fixed or unchanging means based on standard distance measures. Taking a cue from the result of the classical K-Means method, the K-Strange points clustering algorithm presented in this paper locates K points from the dataset equaling the number of required clusters which are farthest from each other and are hence called K-Strange points based on the Euclidean distance measure. The remaining points in the dataset are assigned to clusters formed by these K-Strange points.

Keywords

K-Strange points clustering Farthest points Euclidean distance measure

References

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Manifestations Studies on Enzyme Profile of *Vibrio parahaemolyticus* MTCC451 Inoculated Black Tiger Prawn *Penaeus monodon*

K. Ramalingam, D.R. Shyamala, N. Sri Kumaran, R. Karthik and M.C. Vanitha

Abstract: Vibriosis is one of the major **pathogenic bacterial** diseases in shrimp aquaculture. Since, the disease patterns differ and the causes of the diseases are multifactorial, the results of such diagnostic profile tests could be correlated to the differing patterns of the disease. The present study aimed to evaluate the metabolic profile (biochemical and enzymatic) of *V. parahaemolyticus* MTCC 451inoculated black tiger prawn *P. monodon* (Fabricius). The injected *V. parahaemolyticus* MTCC451 resulted in the outbreak of vibriosis in the tested *P. monodon*. The levels of Alkaline phosphatase activity, Acid phosphatase activity, Lactate dehydrogenase activity, Glutamate Pyruvate Transaminase (GPT) activity, Glutamate Oxaloacetate Transaminase activity, Chitinase activity, Water content, Sodium, Potassium, Calcium, Ascorbic acid and Histamine in Haemolymph, Hepatopancreas and Body muscle of *P. monodon* control Vs tested were noted. The laboratory results of the present investigation, using the inoculum *Vibrio parahaemolyticus* MTCC451 revealed that these endemic bacterial populations might become opportunistic pathogens, when hydroecological conditions are altered in the farm ponds and could bring the fatal episodes of mass mortality.

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Mining the Amino Acid Dominance in Gene Sequences

V. Balamurugan[1*] and T. Marimuthu[2]

[1]Department of Information Technology, AMET University, Chennai - 603112, Tamil Nadu, India; bala_vm@yahoo.com

[2]Manonmaniam Sundaranar University, Tirunelveli - 627012, Tamil Nadu, India; mastersvksmca@gmail.com

Abstract

In the recent period, the classification techniques are widely applied in the field of Bioinformatics. The proposed Amino Acid Component based Classification algorithm adopts Iterative Dichotomiser3 classifier. The algorithm consists of two phases viz. attribute selection and component based classification. In the attribute selection phase the dominating amino acids and deficiencies in amino acids that cause the diseases are found. The second phase finds the components of amino acids which spread the diseases in the specified sequence. The experiments were carried out on the gene sequence of dengue virus which is available on the NCBI online biological database and the accuracy of the proposed algorithm is calculated as 90.744%. The proposed classification algorithm is compared with the traditional benchmark algorithms such as Naive Bayes, ID3, Random Forest, Multilayer Perceptron and J48. The result of this work can be used by the drug designers to predict new viral diseases.

Keywords: Amino Acid Components, Classification, Entropy, Information Gain

1. Introduction

Data mining is the process of extracting meaningful or interesting patterns from the large amount of data. There are several techniques in data mining such as classification, clustering, association rule mining, and regression that are used to extract the required information. Classification is a method of categorizing the given input items into a predefined group called class. As the manual data classification is a time consuming process, there is a need for automatic classification techniques. Machine learning techniques like neural networks, genetic algorithms, artificial intelligence are found useful in the classification of large data set. The primary step in the classification process is to build a classifier on the basis of known cases with multiple attributes. The classifier thus found is used to predict the new cases with similar attributes. In other words, the classifier allots the label for the new case. Data classification process has two phases viz. training phase and testing phase. There are several classification techniques such as Bayesian classification, decision tree induction, Self Organizing Map (SOM), etc in practice. Furthermore, the classification techniques that are based on rough set, fuzzy set, neural networks and Genetic algorithm are available in the literature[11]. In the recent period, the classification of genome sequences has been attempted by many researchers as this will be helpful in the treatment of many diseases[1]. Though this technique can be applied on any sequence, this work concentrates on the dengue virus genomic data.

Cells of the human body have a central core called Nucleus, which are packaged in units known as

*Author for correspondence

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Performance Enhancement of Radial Distributed System with Distributed Generators by Reconfiguration Using Binary Firefly Algorithm

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- N. Rajalakshmi (1) Email author (rajit12.2.1987@gmail.com)
- D. Padma Subramanian (1)
- K. Thamizhavel (2)

1. Faculty of Electrical and Electronics Engineering, AMET University, , Chennai, India
2. Faculty of Electrical and Electronics Engineering, Mohamed Sathak A.J. College of Engineering, , Chennai, India

Original Contribution
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Abstract

The extent of real power loss and voltage deviation associated with overloaded feeders in radial distribution system can be reduced by reconfiguration. Reconfiguration is normally achieved by changing the open/closed state of tie/sectionalizing switches. Finding optimal switch combination is a complicated problem as there are many switching combinations possible in a distribution system. Hence optimization techniques are finding greater importance in reducing the complexity of reconfiguration problem. This paper presents the application of firefly algorithm (FA) for optimal reconfiguration of radial distribution system with distributed generators (DG). The algorithm is tested on IEEE 33 bus system installed with DGs and the results are compared with binary genetic algorithm. It is found that binary FA is more effective than binary genetic algorithm in achieving real power loss reduction and improving voltage profile and hence enhancing the performance of radial distribution system. Results are found to be optimum when DGs are added to the test system, which proved the impact of DGs on distribution system.

Keywords

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Performance Investigation of a Closed Cycle Magneto Hydrodynamics Powerplant with Liquid Metal as Heat Source

A. R. Sivaram[1*], G. Kanimozhivendhan[2], R. Rajavel[1] and V. P. Durai Raj[3]

[1]Department of Mechanical Engineering, AMET University, Chennai - 603112, Tamilnadu, India; sivaramthermal12@gmail.com

[2]Department of Mechanical Engineering, Regional Centre of Anna University, Tirunelveli - 627007, Tamilnadu, India

[3]Department of Mechanical Engineering, Bharath University, Chennai - 600073, Tamilnadu, India

Abstract

Magneto hydro dynamics power generation is a non-conventional energy resource used in modern systems. Due to high demand of coal, it is necessary to search for other alternative heat source to drive the magneto hydrodynamics power plants. The liquid metal like alumi-num, manganese, copper and silver can be employed due their improved thermal conductivity and flow characteristics. The magneto hydro dynamics power generation process needs high temperature heat source for converting the inert gas into ionized plasma. A regenerative heat exchanger is employed for heat transfer between melted metal from source chamber to argon gas chamber. The heat transfer coefficient between the liquid metal flow and inert gas is high according to flow conducting material. This work deals with the inert gas plasma which is produced from liquid aluminium and this can be used for recycling. This system proves only 36% of aluminum is required than that of regular MHD system using coal as a heating source.

Keywords: Ionization, Liquid Metal Phase Change, Magnetic Field Strength, Magneto Hydrodynamics, Power Density

1. Introduction

Michael Faraday initially described energy conversion process in MHD. Faradys generators are used as MHD generators. MHD generators typically reduce the temperature of the conductive substance from plasma temperatures to just over 1000 °C. A Faraday's generator layout is shown in Figure 1.

Generally there are two types of MHD power plants. They are,

- Open cycle magneto hydrodynamic power plant
- Closed cycle magneto hydrodynamic power plantA typical layout of open cycle and closed cycle magneto hydrodynamic power plant is shown in Figure 2. and 3.,

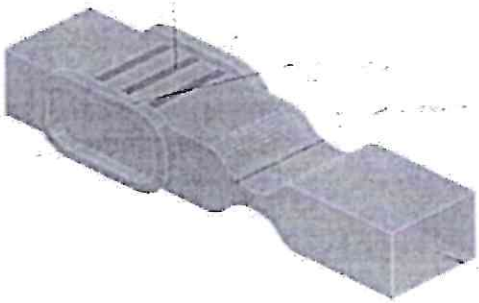

Figure 1. Faraday's continuous MHD generator.

Fengyan Li et al.[1] have investigated Magneto Hydrodynamic (MHD) equations by Galerkin methods. Samuel O Mathew et al.[2] have studied the feasibility of

* Author for correspondence

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Performance, emission and combustion characteristics of a diesel engine with the effect of thermal barrier coating on the piston crown using biodiesel

A.R.Manickam[1]*, K.Rajan[2], K.R.Senthil Kumar[3] & N.Manoharan[4]

[1]Department of Mechanical Engineering, AMET University, Chennai-112, India.
[2] Dr.M.G.R.Educational and Research Institute, University, Chennai-95, India.
[3]R.M.K.Engineering College, Chennai, India.
[4]AMET University, Chennai-112, India.

Abstract: This paper investigates the effect of thermal barrier coated piston on the performance, emission and combustion characteristics of the bio-diesel fuelled diesel engine. Initially, the piston crown was coated with 0.3mm thickness of Partially Stabilized Zirconium (PSZ) material by plasma coating method with the base coat of Y_2O_3 material without affecting the compression ratio of the engine. Then the test was conducted on a base engine and coated diesel engine using diesel and bio-diesel blend at different load conditions. The results revealed that BSFC was decreased by 8.5% and the brake thermal efficiency (BTE) was increased by 6.2% for B20 with coated engine compared with the base engine with biodiesel blend. The smoke, CO and HC emissions were also decreased for biodiesel blend with coated engine compared with base engine. The combustion characteristics such as like peak pressure, maximum rate of pressure rise and heat release rate were increased and the ignition delay was decreased for B20 blend for the coated piston engine compared with biodiesel blend with the base engine.

Keywords: Biodiesel, emissions, diesel engine, partially stabilized zirconia coating, piston.

1. Introduction

Stringent emission norms to reduce the emission have urged the researchers to search for an alternative energy sources like alcohol, vegetable oil for diesel engines. Vegetable oils are easily available and renewable it nature. A number of vegetable oils have been tried in the past to use as fuel in diesel engine. It has been reported that raw vegetable oils can be used as fuel in diesel engines in neat form as well as blended with the diesel fuel. However, the long term operation of the engine problems of injector coking, dilution of engine oil, deposits in various parts of the engine. Higher viscosity of oils is having an adverse effect on the combustion in the existing diesel engines [1-3]. Esterification is one of the methods to convert the vegetable oil into its methyl ester, known as biodiesel. Several researchers have used biodiesel as an alternate fuel in the existing CI engines without any modifications [4-8].

Satyanarayana Murthy et al [9] investigated the effects of steam injection into the intake manifold of a single cylinder, low speed, direct injection diesel engine fuelled with biodiesel palm methyl ester. The addition of steam in to the intake manifold of the engine was carried out by vaporizing the water inside a boiler and heat is supplied by the solar concentrated parabolic dish. They reported that the addition of steam to the combustion chamber decreases the NOx emisions and also there is a significant improvement of engine performance in

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Pull-in Voltage Study of Various Structured Cantilever and Fixed-Fixed Beam Models using COMSOL Multiphysics

P. K. Senthil Kumar[1*], R. Elavarasi[2], Paul Braineard Eladi[1] and M. Gopikrishnan[3]

[1]SRM University, Kattankulathur, Chennai, 603203, India; pksenthil2007@yahoo.co.in
[2]AMET University, Chennai, 603112, India; elavarasi_r@yahoo.com
[3]Bharath University, Chennai, 600073, India

Abstract

The present work involves the study of pull-in voltage of MEMS electrostatic Cantilever beam, Fixed-Fixed beam and modified beam structures with perforations of square, rectangular and circular shapes. The analysis is done using COMSOL 4.3 software. The dimensions of the Cantilever beam, Fixed-Fixed beam and three various structured beams modeled in this paper are length = 300 µm, width = 50 µm, thickness = 3 µm and gap between top electrode and ground plane is 2.5 µm. The pull-in voltage obtained for Cantilever beam is 17.6 V and for Fixed-Fixed beam is 118.8 V. For the modified models with square, rectangular and circular perforations are 12.18 V, 15.45 V and 13.75 V respectively. The results of the work demonstrate an ability to achieve lower pull-in voltage levels for three various structured beams modeled in this paper when compared to cantilever and Fixed-fixed beams. The dependence of the pull-in voltage on geometrical parameters, thrusts on stringent design considerations even at the initial stages.

Keywords: Cantilever, COMSOL, Deflection, Fixed-Fixed, Perforated beams, Pull-in Voltage

1. Introduction

Electrostatic actuation is a popular methodology adopted in MEMS technology for realizing actuators because of good scaling properties with scaling. It has good sensitivity and energy densities. Realization of new design concepts and low-power consumption is also possible. These types of transducers are consists of deformable diaphragm, cantilever beam which is fixed at both ends known as the fixed-fixed beams[1]. This is separated from a fixed ground plane by an air gap of suitable thickness. In these devices, the drive mechanism consists of a constant voltage source (voltage drive) or constant current source (current drive) for enabling electrostatic actuation. The widely used capacitive type sensors and actuators are Micro fabricated cantilever and Fixed-Fixed beams. The drive mechanism used in most of these devices is constant voltage source. In constant voltage source or voltage drive the electrostatic force or bias voltage used is non-linear and leads to the phenomenon of 'pull-in'. Young's modulus and the residual stress of micro fabricated thin films can be determined using pull-in voltage[2].

Pull-in voltage determination in parallel-plate approximation method incorporates a piston like motion of the beam under the assumption of a linear spring constant. This method predicts the occurrence of pull-in when the highest deformation of the movable structure exceeds one-third of the air gap. This paper involves the study of the pull-in voltage of MEMS electrostatic Cantilever, Fixed-Fixed beam type and it is compared with pull-in voltage of three various structured beams. Numerical simulations were validated by simulating pull-in volt-

*Author for correspondence

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Quantum of Ebola Virus Disease Occurrence and Quantum of Research Publications: A Scientrometric Analysis

P. Ramkumar[1*] and B. Suresh[2]

[1]AMET University, Chennai - 603112, Tamil Nadu, India; ramkumar_pe@yahoo.com
[2]Madurai Kamaraj University, Madurai - 625021, Tamil Nadu, India; bsureshwin@gmail.com

Abstract

Ebola virus in humans causes hemorrhagic fever with a case fatality rate of 50% to 90%. So far, there is no specific treatment or vaccine for the Ebola virus. Patients experience uncontrollable bleeding from all body orifices, with intravenous fluid replacement therapy offering little consolation. World Health Organization (WHO) declared this epidemic as an international public health emergency. Moreover, there is now considerable concern that this Ebola outbreak will threaten world security. The proliferation rate of the disease since 2013 is at an alarming rate and is simultaneously found reflected in an abnormal research literature output. A sum total of 2172 publications were captured from the PubMed covering a longer period spanned between 1985 and 2014. While tracing the development trend in both the frequency distribution of the disease and countries affected, the data of research publications in Ebola were subjected to a Scientrometric study to find out if there exists a correlation between the countries affected by a specific disease and countries contributing to Ebola research. As usual in the case of any epidemic, USA leads in Biomedical research nullifying the hypothesis of the present study while the mostly affected African countries were poor in Ebola research contributions.

Keywords: Biomedical Research, Ebola Research, Ebola Virus Disease (EVD), PubMed, Scientrometric

1. Introduction

World Bank Group Ebola Response Fact Sheet[1] released in December 2014 reads that, 'The World Bank Group is mobilizing nearly $1 billion in financing for the countries hardest hit by the crisis. This includes $518 million for the emergency response, and at least $450 million from IFC, a member of the World Bank Group, to enable trade, investment and employment in Guinea, Liberia and Sierra Leone'.

In 2005, Africa had about 12% of the world's population with more than 840 million people[2]. Africa1 also bears 24% of the disease burden but has only 3% of health workers and commands less than 1% of the world's health expenditures[3].

Ebola Virus Disease (EVD) is a disease of humans and other primates caused by an Ebola virus (*Zaire ebola*). Ebola virus in humans causes hemorrhagic fever with a case fatality rate of 50% to 90%. The first ever to discuss a case of Ebola virus infection was reported by Emond et al[4]. The outbreak of Ebola in West Africa is the largest event of this type since the identification of this virus in 1976. Currently, this outbreak has infected the inhabitants of four countries including Guinea, Sierra Leone, Liberia, and Nigeria. Thousands of people have been infected and more than half of the patients have perished from this devastating disease.

*Author for correspondence

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Reactive Power Optimization Using Firefly Algorithm

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- G. Kannan (1) Email author (ganapathykannan@yahoo.com)
- D. Padma Subramanian (2)
- R. T. Udaya Shankar (1)

1. SMIT, , Chennai, India
2. Faculty of Electrical and Electronics Engineering, Director-Centre for Renewable Energy and Robotic Automation, AMET University, , Chennai, India

Conference paper
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Abstract

This paper presents a Firefly algorithm to minimize the real power losses and to improve the voltage profile. This problem is a nonlinear combinatorial optimization with constraints. Newton-Raphson method of power flow is used in conjunction with Firefly algorithm to obtain the optimal values of the control variables. The control variables for this problem are the Generator bus voltages, Transformer Tap positions and the MVAR at the capacitor Banks. The performance of the proposed algorithm has been demonstrated with the IEEE 30-bus system. The algorithm used in this problem is compared to another nature-inspired metaheuristic algorithm (PSO). The simulated result shows improved results both in terms of convergence time and reduction of real power loss.

Keywords

Reactive power optimization Fire fly algorithm IEEE 30-bus system GA PSO

References

Chapter

Reactive Power Pricing Using Group Search Optimization in Deregulated Electricity Market

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In book: Power Electronics and Renewable Energy Systems

G. Kannan · D. Padma Subramanian · S. Siva Subramanian

Abstract

This paper gives a Group Search Optimization (GSO) algorithm based reactive power pricing in deregulated electricity market. For the efficient transfer of the real power, reactive power flow must be adequate. The increased demand of the real power and insufficient reactive power forces the system to stressed operation. The real power loss is increased due to the voltage stability. This makes the Independent System Operator (ISO) to analyze and accept minimized total real power generation cost from the generating companies. The objective of the reactive power pricing is to minimize the total real power generation cost in a deregulated electricity market. The generator bus voltages, transformer tap settings, generator and capacitive reactive power compensation devices are determined for minimizing the real power generation cost in the system. This procedure is presented in IEEE 57 bus system.

(51, 52)

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Residual Stress Analysis in Austenitic Stainless Steel Weldment by Finite Element Method

N. Jayakumar[1]*, S. Mohanamurugan[2], R. Rajavel[2] and J. Ashok Kumar[2]

[1]Department of Mechanical Engineering, AMET University, Chennai - 603112, Tamil Nadu, India
[2]Department of Automobile Engineering, Saveetha University, Chennai - 600072, Tamil Nadu, India

Abstract

Residual stress in weldments is one of the major concerns in manufacturing industries especially in welding. They occur, sometimes during the initial processing of metals and sometimes during rolling, forging, casting etc. In welding these stresses develop due to non uniform cooling of the welded zone. Tensile stresses are primarily responsible for crack initiation and product failure. Residual stress may also lead to premature failure of the welded joints when subjected to hazardous conditions. There are various physical methods of detection of residual stress in weldments such as x-ray diffraction and deep hole drilling. Nevertheless, numerical method is also one of the most popular methods among researchers to solve various complex engineering problems. In this work, numerical simulation is carried out by creating a 2-D model of the Austenitic stainless steel weldment with various boundary conditions using ANSYS 15.0 software and the results are studied. The details of residual stress are explained with relevance to failure occurrence.

Keywords: Finite Element Method, Residual Stress, Stainless Steel, Weldment

1. Introduction

Residual stresses are self balancing internal stresses arising from non uniform mechanical or thermal straining with some measure of plastic flow. They are mostly related with welding .The mechanical properties of materials such as creep, fatigue life etc are influenced by these residual stresses. On occasions, the effects on these properties are advantageous and other times, these effects are perilous. Hence, we need to inspect and control the residual stresses. There are two different techniques widely used to measure the residual stresses. Among them, the most common technique is a special type of XRD test which is used for measuring the stresses in fine grained crystalline materials. The other method, the hole drilling method, is employed only when the X-ray technique is not helpful.

Residual stresses are those which prevent a body from maintaining equilibrium with its environment. They may be classified by: 1. Cause (thermal or elastic mismatch). 2. The scale over which they self-equilibrate and 3. The method with which they are measured. In this endeavour, a length scale viewpoint is taken up. As shown in Figure 1, residual stresses start off from misfits between different areas. In certain cases, these misfits span over huge distances, for example, the one caused by the non-uniform plastic deformation of a bent rod. They can also arise from sharp thermal gradients, like those caused during welding or heat treatment processes. These stresses could be beneficial, as in the case of shot peening and in toughening of glass, whether they are mechanically induced or thermally induced. The macro stresses are of type 1 as they differ continuously over large spans. This is in disparity to residual stresses which differ over the grain scale or the atomic scale (type 3). In these cases, the misfitting regions span microscopic or submicroscopic dimensions. Low level type 2 stresses almost always exist in polycrystalline materials only because of the fact that the elastic and thermal properties of differently oriented neighbouring grains are different. More noteworthy grain scale stresses take place when the microstructure contains several phases or phase transformations occur. The type 3 category includes stresses due to coherency at interfaces and dislocation stress fields.

*Author for correspondence

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Review Paper on Friction Stir Welding of Aluminium and Magnesium Alloys

D. Muruganandam[1*], C. Balasubramaniyan[2] and B. Gokulachander[3]

[1]Sri Sairam Engineering College, Chennai – 600044, Tamil Nadu, India; murudurai@gmail.com
[2,3]AMET University, Chennai – 603112, Tamil Nadu, India; pvrbala@gmail.com, gokula.chander@gmail.com

Abstract

Objective: Friction Stir Welding (FSW) is a relatively new solid state welding technique for similar and dissimilar materials, especially on current interest with aluminum and magnesium alloys. **Methods/Analysis:** The Friction Stir Welding of aluminum alloys with magnesium alloys are reviewed on this paper. The basic principles of FSW are described, followed by process parameters study which affects the weld strength. **Findings:** The microstructure and the likelihood of defects also reviewed. Tensile strength properties attained with different process parameters are discussed. **Conclusion/Application:** It is demonstrated that FSW of aluminum and magnesium alloy is becoming an emerging technology with numerous commercial applications.

Keywords: Aluminum Alloys, Friction-Stir Welding, Magnesium Alloys, Microstructure, Tensile Strength

1. Introduction

In recent times, focus has been on developing fast, efficient processes that are environment friendly to join two dissimilar materials. The spotlight has been turned on Friction Stir Welding as a joining technology capable of providing welds that do not have defects normally associated with fusion welding processes[1–3].

2. Process Parameters

It is well understood that the effect of some important parameters such as rotational speed and welding speed on the weld properties is the major topics for researchers. In all the above cases, FSW parameters are selected by trial and error to fix the major topics for researchers[4].

Lakshminarayanan A. K. et al.[5] conducted study on AA2219 aluminum alloy at spindle rotation of 500–1600 RPM and frictional speed of 0.37–2.25 mm per sec. They found that defect free FSW on AA2219 metals produced under a wide range of rotational speeds and welding speeds.

Yang Yong et al.[6] conducted study on dissimilar metals such as 5052 aluminum alloy and AZ 31 magnesium alloy. They found that sound weld was obtained at rotational speed of 600 RPM with welding speed of 40 mm/min. The microstructure of the stir zone is greatly refined.

Elangovan and Balasubramaniam[7] conducted stud on 2219 aluminum alloy material by FSW process. They have used five different tool pin profiles - straight, cylindrical, threaded cylindrical, triangular and square with three welding speeds. Square pin profiled tool produced defect free Friction Stir Processed (FSP) irrespective of welding speeds. Of the three welding speeds used to fabricate the joints, the joints fabricated at a welding speed of 0.76 mm per seconds showed superior tensile properties, irrespective of tool pin profiles. FSW joints usually consist of four different regions as shown in Figure 2. They are: 1. Unaffected Base Metal, 2. Heat Affected Zone (HAZ), 3. Thermo-Mechanically Affected Zone (TMAZ) and 4. Friction Stir Processed (FSP) zone. The formations of above regions are affected by the material flow behavior under the action of rotating non- consumable tool. However, the material flow behavior is predominantly influenced by the FSW tool profiles, FSW tool dimensions and FSW process parameters[8].

In the FSW process, parameter selection and tool geometry are among the key factors that determine the

*Author for correspondence

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Screening of Beta-lactam Acylase Producers from Soil and Characterization of Isolates for Substrate Specificity for Cephalosporins

Trupti K. Ashar[1*], V. W. Rajasekar[2] and Anupama Datla[2]

[1]Department of Management, AMET University, Chennai, India; trupti.ashar@fermentabiotech.com
[2]R&D Biotech Division, Fermenta Biotech Ltd, DIL Complex, Majiwada, Thane, 400610, India; vyasa.rajasekar@fermentabiotech.com

Abstract

Beta-lactam acylase enzyme producers were isolated from soil samples. Soil samples were induced with phenyl amino acid derivatives for selelctive isolation. Out of the two potential isolates obtained, one of the isolates was studied for presence of beta-lactam acylase enzyme with cephalexin as model substrate. Enzyme activity of isolate grown in media at varying pH showed it to be tolerant to alkaline pH 8.5. Also the substrate specificity for various cephalosporins showed it most selective to cephalexin.

Keywords: Betalactam Acylase Enzyme, Cephalexin, Soil Isolate

1. Introduction

Beta lactam antibiotics have been in clinical use for more than 60 years and are currently the most widely used group of antibiotics utilized to treat bacterial infections by virtue of beta-lactam nuclei and different acyl side chain in semisynthetic antibiotics responsible spectrum of antibacterial activity and increased chemical stability and lesser known toxicity to mammalian cells[1].

Beta-lactam antibiotics particularly derivatives of Penicillins and cephalosporins represent world's major biotechnology products and comprise ~65% of the total world market for antibiotics. Beta-lactam antibiotics have been in clinical use for treatment of bacterial infections since the discovery of Penicllin in 1960 and produced fermentatively from Penicillium and Cephalosporium sp. However wide spread use of these during first world war led to resistance by various bacteria producing betalactamase enzyme which cleaves the beta-lactam nucleus. The susceptibility was also found to be influenced by acyl side chain which on alteration resulted in changed pharmacological properties. These observations led to introduction of semisynthetic beta-lactams containing synthetic side chain attached to beta-lactam nucleus. Amoxicillin, Ampicillin, Cephalexin, Cefadroxil were amongst initial ones.

Manufacturing of semisynthetic beta-lactam antibiotics involved 2 steps - i) Enzymatic hydrolysis of antibiotic to generate nucleus ii) Coupling of synthetic side chain to beta-lactam nucleus. Biocatalysis has paved its way for enzymatic hydrolysis of Penicillin and Cephalosporin to generate key intermediates like 6 Amino Penicillanic Acid (6APA) and 7 Amino Desacetoxycephalosporanic Acid (7ADCA) using Penicillin G Acylase (PGA E.C.3.5.1.11) enzyme widely used for this purpose on commercial scale since 1985[2].

Betalactam acylase enzymes belonging to Ntn hydrolase family include Penicillin amidase or amino acid

*Author for correspondence

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Structural, optical and thermal properties of $CuGaS_2$ crystals by chemical vapor transport (CVT) method

S. Sugan [a,b], K. Baskar [a], R. Dhanasekaran [a,*]

[a] Crystal Growth Centre, Anna University, Chennai 600 025, India
[b] Department of Physics, AMET University, Kanathur, Chennai 603 112, India

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ABSTRACT

The ternary $CuGaS_2$ single crystals were grown by chemical vapor transport (CVT) method, using iodine as a transporting agent in a closed system. The as grown $CuGaS_2$ crystals exhibit dark green color. The concentration of transporting agent was 12 mg/cm^3. The maximum size of single crystal has the dimension of 6 × 2 × 1 mm^3. XRD studies show that the grown crystal belongs to tetragonal (chalcopyrite) system with (1 1 2) as dominant orientation. High resolution scanning electron microscope (HR-SEM) analysis disclosed layer growth pattern of the $CuGaS_2$ crystal. Energy Dispersive X-ray (EDX) analysis revealed the composition of the grown $CuGaS_2$ crystal. Raman spectrum of the grown $CuGaS_2$ crystal exhibited a sharp peak of the A_1 mode at 308 cm^{-1}. The emission spectrum showed that the crystal has a band gap emission of 2.32 eV (534 nm) when excited with 490 nm. The melting point of the grown $CuGaS_2$ crystal was found to be 1236 °C using differential thermal analysis.

1. Introduction

Copper gallium sulfide ($CuGaS_2$) belongs to I–III–VI_2 ternary compound semiconductor that crystallizes in chalcopyrite structure with space group *I*-42*d* [1]. The pseudo-ternary and ternary compounds are interesting for their possible applications in tuning lattice parameters and optical gaps [2] in order to obtain compounds tailored to meet specific photoconductive and non-linear optical demands. This group of materials has been intensively investigated in the past and currently used in optoelectronics devices, photovoltaic solar cells, light emitting diodes, infrared detectors and various non-linear optical devices [3,4]. $CuGaS_2$ single crystal has been considered as a promising material for visible and ultraviolet (UV) light – emitting devices and has a wide direct band gap of 2.49 eV at room temperature [5–8]. Growth of $AgGaS_2$ and $CuGaS_2$ single crystals has been performed by melt growth using quartz ampoule [9]. But the vapor pressure of elemental sulfur is more than 20 atmospheric pressure at the reaction temperature, which exceeds the rupture strength of fused quartz. So, the synthesizing $CuGaS_2$ polycrystalline material by the conventional melt reaction method is difficult. The properties of $CuGaS_2$ microcrystals were reported by Julien et al. [10]. Radiative defects in $CuGaS_2$ thin films have been studied using photoluminescence spectroscopy by Botha et al. [11]. Shirakata et al. have reported photoluminecsence of $CuGaS_2$ epitaxial layers grown by metalorganic vapor phase epitaxiy [12]. Crystallization of $AgGaS_2$ melts enriched with Ag_2S and Ga_2S_3 were studied by Kokh et al. [13]. Exciton-phonon luminescence and Raman scattering in $CuGaS_2$ crystals were investigated by Syrbu et al. [14]. Crack free, transparent and high quality single crystals are required to fabricate non-linear optical and photovoltaic devices. Hence in the present work CVT method has been adopted for the growth of $CuGaS_2$ single crystals using iodine as the transporting agent. The as grown crystals were characterized using powder X-ray diffraction, high resolution scanning electron mictroscope (HR-SEM), energy dispersive X-ray analysis (EDX), FT-Raman spectrum, fluorescence spectrum and differential thermal analysis (DTA).

2. Experimental

$CuGaS_2$ single crystals were grown by chemical vapor transport (CVT) method using iodine as transporting agent. The individual elements of the source materials Cu, Ga and S in the mole ratio 1:1:2 along with iodine were taken in a quartz ampoule of length about 180 mm and diameter 13 mm. The quartz ampoule along with the source materials has been evacuated to a pressure of about 1 × 10^{-5} mbar and sealed off. The ampoule was placed into a double zone resistive heating horizontal muffle furnace fitted with

* Corresponding author. Tel.: +91 44 22358317.
E-mail addresses: [illegible] (S. Sugan), [illegible] (R. Dhanasekaran).

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ЖУРНАЛ НАНО- ТА ЕЛЕКТРОННОЇ ФІЗИКИ
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Studies on Hall Effect and DC Conductivity Measurements of Semiconductor Thin films Prepared by Chemical Bath Deposition (CBD) method

S. Thirumavalavana[1], K. Mani[2], S. Suresh Sagadevan[3]

[1] *Department of Mechanical Engineering, SathyabamaUniversity, Chennai-600 119, India*
[2] *Department of Mechanical Engineering, PanimalarEngineeringCollege, Chennai-602103, India*
[3] *Department of Physics, AMET University, Kanathur, Chennai - 603112, India*

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Semiconductors have various useful properties that can be exploited for the realization of a large number of high performance devices in fields such as electronics and optoelectronics. Many novel semiconductors, especially in the form of thin films, are continually being developed. Thin films have drawn the attention of many researchers because of their numerous applications. As the film becomes thinner, the properties acquire greater importance in the miniaturization of elements such as resistors, transistors, capacitors, and solar cells. In the present work, copper selenide (CuSe), cadmium selenide (CdSe), zinc selenide (ZnSe), lead sulphide (PbS), zinc sulphide (ZnS), and cadmium sulphide (CdS) thin films were prepared by chemical bath deposition (CBD) method. The prepared thin films were analyzed by using Hall measurements in Van Der Pauw configuration (ECOPIA HMS-3000) at room temperature. The Hall parameters such as Hall mobility of the material, resistivity, carrier concentration, Hall coefficient and conductivity were determined. The DC electrical conductivity measurements were also carried out for the thin films using the conventional two – probe technique. The activation energies were also calculated from DC conductivity studies.

Keywords: Semiconductor, Thin films, Hall effect, Van Der Pauw method, DC conductivity.

PACS numbers: 72.20. – i, 73.50. – h, 72.20 My

1. INTRODUCTION

The Hall Effect is caused by the action of a magnetic field on the current (electrons) flowing in a solid. Though the Hall Effect was originally discovered in a metal, today it is used mainly for the characterization of semiconductors of thin films. Hall Effect measurements are useful for characterizing virtually every material used in producing semiconductors. The Van Der Pauw method [1] is one of the most utilized measurement methods for the evaluation of electrical properties in semiconductor materials such as resistivity, carrier density, and mobility. The Van Der Pauw method can be used to calculate samples of arbitrary shape, although several basic sample conditions must be satisfied to obtain accurate measurements such as the thickness of the sample must be constant, point contacts placed at the edges of the samples must be used for the measurements, and the sample quality has to be homogeneous. Most semiconductor samples satisfy these conditions, so that this convenient measurement method is widely utilized. Most of the semiconductor thin films are under development to realize high performance novel devices. The Van Der Pauw method is a convenient measurement method for the evaluation of semiconductor thin films. Therefore, newly prepared thin films will be sometimes measured using the Van Der Pauw method to determine film quality as a reference, regardless of their homogeneity. There have been several reports on the influence of inhomogeneity on Van Der Pauw measurements of such unintentional inhomogeneous samples [2-5]. In the present investigation, the Hall Effect and DC conductivity studies were carried out on CuSe, CdSe, ZnSe, PbS, and ZnS thin films.

2. EXPERIMENTAL PROCEDURE

Chemical Bath Deposition is a convenient and low cost technique for producing large area thin film for semiconducting materials, used to deposit on the substrates. The deposition by chemical bath method is frequently carried out in an aqueous solution containing specific chemicals. In the CBD process, the precipitation of compound semiconductor is controlled through the use of suitable complexing agents and the amount of ions. However, CBD technology lacks mainly in aspects such as chemical kinetics and growth mechanisms, which have significant relevance to improving the quality of the materials and processes. A simple chemical bath deposition (CBD) set-up was fabricated in the present work for large area deposition of thin films. This is an inexpensive technique at low deposition temperatures. In addition, the process can be controlled simply by varying pH, time, temperature, and concentration. Thin films of copper selenide (CuSe), cadmium selenide (CdSe), zinc selenide (ZnSe), lead sulphide (PbS), zinc sulphide (ZnS), and cadmium sulphide (CdS) were prepared by CBD method [6-9]. In this work ECOPIA Hall Effect measurement system was used to study the electrical properties such as resistivity, carrier concentration, Hall mobility, Hall coefficient and conductivity of the deposited thin films. The experimental set-up of Hall Effect is shown in Fig. 1.

3. HALL EFFECT MEASUREMENTS

Hall Effect measurements have been valuable tools for analyzing the material characterization. Essentially, the Hall Effect can be observed when the combination of a magnetic field through a sample and a current along the length of the sample creates an electrical

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Survey on Fuzzy Petri Nets for Classification

S. Meher Taj[1]* and A. Kumaravel[2]

[1]Department of Mathematics, AMET University, Chennai - 603112, Tamil Nadu; taj.meher@gmail.com
[2]School of Computing, Bharath University, Chennai - 600073, Tamil Nadu; drkumaravel@gmail.com

Abstract

The aim of this study is based on Survey on fuzzy Petri nets for Classification. Petri Nets (PN) is excellent networks which have great characteristics of combining a well defined mathematical theory with a graphical representation of the dynamic behavior of systems. But, with the growth in the difficulty of modern industrial, and communication systems, PN found themselves inadequate to address the problems of vagueness, and imprecision in data. This gave rise to combination of Fuzzy logic with Petri nets and a new tool emerged with the name of Fuzzy Petri Nets (FPN). Much research has been done for FPN and a number of their applications have been expected, but their basic types and structure is still ambiguous. Result of this research, an effort is made to categorize the applications of FPN for classification according to their structure and algorithms. We identify the different types of Petri nets will improve future research on Petri nets. Hence in this study, due to these limitations we focus on establishing the FPN in the light of their classifications has been done.

Keywords: Discrete Event Systems, Fuzzy Logic, Fuzzy Petri Nets, Petri Nets

1. Introduction

Petri Net (PN) (also known as a place/transition net or P/T net) is one of several mathematical modeling languages for the description of Discrete Event Systems (DES). PNs are proved to be quite effective tool for graphical modeling, mathematical modeling, simulation, and real time control by the use of places and transitions. However, there was an intuitive need for a system, which would be able to address uncertainties and imprecision of the real world systems, because of increase in the complexity of industrial and communication systems. Fuzzy logic proved to be an appropriate complement because of its possibility nature to handle vague data.

Up till the date, numbers of ways have been proposed for combining PN with fuzzy logic, according to different applications. But with the increasing applications of these nets, there is an increase in the ambiguity about their types and structures. Almost in every new research on Fuzzy Petri Nets (FPN), researchers claim to have come up with new type of FPN. Therefore, for the ease of future researchers and engineers, it was essential to categorize FPN on the basis of some criteria. Owing to this fact, in current research FPN are classified according to their structures, and algorithms. Further, literature review of the applications of FPN has been done in the light of their classifications.

As PN can be timed and/or colored, similarly FPN can also be timed and/or colored to include the temporal effect and/or enhance their visibility. Like that of Neural Networks (NN), FPN can also do learning, and can be trained in order to get adapt to the changing situations. And as Fuzzy logic is being combined with PN to get FPN, in the same way FPN can be combine with other Artificial Intelligence (AI) tools, and mathematical models to become more efficient, and powerful.

On the basis of structures and algorithms FPNs have been classified as; Basic Fuzzy Petri Nets (BFPN), Fuzzy Timed Petri Nets (FTPN), Fuzzy Colored Petri Nets (FCPN), Adaptive Fuzzy Petri Nets (AFPN), and Composite Fuzzy Petri Nets (CFPN).

Section 1, 2, 3, 4 and 5 are allocated to each of the above mentioned type of the net, and their proposed applications. The research is being concluded in Section 6.

*Author for correspondence

Synthesis and applications of exo N-((1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]hepta...

more

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Abstract

A series of exo N-((1R,2R,4R)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-yl)benzamides were prepared from (R)-isobornyl amine and screened as chiral solvating agents to discriminate the isomers of 1,1′-binaphthyl-2,2′-diyl hydrogenphosphates by ^{31}P NMR analysis. A linear relationship between the experimental and calculated enantiomeric purity was established indicating the potential use of the system to determine the ee for samples of this acid of unknown enantiomeric purity. The amides were also screened for chiral discrimination of some α-substituted acids by ^{19}F NMR analysis.

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Authors

Jayaraman Kannappan
Department of Chemistry, Amet University, 135, East Coast Road, Kanathur, Chennai 603 112, India

Nilesh Jain
Department of Chemistry, Faculty of Science, M. S. University of Baroda, Vadodara 390 002, India

Ashutosh V. Bedekar
Department of Chemistry, Faculty of Science, M. S. University of Baroda, Vadodara 390 002, India

Additional information

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Synthesis, Characterization and Antimicrobial Activities of Turmeric Curcumin and Curcumin Stabilized Zinc Nanoparticles -A Green Approach

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M. Jayandran

Manar Haneefa
7.05 · Kent State University

V. Balasubramanian

Abstract

Metal nanoparticles are versatile platforms for biomedical applications and therapeutic intervention. But there is a need to develop new method in the preparation of nanoparticles which should not be harmful to environment. Recent studies demonstrated that several metal nanoparticles synthesized by green methodologies have shown potential antibacterial, antifungal activities. This paper investigates the synthesis of turmeric curcumin as well as zinc nanoparticles in the greener route by using natural lemon extract as a reducing agent and curcumin as a

5.6

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Spectral analysis of photonic crystal based bio-sensor using AdaBoost algorithm

Publisher: IEEE

1 Author(s) Sriram G ; Vivek M ; Sandeep Kumar Roy ; Preeta Sharan View All Authors

Abstract

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I. Introduction

II. Structure Design

III. Sensor Output

IV. Adaptive Boosting (Adaboost)

Confusion Matrix

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Figures

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Keywords

Metrics

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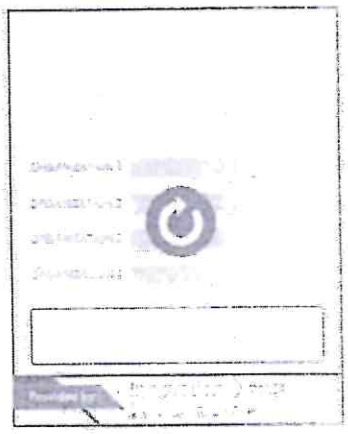

Metadata

Abstract:
Photonic is the study that includes the use of light, where the fundamental element is photon. The optics is the branch of the physics which deals with the properties of the light. In this paper the sensor is designed to detect the glucose content of human body and the spectrum from the output of the sensor is analyzed by using AdaBoost algorithm. The Adaptive Boosting in short considered to be AdaBoost algorithm. The classification of the multiple discrete weak classifiers allowing the formation of strong classifier by integrating, provides better improved performance using the concept of AdaBoost. The AdaBoost is used widely in almost all fields like physical sensing, chemical sensing, bio sensing etc. This paper primarily based on analyzing the spectrum from the bio sensors. The major role of the machine language is that it gives the accurate outputs which is easily understood by all the humans without having the knowledge on that particular field. Using the AdaBoost along with the photonic crystals based designs, the sensing technology can be improved in accuracy, sensitivity and specificity. Thus this can be successfully implemented in detection of Diabetic patient. The simulation tool that is used in the paper is MEEP, Mat Lab.

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The High Efficiency Renewable PV Inverter Topology

K. Bavitra[1*], S. Sinthuja[2], N. Manoharan[3] and S. Rajesh[4]

[1]EEE, AMET University, Kanathur, Chennai, 603112, India; bavitra720.chm@gmail.com
[2]TEJAS Research Centre of Excellence, AMET University, Chennai, 603112, India
[3]AMET University, Chennai, 603112, India
[4]Department of ECE, Bharath University, Chennai, India

Abstract

The recent trend in photovoltaic inverter is to use topologies with the absence of transformers to acquire higher efficiency. This gives very low ground leakage current. After the elimination of transformer in a grid/Load connected Photovoltaic (PV) system, a galvanic connection exists between the grid/Load and the PV array. The different inverter topology that generates no varying common-mode voltage is proposed to avoid leakage currents, this proposes a new topology with six switches and two diodes that generates no varying common-mode voltage and exhibits high efficiency.

Keywords: Ground Leakage Current, H-Bridge, Photovoltaic Inverter, Transformer Less Topology

1. Introduction

The transformer less system for Photovoltaic (PV) inverter a new emerging part in the field of power electronics. The PV inverter converts the output of PV cell to an alternating current than can be used by the utility. As the demand for the PV system is increased, our focus on the photovoltaic inverter.

The proposed H6-ZVR topology, consist of diode rectifier, and a new ac H-bridge bypass circuit thus the ground leakage problem is reduced[1]. The efficiency of the transformer less system is not reduced due to losses but offers safety. A high efficiency is obtained using low-input voltage and common mode voltage is not generated in the system, Similar to bipolar PWM full bridge[2]. In PV systems a new conversion topology is used to get assured behaviors and reduced electromagnetic interference[3]. Due to this new conversion topology common mode voltage is generated which improves the behavior of the system and reduces electromagnetic interference[4]. Comparisons of the transformer less topologies are analyzed and the results were found in favour[5]. The new topology used is H-bridge (consists of six diodes) in this the ac bypass circuit consisting of a diode rectifier and a switch is attached to the midpoint[6]. The step down converters are used to modulate a half wave of the output current. Higher efficiency and reliability is achieved because of the straight forward design, reduced number of semiconductor and its simple operation[7]. Due to the use of Sinusoidal Pulse Width Modulation (SPWM) high frequency common-mode voltages are developed this has been avoided in the unipolar SPWM full-bridge inverter[8].

2. General Transformer Less Photovoltaic Inverter

To reduce ground leakage currents and to improve the efficiency of the system various topologies are present. The various benefits in transformer less systems are namely improved efficiency, smaller size and reduced weight. The various topologies used in this system are discussed below. The general photovoltaic inverter without transformer is shown in the Figure 1.

*Author for correspondence

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Thermodynamic Analysis of a Cascade Refrigeration System with R744/R290 Mixtures

S. Satheesh Kumar[1]*, A. R. Sivaram[2] and R. Rajavel[2]

[1]Department of Mechanical Engineering, Sree Sowdambika College of Engineering, Aruppukottai - 626112, Tamil Nadu, India; sateeskanna@gmail.com

[2]Department of Mechanical Engineering, AMET University, Chennai - 603112, Tamil Nadu, India

Abstract

This investigation thermodynamically analyzes a cascade refrigeration system which uses an eco-friendly refrigerant R744/R290 mixture in the circuit with lower temperature as a working fluid. It has zero ODP. Condensing temperature, evaporating temperature, and cascade temperature difference with and without the effect of superheating and subcooling both circuits are the operating parameters and design parameters considered in this investigation. In the present study, thermodynamic analysis of an eco-friendly alternative new refrigerant (mixture of R744 and R290) was proposed and performed with five refrigerants such as R407c, R408a, R410a, R404a, and R417a, which are in the higher temperature circuits of a cascade refrigeration system. MAT-LAB software was performed in terms of temperature in evaporator, temperature in condenser and difference in cascade temperature to develop an expression mathematically for excellent COP, most favorable evaporating temperature of R744/R290 mixture and most favorable mass flow ratio of high temperature refrigerant to that R744/R290 mixture.

Keywords: Binary Mixture, Cascade Refrigeration System, COP, Carbon dioxide, Propane, Theoretical Analysis

1. Introduction

Low-temperature refrigeration systems which are in the temperature range from -30°C to -100°C are required for applications in food, pharmaceutical, and other industries. For such lower temperatures, single-stage vapor compression systems do not suit due to higher pressure ratios because higher pressure ratio would result in high discharge, oil temperatures and low volumetric efficiencies and, hence finally it results in lower values of COP. A two stage cascade system comprises of two vapour–compression units which works separately and interconnected with each other in such a way that evaporator of one system works as condenser to the other system. A schematic layout and p-h plot of a two stage cascade system using two refrigerants are shown in "Figure 1." and "Figure 2."

From the lower stage, the refrigerant vapour is condensed in cascade condenser, which also serves as the evaporator of the next higher stage refrigerant.

B. Agnew et al.[1] have studied on a three stage a cascade refrigeration system which uses two different refrigerants. Nicola et al.[2] have performed a thermodynamic analysis of a cascade refrigeration system which uses HFC's and their blends with carbondioxide as refrigerants in low-temperature circuits. Tung-Wei Chen et al.[3] have analyzed a cascade refrigeration system thermodynamically which uses carbon dioxide and ammonia as refrigerants, to determine the most favorable condensing temperature. Souvik Bhattacharyya et al.[4] have analyzed a natural refrigerant cascade refrigeration system, which uses nirous oxide and carbondioxide in low temperature and high temperature circuits respectively. Souvik Bhattacharyya et al.[5] have examined the performance of a cascade refrigeration–heat pump system analytically. Maoqiong Gong et al.[6] have examined the refrigeration performance parameters of two binary azeotropic mixtures and a ternary azeotropic mixture. The results showed that binary mixture has 10% higher COP than that of R508B. P.K. Bansal

*Author for correspondence

(68, 69, 70)

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5.19

UNDERSTANDING TO PREDICT SOIL BEHAVIOR

J.Rajaraman[1] K.Thiruvenkatasamy[2] and S. Narasimha Rao[3]

[1,2]Department of Harbour and Ocean Engineering AMET University, Chennai, India
[3]IIT Madras, Director, Dredging Corporation of India (Govt.of India).

ABSTRACT: Understanding is needed to relate variation of shear strength of soil in different environment. The shear strength is determined by the parent material of the soil (mineral skeleton), pore fluid (distilled water/ saline water) and environment which changes from land areas to deep Ocean. The shear strength interpretation is extended to the environments of turbidity currents, carbonate compensation depth and abyssal plains. The abyssal plains maintain moderate shear strength. The abyssal plain is a controlled environment which controls any events of the restless earth around it. The Carbonate compensation depth influences both turbidity currents and abyssal plains. Based on the analysis and interpretation of documented cases this paper makes a new conceptual model in interpretation of the influence of Carbonate Compensation depth on turbidity currents in Abyssal plain and the geotechnical behavior of the sediments in Abyssal plains. Documented Cases are: 1) Liquid Limit of a soil calculated by using distilled water is not representative sample in marine condition. The distilled water overestimates Geotechnical property. 2) The failure envelope of reconstituted clay mixed with distilled water is different from the one mixed with Nacl solution. 3) The Oedometer test on undisturbed specimens exposed to distilled water display higher strains than tested in solution.

Keywords: Abyssal plains Carbonate Compensation depth Lysocline layer Reliability Shear Strength.

1. INTRODUCTION

Turbidity currents are a subclass of the broader category of density currents. Density Currents also are termed gravity currents. A density Current "is the flow of one fluid within another caused by the density difference between the fluids. Turbidity currents exist when the density difference is due to suspended sediment and of course the fluids involved are both water. The weathering and stress history of the continental Rock transported as sediment as varying stages to abyssal plain meets varying or different environmental conditions on the way. Any Experimental data collected on Continental areas should be viewed with environmental information as an additional parameter to interpret Marine conditions. A few documented cases are discussed below.

2. DOCUMENTED CASES

2.1. Case (i) Effect of Distilled Water and NaCl Solution on Liquid Limit of Soil Samples

The liquidity limit obtained with distilled water is about two times the one obtained with Nacl solution, regardless its molarity.
A soil with a higher liquid limit will settle more. Distilled water is not a suitable pore liquid because it helps to obtain more settlement. In this context saline water is a better pore fluid compared to distilled water. The salinity of fresh water is in between distilled and Saline Sea water.

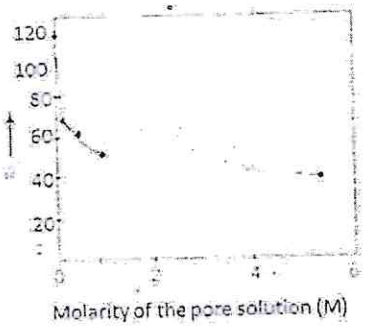

Fig. 1 Variations of liquid limit value with pore water types [1]

2.2. Case (ii) Odometer Test with Distilled Water and NaCl Solution of Soil Samples

An example of possible effects of infiltration of fresh water in a natural deposit subjected to swelling is shown in fig (2). The results of an Odometer tests carried out on two couples of undisturbed specimens of a type of clay shale taken respectively at a depth of 2.5 and 21m. A specimen of each couple was tested in a 1 m NaCl solution. The influence of the nature of the bath does not appear significant in the stage of compression, when the pore water is expelled from

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5.24

Image Super Resolution Reconstruction Using Iterative Adaptive Regularization Method and Genetic Algorithm

Computational Intelligence in Data Mining - Volume 2 pp 675-681 | Cite as

- S. S. Panda (1) Email author (sudamshekhar@gmail.com)
- G. Jena (2)
- S. K. Sahu (2)

1. AMET University, , Chennai, India
2. Roland Institute of Technology, , Berhampur, India

Conference paper
First Online: 11 December 2014

Part of the Smart Innovation, Systems and Technologies book series (SIST, volume 32)

Abstract

Super resolution is a technique to obtain high resolution images from several degraded low-resolution images. This has got attention in the research society because of its wide use in many fields of science and technology. Even though many methods exist for super resolution, adaptive regularization method is preferred because of its simplicity and the constraints used to get better image restoration result. In this paper first adaptive algorithm is considered to restore better edge and texture of image. Further Genetic algorithm is used to smooth the noise and better frequency addition into the image to get an optimum super resolution image.

Keywords

Peak signal to noise ratio (PSNR) Regularization Low/high resolution (LR:HR) Genetic algorithm (GA)

References

(12)

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Article

Big data storage system handling and analytic platform on technology

July 2015

Project: Big Data Analysis

Mohamed Sinnaiya Chithik Raja · M. Munir Ahmed Rabbani

Abstract

Large-scale data processing systems released by leading Internet firms, such as Google, are being recreated by open-source territory, which can be used in a development environment. Efficient storage of large data and processing capability according to all the environmental factors are closely related to business competition. Platformization of data storage and processing functionality by many software organizations and companies enable easy use of services. Small groups or companies are now able to utilize the big data technology, which used to be exclusive to large firms, due to the difficulty in securing specialized manpower and high costs. The reason why we need to be concerned over problems that have not yet occurred is to secure sufficient response time. Sufficient time will enable us to take full consideration before making decisions as well as preparation. Therefore, it is invaluable to predict upcoming events and be concerned about future problems. To solve matters in hand, explicit recognition is needed.

Growth and Characterization of Non-Linear Optical Single Crystal: L-cysteine Hydrochloride Monohydrate

V. AZEEZAA[a,b], A.J. ARUL PRAGASAM[a], T.G. SUNITHA[c], P. KOTEESWARI[d] AND S. SURESH[e,*]

[a]Department of Physics, Sathyabama University, Tamilnadu-600 119, India
[b]Department of Physics, SRR Engineering College, Tamilnadu-603 103, India
[c]Department of Chemistry, Pachaiyappa's College, Tamilnadu-600 030, India
[d]Department of Physics, Justice Basheer Ahmed Sayeed College for Women, Chennai 600018, India
[e]Department of Physics, AMET University, Chennai 603 112, India

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Nonlinear optical single crystals of L-cysteine hydrochloride monohydrate (LCB) were grown by slow evaporation technique. Single crystal X-ray diffraction analysis revealed the crystal system and helped to determine lattice parameter values. Powder X-ray diffraction analyses were carried out and the diffraction patterns were indexed. The optical properties of the crystals were determined using UV-visible spectroscopy. Optical constants such as refractive index, extinction coefficient and electric susceptibility were determined from UV-visible spectroscopy. The Fourier transform infrared studies confirmed the various functional groups present in the grown crystal. The mechanical behaviour of the grown crystals was studied using Vicker's microhardness tester. The thermal analysis confirmed that the crystal was stable up to 108.7°C. The dielectric constant and the dielectric loss measurements were carried out for different temperatures and frequencies. Second harmonic generation of LCB crystal was investigated by the Kurtz powder technique.

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1. Introduction

In recent years there has been considerable interest in synthesizing non-linear optical materials with excellent second order optical non-linearities owing to their potential application in electro-optic and opto-electronic devices [1, 2]. Non-linear optics (NLO) is at the forefront of current research because of its importance in providing the key functions of frequency shifting, optical modulation, optical switching, optical logic and optical memory for the emerging technologies in the areas such as telecommunications, signal processing and optical interconnections [3, 4].

The rapid development of optical communication systems has led to a demand for non-linear optical materials with high optical quality. Owing to the technological importance of these non-linear crystals, the need for good quality crystals has grown dramatically in the last few decades. The wide range of applicability of bulk single crystals is evident in the fields of semiconductors, infrared detectors, non-linear optics, piezoelectric oscillators, photonics and optoelectronic industries. The key factors for materials selection depend not only on the laser condition but also on the physical properties of the crystal such as transparency, damage threshold, conversion efficiency, phase matching, temperature stability, and size of the crystal [5]. Slow evaporation methods, slow cooling method etc., are known for single crystal growth techniques from solution [6–8]. Solution growth technology plays a principal role for the non-linear optical susceptibilities. The transparency and other mechanical properties of the grown crystals are affected in other growth processes due to thermal stress. It is reported that solution growth overcomes these difficulties due to its simplicity and convenience [9].

The borate crystals generally possess chemical stability, high damage threshold and high optical quality [10]. The experiment conducted by Becker on NLO materials proved that borate compound materials are superior to other commonly used materials for UV applications [11–13]. Moreover, amino acids are dipolar in nature and the molecules possess an electron donor group and an electron acceptor group. This leads to large second order optical non-linearity arising out of intramolecular charge transfer between the donor and the acceptor. Owing to dipolar nature, amino acids are considered to be high potential for NLO applications [14].

Some of the L-cysteine complexes are L-cysteine tartarate monohydrate [15], L-cysteine hydrochloride monohydrate [16, 17] and L-cysteine hydrochloride [18]. In the present investigation, attempts were made to grow single crystals of L-cysteine hydrochloride monohydrate (LCB) by slow solvent evaporation technique and characterization on single crystal X-ray diffraction (XRD), UV-visible absorption, the Fourier transform infrared (FT-IR) spectroscopy, microhardness, thermogravimetric-differential thermal analysis (TG-DTA), differential scanning calorimetry (DSC), second harmonic generation and dielectric studies were done as well.

*corresponding author, e-mail: sureshcagadevan@gmail.com

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(94)

5:48

Analysis on the Growth and Characterization of a Non-linear Optical Single Crystal: L-Cystine Dihydrobromide

Azeezaa Varsha Mohammed[a,b], *Joseph Arul Pragasam Arulappan*[c], *Sunitha Thangaiya Ganesan*[d], *Suresh Sagadevan*[e]*

[a]*Research Scholar, Department of Physics, Sathyabama University, Chennai- 600 119, India*
[b]*Department of Physics, SRR Engineering College, Chennai- 603 103, India*
[c]*Department of Physics, Sathyabama University, Chennai- 600 119, India*
[d]*Department of Chemistry, Pachaiyappa's College, Chennai- 600 030, India*
[e]*Department of Physics, AMET University, Kanathur, Chennai - 603112, India*

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Nonlinear optical single crystals of L-cystine dihydrobromide (LCHB) have been grown by slow evaporation method. Single crystal X-ray diffraction analysis revealed the crystal system and lattice parameter values. Powder X-ray diffraction analyses have been carried out and the diffraction patterns have been indexed. Fourier transform infrared (FTIR) analysis confirms the various functional groups present in the grown crystal. The thermal behavior of the grown crystal was investigated by DTA and TGA analysis. The optical properties of the crystals were determined using UV-Visible transmittance spectrum. The dielectric constant and dielectric loss of the crystal are studied as a function of frequency for various temperatures. The SHG efficiency of the crystal is studied using the Kurtz and Perry technique.

Keywords: *growth from solution, x-ray diffraction, infrared spectra, optical transmission spectrum*

1. Introduction

L-cysteine [$C_3H_7NO_2S$] is the simplest amino acid and it has centre of chirality and is optically active. L-cysteine can exist as neutral molecule in the gas phase; it exists as a Zwitterion in solution as well as in solid state. L-cysteine crystallizes in non-centrosymmetric space group making it a potential candidate for piezoelectric and non-linear applications. L-cysteine exist as a dipolar ion in solid state in which carboxyl group is present as a carboxylate ion and amino group is present as ammonium ion. In addition, thiol group is present in aqueous solution of L-cysteine. Due to this dipolar nature, L-cysteine has a high melting point. Another added advantage of L-cysteine is the presence of chromophores namely amino group and carboxyl group which makes it transparent in the UV-Vis region[1,2]. Thus more emphasis has been given by the scientists to develop non-linear optical crystals in L-cysteine and its analogs. Experiments conducted by Martin et al.[3], Loganayaki et al.[4], Bhagavannarayana et al.[5], Selvaraju et al.[6] and Anbuchezhiyan et al.[7] reveal the suitability of L-cysteine family crystals for their non-linear optical properties and applications. The non-linear optical properties of L-cysteine analogs make them strong candidates to replace KDP for frequency conversion of infrared lasers. All compounds of this class contain optically active carbon atoms and therefore all of them form acentric crystals[8]. The present study deals with L-cystine dihydrobromide (LCHB), one of the non-linear optical crystals belonging to L-cysteine family. The growth of the crystal has been achieved by slow solvent evaporation technique. The grown crystals were characterized by single crystal XRD analysis, powder XRD, FTIR, thermal analysis, DSC, UV analysis, dielectric and SHG studies.

2. Experimental Procedure

2.1. Crystal growth

L-cystine dihydrobromide ($C_6H_{14}Br_2N_2O_4S_2$) crystals are grown from aqueous solution by slow solvent evaporation technique. The starting materials are L-cysteine and hydrobromic acid. The solution is prepared by dissolving equimolar amount of 2:2 of L-cysteine and hydrobromic acid in double distilled water and the solution is stirred using a magnetic stirrer having hot plate attachment. The mixed solution was slowly heated up to 60 °C and a saturated solution was obtained. This solution is filtered using micro filter paper of 10 µm. The filtered saturated solution is transferred into a petri dish. The prepared solution is allowed to evaporate at room temperature and kept in undisturbed condition. Large size single crystals were obtained due to the collection of monomers at the seed crystal sites from the mother solution, after the nucleation and growth processes were completed. LCHB crystal of dimension about 10 × 10 × 6 mm^3 was harvested in a growth period of twenty four days by slow evaporation of the solvent. The photograph of the grown LCHB crystal is shown in Figure 1. During the growth of LCHB, the formation of several funguses like organism in the solution is observed. These organisms start growing on the surface, exposed to atmosphere and subsequently sink into the solution, thereby, contaminate it. Due to this reason,

*e-mail: sureshsagadevan@gmail.com

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INVESTIGATIONS ON THE MECHANICAL AND ELECTRICAL PROPERTIES OF AN L-CYSTEINE NICOTINAMIDE MONOHYDRATE SINGLE CRYSTAL

V. AZEEZAA*, T. G. SUNITHA[a], A. JOSEPH ARUL PRAGASAM[b] and S. SURESH[c]

Department of Physics, SRR Engineering College, CHENNAI – 603103 (T.N.) INDIA
[a]Department of Chemistry, Pachaiyappa's College, CHENNAI – 600030 (T.N.) INDIA
[b]Department of Physics, Sathyabama University, CHENNAI – 600119 (T.N.) INDIA
[c]Department of Physics, AMET University, Kanathur, CHENNAI – 600123 (T.N.) INDIA

ABSTRACT

Single crystal of L-Cysteine Nicotinamide Monohydrate (LCNM) was grown by slow evaporation method. Single crystal XRD method was used for structural identification. The microhardness study shows that the hardness steadily increases with increase in loads. Work hardening coefficient indicates that the grown crystals are moderately softer. Variation of stiffness constant with load for the given crystals was analysed. Dielectric constant and dielectric loss have been obtained as a function of frequency between 50 Hz -5 MHz and different temperatures. The dependence of AC conductivity (σ_{ac}) on temperature and frequency of the applied field (50 Hz–5 MHz) was studied. The D.C. conductivity was deduced from the A. C. conductivity and activation energy is calculated. The photoconductivity studies reveal that the LCNM crystal exhibits negative photoconductivity nature of the grown single crystal.

Key words: Single crystal, Microhardness, Dielectric loss, Dielectric constant, AC and DC conductivity, Photoconductivity.

INTRODUCTION

A non-linear optical (NLO) frequency conversion material is of vital role in the field of photonics and optoelectronics applications. NLO crystals are not only confined because of their NLO properties. They also study other characteristics such as hardness and dielectric,

*Author for correspondence; E-mail: azeezaaphysics@gmail.com

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ORIGINAL ARTICLE

Cross-Layer Design Approach for Power Control in Mobile Ad Hoc Networks

A. Sarfaraz Ahmed [a,1], T. Senthil Kumaran [b,*], S. Syed Abdul Syed [a,1], S. Subburam [b]

[a] AMET University, Chennai, Tamil Nadu, India
[b] ACS College of Engineering, Bangalore, Karnataka, India

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KEYWORDS

RSS;
AODV;
CLPC

Abstract In mobile ad hoc networks, communication among mobile nodes occurs through wireless medium The design of ad hoc network protocol, generally based on a traditional "layered approach", has been found ineffective to deal with receiving signal strength (RSS)-related problems, affecting the physical layer, the network layer and transport layer. This paper proposes a design approach, deviating from the traditional network design, toward enhancing the cross-layer interaction among different layers, namely physical, MAC and network. The Cross-Layer design approach for Power control (CLPC) would help to enhance the transmission power by averaging the RSS values and to find an effective route between the source and the destination. This cross-layer design approach was tested by simulation (NS2 simulator) and its performance over AODV was found to be better.

1. Introduction

A mobile ad hoc network is a collection of wireless nodes that can transfer data without the use of network infrastructure or administration. Such networks have many potential applications, including in disaster mitigation, defense, health care, academia and business. In such a network, every node acts both as a host and a router.

A major limitation with mobile nodes is that they have high mobility, causing links to be frequently broken and reestablished. Moreover, the bandwidth of a wireless channel is also limited, and nodes operate on limited battery power, which will eventually be exhausted. Therefore, the design of a mobile ad hoc network is highly challenging, but this technology has

* Corresponding author.
E-mail addresses: sarfarazahmed@gmail.com (A. Sarfaraz Ahmed), senthilvis@gmail.com (T. Senthil Kumaran), saeedabdul4u@gmail.com (S. Syed Abdul Syed), subburam.bayal@gmail.com (S. Subburam).
[1] Research Scholar.

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Article Full-text available

Efficacy of Probiotics on Litopenaeus vannamei Culture through Zero Water Exchange System

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DOI: 10.3923/jfas.2015.445.463

D. Yuvaraj · Karthik Ramachandran

Abstract

Biosecure zero-exchange systems represent an emerging technology that provides a high degree of pathogen exclusion with minimal water exchange. An important ramification associated with reduced or zero water exchange is the increased importance of in situ microorganisms both in regulating biogeochemical cycles within the culture environment and in directly affecting shrimp growth and survival. The newest attempt to improve water quality and control diseases in aquaculture is the application of probiotics and/or enzymes to ponds. This concept of biological disease control, particularly using microbiological modulator for disease prevention has received widespread attention. Keeping the above points in mind, this work was performed with zero discharge using probiotics, monitoring all the physico-chemical parameters and nutrients. The microbial population of the water and sediment were analyzed throughout the culture period. Highlights of this study are, (a) In the experimental ponds 1 and 2, the shrimps had a better growth (34.5 and 32.6 g, respectively), compared to 29.8 g in the control pond and (b) There was no incidence of disease in the experimental ponds, whereas the control pond had some bacterial infections. These encouraging results may be attributed to the use of probiotics in zero water exchange system.

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Landsman Converter Based Particle Swarm Optimization Technique

Ramesh. P[1], V.Mathivanan[2]
[1]AMET University, Chennai
[2]ARM college of Engineering and Technology, Chennai

Abstract

This paper proposes a novel control technique for landsman converter using particle swarm optimization. The controller parameters are optimized by pso algorithm, the proposed algorithm is compared with PID controller and the comparative results are presented. Simulation results shows the dynamic performance of pso controller. Landsman converter reduction in output voltage ripple in the order of mV along with reduced settling time as compared to the conventional PID controller. The simulated results are executed in MATLAB/SIMULINK.

Keywords: *PID controller, Landsman converter, MATLAB/SIMULINK*

1. Introduction

Boost converters are required when the output voltage must be greater than its input voltage. these converters are largely used in solar power applications, vehicle battery charging, and fuel cell power converting systems, when these operated in the openloop mode,it attains poor voltage regulation and worst dynamic response. A Control Algorithm for Voltage regulation and boost converter are explained by [1] [2]. Hence, we are moving with a closed-loop controller to achieve good transient and dynamic response and output voltage regulation. This landsman converter gives smooth transient response and good dynamic voltage output reduced ripple with reduced settling time. Boost Converter Controller Design Based on Particle Swarm Optimization and Hybrid Fuzzy Logic Based A Particle Swarm Optimization Controller are discussed by [3-4].

In conventional DC-DC voltage converters leads to of heavy voltage ripples at output. In order to control this, ripple conventional carried out these methods used are Equivalent Series Resistant (ESR) Capacitor, adding an inductance-capacitance (LC) filter although these methods have poor transient but difficult to achieve Continuous Conduction Mode(CCM) Some control techniques for DC-DC converter are voltage control techniques, sliding mode converter and loop bandwidth control for the reduction of output voltage ripples. Solar photovoltaic array fed water pump driven and Trajectory Control Using Particle Swarm Optimization are described by [5-6].

It is clear that these systems with CCM which produces good transient response using pso we are achieving CCM andreduced voltage output ripple. Investigations on structural, optical, morphological and electrical properties are discussed by [7]. The parameter are estimated in time domain series . The converter is represented in MATLAB simulink model.

2. Proposed System

In this paper the novel technique is particle swarm optimization algorithm is presented in the controller to select the angle of landman converter switches to reduce the output voltage ripple which is represented by the block diagram in following Figure 1.

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Mn^{2+} concentrations creating defects in chromium sesquioxide (Cr_2O_3) influenced the enhanced optical properties and photocatalytic activities: Synthesized via the facile precipitation process

K. Anandan [a,*], K. Rajesh [a], K. Gayathri [a], V. Rajendran [b]

[a] Department of Physics, AMET University, Chennai 603 112, Tamil Nadu, India
[b] Department of Physics, Presidency College, Chennai 600 005, Tamil Nadu, India

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ABSTRACT

Chromium sesquioxide (Cr_2O_3) nanomaterials were successfully synthesized via the facile precipitation process with different (1–3 mol %) concentrations of a Mn^{2+} metal ion as a dopant. The effects of the metal ion dopant concentrations creating defects in the chromium sesquioxide nanoparticles were analyzed by different techniques. The structural, morphological and optical properties of the products were studied by using XRD, FTIR, SEM, EDX, TEM, UV–vis and PL techniques. The Photocatalytic degradation performances of the products were comparatively discussed with pure chromium sesquioxide nanoparticles methyl orange as a model dye solution.

Selection and Peer-review under responsibility of the scientific committee of the 2nd International Conference on Nanoscience and Nanotechnology.

1. Introduction

Transition metal oxide nanoparticles represent a broad class of materials that have been researched extensively due to their interesting catalytic, electronic, magnetic, and medicinal properties [1–6]. Among the transition metal oxides, chromium sesquioxide or chromia (Cr_2O_3) has been widely studied, due to its useful properties required in industrial applications, and its importance both in science and technology. Chromium sesquioxide (in mineral eskolaite) is a wide band gap (E_g = 3.4 eV) p-type semiconductor with a corundum structure, in which the oxygen atoms form a hexagonal close-packing array. The metal atoms occupy two thirds of the octahedral interstices between two layers. The chromium atoms form graphite-like layers parallel to the oxygen layers. Cr_2O_3 consists of the rhombohedral primitive cell with lattice parameters a = 4.95876 Å, c = 13.594 Å, and space symmetry group [7]. Among the different chromium oxide solid phases such as CrO, Cr_2O, CrO_2, Cr_2O_3, Cr_2O_5, Cr_3O_4, etc., special attention has been paid to the formation and properties of Cr_2O_3 nanoparticles because of their most stable phase existing in a wide domain of temperature and pressure and importance both in science and in technology. They are important for their uses as heterogeneous catalysts, coating material, digital recording system, wear resistance, pigment, advanced colorant, and solar energy collector [8].

Various authors have reported on the photocatalytic properties of the Cr_2O_3 nanoparticles, even though they have not stated photocatalytic activities of pure Cr_2O_3 nanoparticles. They reported the addition of some other metal oxides/metals with chromium oxide, and photocatalytic activities of Cr_2O_3 with other metal oxides/metals. These are tabulated in Table 1. So, in our research we tried to produce Cr_2O_3 photocatalyst in an independent state to increase the photocatalytic activity induced by a small amount of Mn as a dopant. Moreover, TiO_2 is a better catalyst under UV irradiation; however nowadays various researchers have focused on an alternative source of TiO_2; as an alternative source, the Cr_2O_3 catalyst behaves better considering the cost factor.

Several synthetic processing techniques for Cr_2O_3 nanoparticles have been reported, including hydrothermal, solvothermal, solid thermal decomposition, sol–gel, combustion, precipitation-gelation, microwave irradiation etc., [22–29]. However, in most cases, irregular and ill-defined particle shapes were produced and particle agglomeration was obtained. In addition, industrial applications of some of these methods may be limited, due to their high cost and low yield. An economical, simple approach to creating chromium sesquioxide nanoparticles of controlled size, shape and high yields, is needed. Among the synthesis methods, the precipitation method is one of the conventional methods to prepare

* Corresponding author.
E-mail address: anand.nanoscience@yahoo.com (K. Anandan).

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Study on the Pre Shipment and Post Shipment Process with Reference to the Triway Forwarders Pvt Ltd

Rajasekar, M.Thiagarajan

ABSTRACT--- ***The exporter gets payment at the time of the shipment of goods; he has to arrange for finance to meet the expenses involved until the time of shipment. These include expenditure on the purchase of materials and Components, processing, packaging, packing, marking, transaction, Warehousing, etc. In many instances, the exporter is compelled to extend credit to the overseas buyer .In fact, in international marketing; the nature of the sales/credit term offered is a very decisive factor in obtaining business. In many cases, the exporter as to wait for a period of time-short, medium or long- even after the shipment of goods to obtain payment from the overseas buyer. He as therefore to arrange for post-shipment finance, covering the period between the shipment of the goods and the receipt of payment. All the countries which are serious about export promotion have, therefore, made institutional arrangement for the provision of both pre-shipment and Post-shipment finance. In India the export sector is regarded as a priority sector.***

Keywords: shipping, pre shipment, post shipment, operational procedure

INTRODUCTION

Packing credits are eligible for interest subsidy, normally for period not exceeding 90 days, although the credit may given for a period 180 days for specified items, such as engineering goods, with the permission of the RBI. In genuine case of delay of shipment of specified items, a future of 90 days may be allowed by the RBI. Packing credits is also available against certain incentives; such advances should be repaid by the exporter as soon as these are realized. When a letter of credit or an export order received in the name of an export house or any merchant exporter, an advance made even to a sub-supplier falls with the packing credit scheme. In such a case the sub-supplier should submit the letter to bank from the export house/merchant exporter details of the supply allotted.

Funds to cover an exporter's costs before goods are sent overseas financial assistance is extended by the bank to the exporters at pre-shipment and post-shipment stages. Financial assistance extended to the exporter prior to shipment of goods from India falls within the scope of pre-shipment finance while that extended after shipment of the goods falls under post-shipment finance. While the pre-shipment finance is provided for working capital for the purchase of raw material, processing, packing, transportation, warehousing etc, of the goods meant for export, post-shipment finance is generally provided in order to bridge the gap between shipment of goods and the realization of proceeds.

Purchase of discount facilities in respect of export bills drawn under confirmed export orders are generally granted to the customers who are enjoying bill purchase /discounting limits from the bank. As in the case of purchase or discounting of documents drawn under export order, the security offered under L/C by way of substitution of credit worthiness of the buyer i.e. importer by the issuing bank is not available, the bank financing is totally dependent upon the credit worthiness of the bank. The documents drawn on DP basis are parted with through foreign correspondent only when payment is received. In case of DA bills documents are passed on to the overseas importer against the acceptance of the draft to make payment on maturity. Banks generally opt for ECGC policies and guarantees to be issued in favor of the exporter / Banks to protect their interest in case of non-payment or delayed payment (Note: Due to any mistake or negligence on the part of exporter

STATEMENT OF THE PROBLEM

In the present global scenario International business plays an important role for the development of a country. For effective International business, its process and procedures should be liberalized and simplified according to the expectation of the customers.

Among the policy and procedures of International business, the shipment finance plays a crucial role in motivating the exporters and importers. This will lead to evaluate the process of shipment finance.This research will be very useful for the company to know the pre and post-shipment process followed by the forwarders. Moreover this project will be more focused for the forwarders to take necessary steps to simply the procedure and process of shipment finance according to the expectation of customer, Importers and Exporters.

OBJECTIVES OF THE STUDY

- To understand the concepts of Pre & Post shipment finance.
- To know the detail operational procedure involved in Pre & Post-shipment finance in "TRIWAY FORWARDERS PVT LTD"
- To find out the type of shipment finance preferred by "FORWARDERS"
- To know the problems faced by forwarders, with reference to Shipment finance

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Dr.Rajasekar, Professor,AMET Buisness School,AMET Deemed to be University ,Chennai.

Dr.M.Thiagarajan, Assistant Professor and HOD,Dept.of Business Administration,Alagappa Govt.Arts College,Karaikudi

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Regular Article

Geometry optimization, HOMO and LUMO energy, molecular electrostatic potential, NMR, FT-IR and FT-Raman analyzes on 4-nitrophenol

Rajendran Gandhimathi[1,2,a], Sethuraman Dheivamalar[3], and Ramasamy Dhanasekaran[2]

[1] Department of Physics, AMET University, Kanathur, Chennai 603112, India
[2] Crystal Growth Centre, Anna University, Chennai 600025, India
[3] Department of Physics, Government Arts College for Women, Pudukkottai, India

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Abstract. In the present work, the equilibrium geometry, HOMO-LUMO energy gap, chemical shifts, vibrational frequencies, IR and Raman intensities and thermodynamic parameters of 4-nitrophenol molecule was calculated using the methods of HF and DFT/B3YLP employing 6-311+G basis set. Theoretically calculated geometrical parameters such as bond length and bond angle were compared with the corresponding experimental X-ray diffraction values. The highest occupied (HOMO) and the lowest unoccupied molecular orbitals (LUMO) of the 4-NP molecule have been calculated. The study was extended to calculate the energy gap, ionization potential, electron affinity and chemical hardness. HOMO-LUMO electronic transition of 3.76 eV is obtained from the contribution of the bands. The reacting electrophilic and nucleophilic sites of the molecule were analyzed with the help of molecular electrostatic potential (MEP) surface analysis. The different proton and carbon environment of the grown crystal was analyzed by ^{1}H and ^{13}C NMR analyses. All vibrational frequencies were assigned and compared with the calculated frequencies in detail.

1 Introduction

The crystal structures of organic compounds are very hard to predict because of their weak intermolecular interactions [1]. However the study on organic crystal structures becomes more important to researchers and industrialists since understanding the complete structure of the compound will assist in synthesizing the materials with particular properties. In recent years, electron donor-acceptor (EDA) complexes play an important role in the field of organic semiconductors, photocatalysts and dendrimers [2–4]. 4-nitrophenol (4-NP) compound with push-pull electron interaction is an interesting intramolecular charge transfer system. 4-NP is a nitrated phenolic compound that has an nitro group at the opposite position of hydroxyl groups on the aromatic ring. 4-NP single crystals contain chains of hydrogen bonded molecules. The benzene ring is planar however the nitrogen and oxygen atoms are shifted from the benzene ring [5]. The purpose of the present work is to apply ab initio molecular orbital (MO) method to interpret the geometry of 4-NP crystals. Gaussian calculates the energies, molecular structures, vibrational frequencies of molecular systems, along with numerous molecular properties derived from these basic computation types [6]. Hartree-Fock is the basic ab initio model. Many quantum chemical calculations begin with the Hartree-Fock level of theory with subsequent corrections for coulombic electron-electron repulsions [7]. Generally the results obtained using ab initio methods are comparable with the results obtained with hybrid DFT/B3YLP because it uses corrections for both gradient and exchange correlations. The ab initio or density functional theory requires a basis set specification since it describes the shape of atomic orbitals. In this investigation, we have calculated the structural stability of the optimized geometry, HOMO-LUMO energy gap, NMR chemical shifts and the vibrational assignments of the title compound in the ground state with medium size basis set 6-311+G to produce qualitatively reliable results.

2 Experimental

X-ray diffraction intensity data were collected for 4-nitrophenol compound using Bruker SMART Apex II single crystal X-ray diffractometer equipped with graphite monochromated MoKα (λ = 0.7103 Å) radiation and CCD detector. The infrared absorption spectrum of the grown 4-NP crystal has been recorded in the range

[a] e-mail: crystgandhi@gmail.com

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Hydrothermal synthesis of zirconium oxide nanoparticles and its characterization

Suresh Sagadevan[1] · **Jiban Podder**[2] · **Isha Das**[3]

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Abstract The paper presents the preparation and investigations of zirconium oxide (ZrO_2) nanoparticles that were synthesized by hydrothermal method. The products were characterized by means of powder X-ray diffraction, scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV-absorption spectroscopy and photoluminescence (PL) spectroscopy. The crystal structure was determined using X-ray diffraction. The morphology and the particle size were studied using (SEM) and (TEM). The spherical shaped particles were confirmed through the SEM analysis. The transmission electron microscopic analysis confirmed the formation of the nanoparticles with the particle size. The FT-IR and Raman spectrum ascertained the strong presence of ZrO_2 nanoparticles. The optical properties were obtained from UV–visible absorption spectrum and also PL emission spectrum. The dielectric constant and the dielectric loss were measured as a function of frequency and temperature.

1 Introduction

Nanostructured crystalline particles have drawn the attention of researchers because of their wide applications made possible due to their particle size dependent properties and their scientific and industrial significance. Nano sized particles of semiconductor materials have established their usefulness in recent years because of their desirable properties and applications in various areas such as catalysts, sensors, photoelectron devices, highly functional and effective devices [1–5].These nanomaterials have unique thermal, structural, and electronic properties which impart them the quality of high scientific attraction in basic and applied fields. ZrO_2 (zirconia) is a material of excellent technological significance, having fine natural color, high stability, high toughness, high chemical strength, desirable corrosion, chemical and microbial resistance [6, 7]. ZrO_2 exhibits plenty of oxygen vacancies on its surface with wide band gap P-type semiconductor. The high ion exchange ability and redox movement make it useful in many catalytic processes as a catalyst [8]. ZrO_2 has been examined for potential use as an insulator in transistors for future nanoelectric devices [9], which is an important dielectric material and polymorphic compound [10]. The crystal morphology of zirconia is monoclinic, tetragonal, and cubic. To maintain the zirconia crystal phase of the unstable crystal anatomy of zirconia, the inclusion of other compositions as stabilizer agents is required at room temperature and pressure conditions. To synthesize ultrafine ceramic powders, various approaches such as sol–gel, hydrothermal, spray pyrolysis, salt-assisted aerosol decompositions, carbon nanotube templated technique and reflux and emulsion precipitation have been made [11–16]. The hydrothermal approach can come out with fine, high purity and stoichiometric particles of single and multi-component metal oxides. Moreover, the zirconium oxide particles with desired shape and size can be achieved, if the process circumstances such as solution pH, solute concentration, reaction temperature, reaction time, seed materials, and the type of solvent are carefully guarded. In

✉ Suresh Sagadevan
drsureshnano@gmail.com

[1] Department of Physics, AMET University, Chennai, India

[2] Department of Chemical and Biological Engineering, University of Saskatchewan, Saskatoon, SK S7N 5A9, Canada

[3] Department of ECE, Holy Mary Institute of Technology and Science, Hyderabad, India

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காமராஜர் துறைமுக நிறுவனம்
कामराजर पोर्ट लिमिटेड
Kamarajar Port Limited
(erstwhile Ennore Port Limited)
(A Mini Ratna Government of India Undertaking)

KPL/OP/GM(O)/2016

March 01, 2016

To

The Professor and Head

Department of Harbour and Ocean Engineering,

AMET University,

Kanathur,

Chennai – 603 112

Kind attn : Dr. K.Thiruvenkatasamy- Professor And Head

Sub: Permission for the students to undergo project work – Reg

Ref: AMET University Letter NO. AMET/HOE/2016-Feb 2 dated 17/02/16

In reference to the letter cited under reference, wherein you have requested permission for the students listed below to undergo their project work from 21.03.2016 to April 2016.

In this regard Kamarajar Port Ltd has accorded permission for the same in the period as mentioned by you.

Sl No	Name of the Students	Reg. No
1.	S. Ashwin	HE093
2.	A.Ramkumar	HE087
3.	R.Srivignesh	HE092

Thanking you,

Yours faithfully,

P. Radhakrishnan
General Manager (Operations)

Registrar i/c
ACADEMY OF MARITIME EDUCATION AND TRAINING
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135, East Coast Road,
Kanathur - 603 112, Chennai, India.