ARTIFICIAL DRYING AND SEGREGATION OF COFFEE SEEDS

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ABSTRACT-- Present unpredictable climatic condition and huge demand for labours have made the harvesting and processing of different spices much more arduous. Traditional way of harvesting and processing of spices is cost effective, time-consuming and requires large labour force. Traditional way do not pave a way in maintaining physiological and physiochemical characteristics of coffee beans such as colour, flavour and taste of coffee brew.

Artificial drying and segregation of coffee seeds is a conventional method, which can minimize the cost and labour force required for coffee production. By using the conventional method of processing, it is possible to meet the industrial standards of coffee production. Due to lack of standards and quality, plantation owners are facing huge crisis in the market for their products. Understanding the problems faced by the plantation owners all over the world, this paper aims at designing an artificial drying and segregation of coffee seeds to this issue.

Keyword—Coffee Processing, Artificial drying, segregation.

I. INTRODUCTION

Coffee represents one of the most important crops of world, and it is also one of the most popular beverages currently used in world. Due to its characteristics like pleasant aroma, flavour and colour of coffee brews makes it one of the most consumed beverages in the world. Although over ninety coffee species within the genus, coffea have been categorized in the National Centre of Biotechnology Information. Only two of them are important in the world market. They are coffeaarabica and coffea canephora. Coffea arabica is one of the most important species, representing 65% of worlds coffee products. Green coffee of Arabica and Robusta can be easily distinguished by their caffeine content and total amino acids. The coffee creation start from developing coffee, collecting the fruits, preparing of fruits, drying the beans lastly roasting process. As the consumption increased the need for coffee harvesting and processing became more significant.

The nature of coffee relying upon scent and taste, yet in addition the nature of creation is significant. By and large cooked coffee beans contain a little level of dampness and remote bodies, for example, stone and wood. Hence, it is to discover the best approach to get 100% modern evaluation coffee

.Initially the wet processed coffee beans contain moisture about 50 to 60%. For the industrial grade coffee production the moisture content of the coffee should be maintained at 12% (wb). During the rainy season it is difficult to dry the coffee under the sun light. which may increase the moisture content and prolongs drying to about 7 to 22 days. Drying should be uniform to obtain acceptable colour, size and moisture content. Coffee processing is done by two processes mainly, wet processing and dry processing. This gives explaination about various coffee drying process, which is time convineint, cost effective and easily available. Segregation of coffee based on colour, size and its pleasant aroma. The major concept behind this paper is image processing techniques for segregation and microwave drying technology for coffee seeds.

II. LITRETURESURVEY

Edwin R et al [1] in this paper they introduce image processing technique to identify and remove black coffee beans. Black beans are defected beans, due to over exposing to the water. Using the RGB values the proposed system, identifies and eliminates the defected black coffee beans. In the event that the coffee bean is cooked and on the off chance that it has over 25% dark, dark blue, darker it can. Likewise be considered as dark or abandoned beans. In this paper, they built the algorithm in MATLAB. By using image processing, defected beans were identified and removed.

Paulo CarteriCoradi et al [2] this paper is a research work, to identify the different methods to study the quality of coffee beans after drying. They collected different types of coffee beans and a portion of each was given for drying. These beans were dried in mechanical dryer at temperature of 40 to 60°c. After that they were stored in air-tight room, and humidity

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A Review: Smart Ambulance and Traffic Controlling System

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Abstract— **India is a developing country, population of India is significantly growing. India stands within the 2nd place in the world in terms of population. As there will be increase in population gradually there will be increase in number of vehicles, due to which the traffic congestion increases and because of which the emergency vehicles like ambulance, fire engine etc. face difficult to reach the destination in time. Under these circumstances, a promising system that can clear the traffic signal especially in peak hours and thus provide a safe route for emergency vehicles is extremely important. In existing literature there's less focus show on the emergency vehicles to clear the trail, to overcome this issue a RFID based system is proposed by using this technique we will manage and regulate the traffic signals at junction which emergency vehicle approaches. Thus there'll be easy passing out for the emergency vehicles in traffic congestion. The proposed frame work is modeled by the means of an experimental setup using Arduino and LED displays which simulates a true time traffic scenario. This simulation results illustrate the terms of detection still as is providing passing for the emergency vehicle to of holdup in peak hours.**

Keywords:-RFID technology, traffic signal management, congestion clearance;

I. INTRODUTION

Population in developing countries such as India is increasing significantly. This result in a number of problems such as heavy traffic jams, violation of the traffic rules and sometimes even accidents.
For example, the number of road accidents in major cities such as Chennai, Hyderabad and Delhi increased to 16 deaths per hour,as stated by the Indian Government.
Additionally,traffic congestion leads to long waiting times, fuel depletion and even money waste.
In particular, traffic congestion contributes to high rates of emissions impacting the health of the local population, shuttles and animals.Traffic congestion is often commonlyassociated with some other traffic issues, such as the blocking ofemergency vehicles. Precisely, the traffic congestion often blocks the path of the emergency vehicles which may Human Life is a very valuable thing for any country. The regular occurrence of incidents and medical emergencies such as
fire, road accidents, medical emergencies etc. It is very necessary that emergency vehicles arrive on time to prevent serious loss of humans. Thus, hospitals and fire stations are throughout the city to reduce response time in case of such emergencies.
A very rapid population growth in cities has resulted in tremendous road traffic within the city.In addition, in recent time
s the number of deaths due to delays in the arrival of emergency vehicle
has risen to greater extent.Hence emergency services such as ambulances and fire engines must be on time to avoid loss of human life.In the current traffic situation, therefore, helping an emergency vehicle move out of traffic congestion is very much important. To solve the problems given above. In this paper, we have come up with the 'Smart Ambulance and traffic controlling system'. The main purpose of this device is to allow the ambulance to reach a specific location without making it stop somewhere before it reaches the destination.

II. LITERATURE SURVEY

Vanjale et al [1] have proposed a RFID-based system, which manages and regulates the traffic signals at junctions when the emergency vehicle approaches, by allowing the straight forward passage out of the traffic congestions. This paper proposes an approach which controls the Traffic Signals so as that when the emergency vehicle is on its way to a selected destination. The case of ambulance is tracked by using GPS. This location is send to the application. The application performs the algorithm with the help of this data and so the google map. It controls the signals on its path. They also introduced a current blue light to stoplight to avoid the chaos within the mind of the people waiting at the stoplight. The working of the system relies on two important modules.

- The GPS System
- Application Server

The ambulance or any emergency vehicle must be equipped with the GPS System. This GPS System will send the coordinates of the vehicle at every moment to application Server. Each vehicle must be logged in to the android application. This application keeps tracking the vehicle and tracks the route. The route is already selected by the motive force this route is additionally accessed by the server. The applying server accepts all the knowledge, based on this information the server finds this location of the vehicle and also the route selected to the destination. This helps to look out the following stoplight in its vicinity. Whenever the vehicle comes within the space of certain meters from the signal the server must send the required action so as that the vehicle doesn't must wait at the signal. A symbol is additionally sent to the destination hospital so as that the hospital authorities are able to handle the patient. Hospitals also assign the priority to the patient supported their situation. It's useful when two ambulances arrive to the

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PAPER

Enhancement of power output in passive micro-direct methanol fuel cells with optimized methanol concentration and trapezoidal flow channels

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Abstract

Abstract

This work presents design, fabrication and optimization of methanol concentration and flow channel cross-sectional geometry for enhanced power output in passive micro-direct methanol fuel cells. Passive micro-direct methanol fuel cells are fabricated with flow channels in silicon having both rectangular and trapezoidal cross-sectional geometry for flow of methanol at anode and air at cathode using microelectromechanical systems (MEMS) fabrication technique. The experiments are conducted at 25 °C by feeding methanol with a flow rate of 25 μl min^{-1} and supply of air at cathode by air-breathing method. Results show a peak in open circuit voltage and power density at 7 M methanol concentration for passive micro-direct methanol fuel cells having both rectangular and trapezoidal

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Assessing the Role of Machine Learning in Robotics

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Abstract: Machine learning is concerned with algorithms inspired by the structure and function of the brain called artificial neural networks. Neural framework offers wide support for machine learning algorithms. It is an interface, library or tool which allows developers to build machine learning models easily, without getting into the depth of the underlying algorithms. The neural framework is an exceptionally intricate piece of a person that co-ordinate its activities Moreover, tactile data by transmitting signs to and from various pieces of the body. Neural frameworks are applied to perform object gathering and a grasp orchestrating task. Machine Learning techniques have been applied to many sub problems in robot perception – pattern recognition and self-organisation. Modern robot framework which demands a complete detail of each movement of the robot, which breaks the pick-and-spot issue into about free, computationally conceivable sub-issues as a phase toward a comprehensive endeavour level framework

Keywords: Robot, Machine Learning, Pick and Spot, Artificial Intelligence, Framework.

I. INTRODUCTION

Artificial Intelligence has permitted a change in outlook in design acknowledgment, from utilizing hand-made highlights Moreover, specialized upgrades such as the development of computational force and preparing dataset with measurable classifiers to utilizing universally useful learning systems for learning information-driven portrayals, highlights, and classifiers together. The utilization of the AI world view has encouraged tending to a few PC vision issues more effectively than with conventional methodologies. Actually, in a few PC vision benchmarks, for example, the ones tending to picture order, object identification and acknowledgment, semantic division, and activity acknowledgment, to give some examples, the more significant part of the severe strategies are currently founded on the utilization of profound learning systems. It has just pulled in consideration of the robot vision network. New strategies and calculations are generally evolved inside the PC vision network and afterward moved to the robot vision network.

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II. LITERATURE SURVEY

Feng and Hoberock et al. [1] exhibited a neural system sway to deal with tackling the dynamic booking issue for pick-place tasks of a robot-vision-following framework. An ideal booking issue is planning to limit robot preparation time without requirement infringement.

For gathering each item, this booking is an ongoing enhancement issue that should discuss again. A plan which utilizes neural systems to take in the mapping from object design space to ideal request space is disconnected and to review online what it has discovered is introduced. The thought was executed in a genuine framework to take care of an issue in enormous business dishwashing tasks. Trial results have indicated that with four distinct articles, time reserve funds of up to 21% are conceivable over first-come, first-served plots right now utilized in industry.

Nagchaudhuri et al. [2] portrayed an instructive task utilizing a modern robot and a coordinated vision framework. The undertaking exhibits adaptability given by a coordinated vision framework in an automated work-cell. Robots and numerically controlled machines permit simple new capacity to adjust different tasks, which is predefined and subsequently discovers widespread use of assembling robotic automation in plants. Albeit programmable robots have given some level of adaptability in mechanization endeavours. To a great extent, they joined in assembling cells where a portion of the underlying container taking care should assist in inflexible apparatuses. Vision and material detecting ability have bitten by bit being fused in mechanical work-cells in the advanced industrial facilities to give extra adaptability to parts dealing within pick and spot, welding, painting, cleaning, and get together tasks.

Vandenplas et al. [3] have proposed a work that centres around a recently assembled look into a robot. The use of Perception Architecture can recognize round items that will haphazardly dissipate on a table. At that point, utilizing its gripper procedures, they are picked and set inside a bushel the control framework tunes to such extent that the progression of activities runs quickly and safely. Exercises scholarly can spare time for different gatherings keen on building model robots.

Brudka et al. [4] introduced a shrewd robot control framework that utilizes low-quality high estimations to perform high-accuracy acknowledgment and getting a handle on assignments. The framework adaptively re-establishes the ultrasonic picture utilizing approximators dependent on neural systems. Neural systems are likewise applied to perform object grouping and a grip arranging task. Since grip arranging is not impressive, he built up a novel learning plan that utilizes the desire boost approach.

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A REVIEW ON DEVELOPMENTS AND TRENDS IN BIONIC ARM DESIGN

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***Abstract*— Prosthetic arms have been long used in order to replace an amputated hand. From ancient times, people were using wooden arms as prosthetic devices in order to replace them for a lost arm. These devices only provided body balance and never truly worked as an actual substitute. After the advancement of electronic and software technology, prosthetic arms have been developed in order to provide a bio – feedback. These modern bionic arms could do some operations using electromechanical devices which imitated the actual actions of a hand. These bionic arms have become very popular and is easily available now due to their mass production. But due to the present-day design, the cost of the bionic arm is very high due to the large number of electronic components used in them which also increases the delay of the feedback system. In this paper an exhaustive survey is done in order to bring on some design tweaks in the design of the prosthetic arm which reduces the number of components used thereby decreasing the delay in the feedback system. Also, decreasing the number of components in the device reduces the complexity of the system thereby significantly reducing the cost of the bionic arm. The designs surveyed in this paper can be easily manufactured using simple lab equipment and components present in a normal workshop or laboratory.**

Keywords*— *EMG (Electromyography), EEG (Electroencephalography), Upper Limb Prosthesis, 3D Printing, Body Controlled Prosthesis, EMG Sensor, Bio – feedback system.

I. INTRODUCTION

It can be argued that the most important possession of a human being is his body. Losing a body part can be very painful and traumatizing. Often people who lose their motor organs like their hands and legs face difficulty in performing even the simplest of daily tasks in each and every moment of their life. This often leads to depression and them losing hope thereby making them to resort to adverse actions like suicide. From times immemorial, people have been trying to find a substitute for the lost body part by replacing them with various artificial objects. People in Egyptian civilization and Indus Valley Civilization often used a wooden substitute which was carved in the shape of their arms or legs. Though this was one of the best solutions at that time, it only helped in maintaining the body balance and served no other purpose. This method was used for almost the next two millenniums until the advancement of electronic technology which helped in creating bionic arms which could perform basic actions like a normal human hand. Development of sensors and electromechanical components helped the researchers to predict the actions to be performed by sensing various signals sent by the brain and then developing a program which actuated certain electromechanical components embedded in the prosthetic device thus mimicking the actual action a normal hand would have performed. This has proven to be a huge leap in the prosthetic arms development though contemporary designs often use too much components in their system thus increasing the cost of the device and the delay in the feedback. Many people often give up on the idea of using these bionic arms due to their high cost and complexity of usage. This paper provides the simple design tweaks that can be used to reduce the number of components used to design and develop a prosthetic arm which in turn reduces the cost of the device and complexity of usage.

II. LITERATURE SURVEY

Deng *et al* [1] (2016) proposes in his work that proper holding power is exceptionally hard to get for a prosthetic arm because of the absence of a definite feedback data. At the point when the power applied was excessively little, a heavy item would slip, while an excessively huge power would distort delicate articles. A framework has

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ANTITHEFT SENSOR CONTROLLED HOME SECURITY SYSTEM

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ABSTRACT

In day today life security plays one of the most significant role in the different fields which are commonly utilized for home security reason. As the security system has reached its level high in different aspect for example distinguishing unapproved passage into home, ventures, labs which made requirement for financially savvy home security framework. This framework comprises of 89S52 microcontroller board, IR sensor module, Remote camera to catch the picture of an individual, Vibration sensor on the off chance that somebody attempts to break the entryway or glass of the home, Micro switch, ASK transmitter and collector, Vicinity sensor which is utilized to detect the unapproved section, LCD to show the subsequent status and GSM module for the correspondence such sending message and missed call to the client and close by police headquarters in any crisis.

Keywords: Microcontroller, Sensor, Wireless Camera Amplitude Shift Keying (ASK), Liquid Crystal Display (LCD), Global System for Mobile (GSM).

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1. INTRODUCTION

Security might be a major test wherever in light of the fact that robbery is expanding step by step because of the perilous and unreliable security system in homes, business buildings and ventures. A few customary advancements are accessible to remain at home properties safe from gatecrashers, yet commonest keen home security system take a shot at remote Worldwide Framework for Portable correspondence by Global System for Mobile Communication (GSM) modem shown in figure 1. By this our security system gives great

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Monitoring of Honey Bee Hiving System using Sensor Networks

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Abstract- **Honey bees have throughout history been a keystone species, pollinating an estimated 70 percent of all plants and underpinning some 30 percent of the global food supply. Because the viability of beehives is a critical predictor of the planet's future health and agricultural sustainability, reports of a precipitous decline in the number of colonies around the world have stirred considerable alarm. Since most of the prior contributions are focusing on data gathering, the approach to focus on the user's needs is central to take next steps in the field of using sensors for Beekeeping. Beekeepers can be divided into beekeepers having bees as a hobbies and beekeepers that are professional, making a living of the beekeeping. Visualization and availability of data are key questions for user friendliness. Since there are no standards for measurement data from beehives, there are different manufacturers/contributors that have their own system. If a standard format would be available, it would make it easier to interconnect different devices for visualization in single user interface. If data is available as streams in standardized application program interface (API) a user can use whatever solution found for visualization. The majorities of beekeepers that non-professional, they will probably want to have the "relation to their bees", using too much technology is probably wanted, like having robots doing the actual beekeeping work.**

Keywords- Application Program Interface (API).

I. INTRODUCTION

Honey bees are important for pollination of crops. Honeybees produce different functionalities in our ecosystem, where the two main outcomes are the pollination of crops and honey. There are other products from the bees including Royal Jelly, Pollen and Propolis that are produced by bees. Bees are important for the global food supply, as the quantity and quality of food are increased by pollination, and honeybees are a major pollinator. Crops, including fruits like strawberries are dependent on pollination from bees. The products that are produced by bees need to be harvested and handled from the beehives, normally done by a beekeeper. The beekeeper either keeps bees as a hobby or as a profession where the outcome is important.

Since many years humans have tried to harvest honey from the bees, a proof of activities are old cave paintings approximately 8000-9000 years old. The other technical improvement is the queen excluder, which makes a "barrier" between the area where the queen lay eggs, and the other side of the barrier where only worker bees smaller can pass. The queen excluder makes boxes with only honey, and no eggs, easier to handle for the beekeeper. These two improvements made beekeeping easier and more efficient to product. The bees are normally kept in hives, consisting of "houses". Inside the hive there are frames with cells of wax. The wax is a product of the bees. In a cell the bees can store pollen, honey or have a new bee produced. The bees are produced by the queen, which lay eggs in cells, and then the worker bees are feeding the egg to become a bee in 21 days.

The high proportion of non-professional beekeepers and the number of colonies per beekeeper were the only common characteristics at European level. This fact need to be taken into consideration, that the main group when it comes to beekeepers are not mandatory to make a living from their beekeeping. Today beehives are placed not only on the traditional countryside, but also in the cities. The reason could probably be that people are becoming more aware of the positive side of honeybees.

A main part of beekeeping is the manual inspection of beehives, a "craftsmanship" where the person doing the activities must understand the nature, what to observe and what to actions to take. Reading books, papers can helpful, especially for understanding, but when it comes to observation, judgments, comparison, and actions, experience will help the beekeeper to do a better job. The manual inspection of a beehive is assumed to be done by a beekeeper or a group of beekeepers wearing protective clothes. The aim of a visit to the beehive, are observation, probably some decision-making from observations, and some actions. Depending on the time of year, there are different activities in the beehive, also the local weather conditions affect the activities. Beekeepers are normally doing manual inspections of their hives, to check weight, health etc. To observe the bee health, the reproduction is always interesting. So, checking for eggs, pupae and cells of bees are central when it comes to observation. The number of eggs/larvae/pupae need to be put in context of the time of year, the natures current situation and the specific beehives specific situation. If there are eggs, a queen is present, if the pupae are "normal" it's a mated queen laying eggs. If you don't have fresh eggs during active season, there are probably a problem, then you need to locate a queen visually, and probably take some action to provide a new queen. Another thing to observe is, if there are pollen and nectar present in the nature, one could expect a lively colony, with many bees, much honey, some of it already. The weight of the hive is interesting during the whole year, are there enough food during low season, and how

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A Review of Design and Implementation of Hydrogen Fuel Cell with Modified Proton Exchange Membrane

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Abstract— **Hydrogen fuel cells use hydrogen and oxygen as fuel which is converted into electricity and water. This is similar to batteries we commonly use in which chemical energy is converted to electricity. The batteries contain all of the essential chemicals within and when the chemical supply is reduced, they seize to function. On the other hand, fuel cells require a continuous supply of fuel for operation. Proton exchange membrane fuel cells (pemfcs) are able to generate clean power. Proton exchange membranes (pems) are the main components of pem fuel cells. In this paper the authors focus on high proton conductivity, low fuel permeability, low electro osmotic drag coefficient, good chemical/thermal stability, and high power efficiencies. These are classified into the "iron triangle" performance, durability and cost. Current pemfc technology is based on expensive perflourinated proton exchange membranes that only operate efficiently under fully hydrated conditions. There is important requirement for reducing the membrane and catalystcosts.**

Keywords— Proton exchange membrane fuel cell, platinum catalyst, nafion membrane, comsol multiphiciscs.

I. INTRUDUCTION

A fuel cell is a device that converts chemical energy (energy stored in the form of molecular bonds) into electrical energy. Proton Exchange Membrane (PEM) uses hydrogen gas and oxygen gas as fuel. This reaction leads to production of electricity, water and heat as byproducts. O2 is readilyavailable in the atmosphere and hence, there no need to supply oxygen and the fuel cell will be air-breathing; we need to supply only H2. In this process PEM electrolysis has been used to get electricity[2].

During the electrochemical reaction of hydrogen and oxygen, a proton exchange membrane fuel cell generates electrical energy due to conversion of chemical energy, as opposed to the direct combustion of hydrogen and oxygen gases to produce thermal energy. A stream of hydrogen is delivered to the anode side of membrane-electrode-assembly (MEA). Catalytically, on the anode side it is split into protons andelectrons.

PEM fuel cell consists of four basic elements. The basic elements of PEMFC are shown in Figure 1. Cathode is positive part of the fuel cell which has channels that distribute oxygen to the surface of the catalyst. It also conducts the electrons present in the external circuit back to the catalyst where water is produced with the recombination of protons and oxygen ions.

Anode is the negative part of the fuel cell. It conducts the electrons that are generated at the anode catalyst into the external circuit thus generating electric power. The micro channels in the anode and cathode, flow hydrogen and oxygen gas, respectively. They help to spread the hydrogen gas equally over the surface ofcatalyst.

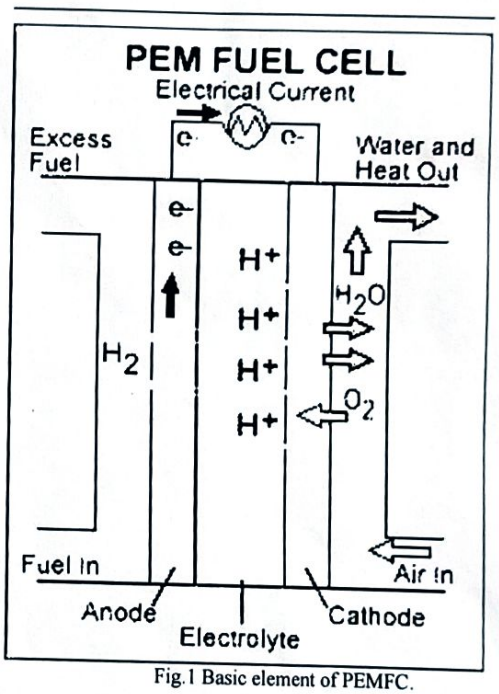

Fig.1 Basic element of PEMFC.

The electrons travel to the cathode side of the MEA from external load circuit. It creates energy output of the fuel cell. Oxygen stream is delivered to the cathode side of the MEA. Here oxygen ions and protons permeated through the membrane from the anode side react to form water molecule.

Short circuit of fuel is the transport of fuel through the membrane before conversion into protons and generation of electrons which pass to the external circuit. This is known as fuel cross-over. Fuel cross-over leads to short circuit effect in HFCs and lowers their performance.Finally,the membrane must be resistant to changes during operation and should be stable. Platinum

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Thermal, mechanical and linear optical studies of pyridine based trimethoxy substituted chromophore for NLO applications

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PRINCIPAL
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Abstract

A new potentially useful pyridine-based; 1-(pyridin-2-yl)-3-(2, 4, 5-trimethoxyphenyl) prop-2-en-1-one (2PTM) organic crystals were grown at room temperature by means of slow evaporation solution growth method. The grown crystals were characterized for their linear optical studies using UV-visible and photoluminescence spectroscopy. The thermal and mechanical properties are analyzed by vicker's microhardness and the thermogravimetric and differential thermal analysis. Thermal study confirms that the crystal is thermally stable up to 119.2 °C. The studies of photoluminescence reveal that the 2PTM crystal exhibits the characteristics of blue light emissions. The pyridine-based grown novel crystal has an optical band gap of 2.89 eV. Hence 2PTMP crystals can be used for NLO applications. © 2019 Elsevier Ltd.

Author keywords

Microhardness; NLO; Photoluminescence; Single crystal

Related documents

Structure and property relationship of methoxy substituted novel organic crystals for photonic applications
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Synthesis, growth and structural characterization of 1-(furan-2-yl)-3-(2,4,6-trimethoxyphenyl) prop-2-en-1-one crystal
Chandra, S. , Anusha, B.M. , Haleshappa, D.
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Structural, linear and nonlinear optical characterization of Ni and Al Co-Doped CdO semiconductor nanostructures for nonlinear optical device applications

Banuprakash M.[a] ✉, Abhishek B.[a], Acharya H.[a], Bairy R.[c], Bhat S.[a], Vijeth H.[d], Murari M.S.[e], Jayarama A.[a,b], Pinto R.[f]

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Abstract

The effects of metallic doping (Ni and Al) on thin film CdO nanostructures have been investigated and their morphological, structural, linear and nonlinear optical properties have been studied. Thin films were grown using spray pyrolysis method with a substrate temperature of 300 °C for different Ni and Al doping concentrations (0, 1, 3, 5 and 10 wt%). Studies of films with Powder X-ray diffraction confirm the polycrystalline nature with the cubic crystal structure. The Scherer rule was employed to determine the crystallite size and found to be enhanced. The elemental analysis confirms the incorporation of Ni and Al into the host CdO matrix. The surface morphology was analysed using the Field Emission Scanning Electron Microscope and the grain size was found to be altered by increasing

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Synthesis, growth and NLO studies of a novel pyridine centered chalcone derivative

Ganapayya B.[a], Haleshappa D.[b] ✉, Jayarama A.[c,d], Shetty S.S.[e], Dharmaprakash S.M.[f], Pinto R.[g]

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Abstract

A novel pyridine based derivative 1-(pyridin-2-yl)-3-(2,4,5-trimethoxyphenyl) prop-2-en-1-one (PTMP) was synthesized and single crystals were grown using slow evaporation technique. The functional groups of the synthesized compound PTMP were confirmed using FTIR spectroscopy. Z-Scan technique was used to find the third order nonlinear optical properties of PTMP. Single crystal X-ray diffraction technique was used to investigate the molecular structural properties. X-ray diffraction studies show that the PTMP crystals belong to centrosymmetric space group P 21/c with lattice parameters a = 8.6516(3) (Å), b = 8.7478(3) (Å) and c = 19.5245(7) (Å). Z-scan studies suggest that the compound PTMP is a promising non-linear optical material for NLO applications. © 2019 Elsevier Ltd.

Author keywords

Chalcone; Laser; Pyridine; Single crystal; Z-scan technique

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Third order non linear optical properties of novel furan based organic crystal

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Abstract

A crystal for potential nonlinear optical applications, namely 1-(furan-2-yl)-3-(3, 4, 5- trimethoxyphenyl) prop-2-en-1-one (FT3MP), has been synthesized using slow evaporation technique. The functional groups present in the compound have been studied with Fourier transform infrared spectroscopy. The Z-scan technique with the single beam was used to examine the third-order NLO properties of the crystal. The measured nonlinear optical absorption coefficient (ß), nonlinear refractive index (n2) and the third order nonlinear optical susceptibility (?(3)) of FT3MP suggest that the crystal is good for possible photonic applications. © 2019 Elsevier Ltd.

Author keywords

Laser; Susceptibility; Third order non linearity; Z-scan

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Chandra, S. , Anusha, B.M. , Haleshappa, D.
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Synthesis, growth and structural characterization of 1-(furan-2-yl)-3-(2,4,6-trimethoxyphenyl) prop-2-en-1-one crystal

Chandra S.[a], Anusha B.M.[b,c], Haleshappa D.[d] ✉, Jayarama A.[c,e], Shetty N.[a], Pinto R.[e,f]

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Abstract

The compound 1-(furan-2-yl)-3-(2, 4, 6-trimethoxyphenyl) prop-2-en-1-one (FT2MP) was synthesized using solution growth method and UV-Visible, FT-IR and FT-Raman spectroscopy studies were carried out. In addition, thermal and optical studies have also been carried out. Thermal studies indicate that acetyl furan substituted chalcone crystal FT2MP is thermally stable. It was also observed that chalcone derivatives substituted with multiple methoxy group show better crystallizability. In case of chalcone derivative such as FT2MP, methoxy group linked on benzoyl ring at one end acts as an electron donor and a methyl furan ring at the other end acts as strong electron acceptor thereby enhancing nonlinearity. Third order nonlinear optical studies have been carried out using both open and closed aperture Z-scan experiments. Third order nonlinear optical properties such as absorption coefficient, refractive index, and susceptibilities have been extensively studied and the results show that the high third order optical nonlinearities of the crystal may lead to important applications in optical devices. © 2019 Elsevier Ltd.

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Development of novel porous membrane for filtration of dump yard ground water contaminants

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Abstract

Water in urban areas and especially in developing countries is being polluted due to various reasons. Few of the pollution are due to disposal of industrial effluents directly into rivers, improper treatment of waste water and infiltration in waste disposal sites. The primary reason for contamination near dump yards which do not have proper lining material is due to infiltration. This poses a huge threat to the people living near the dump yard sites. In this paper we report a novel membrane developed using PVC and PVA for filtration of water in which PVA partially acts as a sacrificing component in the creation of pores. The porosity of the polymer composite membrane was studied using scanning electron microscope. The contaminations due to Vamanjoor dump yard site located near Mangalore, Karnataka, India are investigated and the various pollutants in the ground water are identified. A composite filter membrane unit is designed and developed which is used as an integral part of the

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Structural, morphological and optical properties of barium doped bismuth ferrite thin films deposited by spray pyrolysis

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Abstract

In the area of material science and technology, fabrication and characterization of nano-materials play an important role since it leads to the development of devices with interesting performance and potential applications in electronics, magnetics, optics, and photonics. Among the materials perovskite materials are gaining prominence. In this investigation, thin films of bismuth ferrite have been prepared and the impact of co-substitution of barium on their structural, morphological and optical properties have been studied. The spray pyrolysis procedure was used to prepare the thin films of bismuth ferrite with medium thickness by doping barium with concentrations of 1%, 3%, 5% and 10%.

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Role of Zn in tuning the structural, morphological and optical properties of V_2O_5nanostructures deposited by spray pyrolysis

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Abstract

Venadium Pentoxide (V2O5) thin films were deposited by employing a spray pyrolysis technique on glass substrates at 573 K for different Zn-doping levels (0, 1, 3, 5 and 10 wt%) to study the optical, structural and morphological properties of pure and Zn-doped V2O5 thin films. The characterisation study with powder X-ray diffraction confirms the orthorhombic structure and also that the films grow along (2 0 0) direction with increase in the doping concentration. The Scherer rule was employed to determine the crystallite size and found to be enhanced. Field Emission Scanning Electron Microscopy study reveals that the surface morphology modifications increase with Zn-doping. The surface topography of the prepared films was also studied using AFM and found to be enhanced. The optical energy band gap (Eg) of the prepared films was found to be varying between 3.27 eV and 3.72 eV due to increase in doping concentration. The interesting results of structural and optical parameters with the increase in Zn-doping concentration suggest that these nanostructured films are a promising material for opto-electronic device applications. © 2019 Elsevier Ltd.

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Simulation and analysis of P(VDF-TrFE) cantilever-beams for low frequency applications

Rashmi K.R.[a] ✉, Arjun Sunil Rao[b], Satyanarayan[c], Veena Devi Shastrimath V.[d], Jayarama A.[a], Pinto R.[b]

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Abstract

The work presented here describes a structural design of piezoelectric co-polymer P(VDF-TrFE) cantilever-beams for very low frequency applications; the design is based on silicon bulk-micromachining and micro-electromechanical systems technology. COMSOL simulation software has been used to study the mechanical and electrical behavior of cantilever-beams. The dimensions of the beams designed are: 3mm×0.6mm×5μm, 5mm×1mm×5μm and 10mm×3mm×5μm. The configuration of the cantilever-beam comprises of an active layer of piezoelectric P(VDF-TrFE) with chrome-gold interdigitated electrodes for electrical signal output generated due to vibration of piezoelectric beams. Simulation results show that the cantilever-beam of dimension 10mm×3mm×5μm has a resonant frequency of 42.68 Hz, indicating that P(VDF-TrFE) is a favorable piezoelectric material for low and very low frequency applications. © 2019 Elsevier Ltd.

Author keywords

COMSOL; MEMS; P(VDF-TrFE); Piezoelectric; Vibration sensors

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Novel methyl furan based chalcone material for potential nonlinear optical applications

Satheeshchandra S.[a], Namratha W.N.[b], Haleshappa D.[c] ✉, Jayarama A.[d,e], Shetty N.[a], Pinto R.[f]

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Abstract

A mixture of 2-acetyl furan and 3, 4, 5-trimethoxybenzaldehyde was used to synthesize and grow the novel methyl furan-based chalcone derivative 1-(furan-2-yl)-3-(3, 4, 5-trimethoxyphenyl) prop-2-en-1-one (FT3MP) crystal. Thermal stability of the crystal was found to be up to its melting point and the second harmonic generation efficiency was found to be 1.5 times higher than KDP crystal. UV-Vis spectrum showed a cut-off wavelength at 442 nm. The UV-Vis absorption spectral studies showed that the crystal has better transparency in the visible region of electromagnetic spectrum. © 2019 Elsevier Ltd.

Author keywords

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Synthesis, growth, Hirshfeld surface analysis and crystal structure of a pyridine based chalcone single crystal

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Abstract

In this article we present the growth and structural details of a pyridine based chalcone single crystal grown using the method, slow evaporation of solvent. The crystal structure was studied by X-ray diffraction method. The solid belongs to orthorhombic crystal system with a non-centrosymmetric space group Pna21. Weak C-H-O intermolecular hydrogen bond interactions stabilize the crystal structure, which is further confirmed by surface analysis by Hirshfeld. As the material crystalizes in enantiomorphic crystal structure, it may be a potential candidate for various photonic applications. © 2019 Elsevier Ltd.

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The significant role of molecular dipole arrangements on the second and third-order nonlinear optical properties of a furan based chalcone

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Methanol crossover reduction and power enhancement of methanol fuel cells with polyvinyl alcohol coated Nafion membranes

Rao A.S.[a] ✉, Rashmi K.R.[b], Manjunatha D.V.[a], Jayarama A.[b], Veena Devi Shastrimath V.[c], Pinto R.[a]

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Abstract

This paper presents the effect of polyvinyl alcohol (PVA) coated Nafion membranes on their water uptake, swelling and proton conductivity for various PVA coating thicknesses. These studies show that the optimum coating thickness of PVA on Nafion is 2 μm. Methanol permeation studies show that 2 μm thick PVA coating forms a barrier for methanol and significantly reduces methanol permeation through the membranes. Further, passive methanol fuel cells are tested with 2 μm thick PVA coat on Nafion as proton exchange membranes and their polarization plots show a significant enhancement in power as

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Investigation of physical, spectral and thermal properties of a dimethoxy substituted chalcone for opto-electronic device applications

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Abstract

We report herewith the experimental results of various analytical techniques performed on a chalcone material 3-(3,4-dimethoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (DMPP). The Scanning electron microscope images disclosed a layered 2D growth pattern. Existing functional groups were identified using FT-IR and FT-Raman spectra while the hydrogen atoms in the molecule were confirmed by 1H NMR spectrum. The title crystal is tested for thermal stability. DMPP melts at118 °C and chemically stable up to 200 °C. This feature makes the material a useful candidate for high temperature optical device applications. © 2019 Elsevier Ltd.

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Optimum hydrogen flowrates and membrane-electrode clamping pressure in hydrogen fuel cells with dual-serpentine flow channels

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Abstract

Hydrogen fuel cells have been designed and fabricated with an aim to investigate effect of cell clamping pressure and hydrogen flowrates on the performance of fuel cells. Fuel cells with active area 1.9 cm × 1.6 cm were fabricated with aluminum anode, cathode and other accessories. Membrane Electrode Assembly (MEA) was made up of nafion 212 (50 μm) membrane sandwiched between two gas diffusion electrodes (GDE) on either side of nafion membrane. Anode and cathode GDE had carbon cloth with 0.25 mg/cm2 and 0.50 mg/cm2 Pt loading, respectively. Double serpentine flow channels

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Voltammetric and galvanostatic methods for measuring hydrogen crossover in fuel cell
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