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S.No	Academic Year	Number of paper published in National / International journals
1.	2022-2023	03
2.	2021-2022	06
3.	2020-2021	07
4.	2019-2020	14
5.	2018-2019	21

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Experimental Study on Self Compacting Concrete

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ABSTRACT:Self compacting concrete (SCC) is a development of conventional concrete, in which the use of vibrator for compaction is no more required. Self-compacting concrete was first developed in 1988 to achieve durable concrete structures. Since then, various investigations have been carried out and this type of concrete has been used in practical structures in Japan mainly by large construction companies. The use of self-compacting concrete (SCC) can facilitate the placement of concrete in congested reinforcement in the structural members. This is especially important in deep structural members and wall elements where concrete can segregate and exhibit bleeding and settlement which can result in local structural defects that can reduce mechanical properties. Investigations for establishing a rational mix-design method and self-compatibility testing methods have been carried out from the viewpoint of making self-compacting concrete a standard concrete.

KEYWORDS: Self compacting, concrete, structural stability, wall elements, slabs, footings, compression test.

I. INTRODUCTION

Development of self-compacting concrete (SCC) is a desirable achievement in the construction industry in order to overcome problems associated with cast-in-place concrete. Self-compacting concrete is not affected by the skills of workers, the shape and amount of reinforcing bars or the arrangement of a structure and, due to its high-fluidity and resistance to segregation it can be pumped longer distances.The concept of self-compacting concrete was proposed in 1986 by Professor Hajime Okamura[1], but the prototype was first developed in 1988 in Japan, by Professor Ozawa [2] at the University of Tokyo. Self-compacting concrete was developed at that time to improve the durability of concrete structures. Since then, various investigations have been carried out and SCC has been used in practical structures in Japan, mainly by large construction companies. Investigations for establishing a rational mix-design method and Self-Compactability testing methods have been carried out from the viewpoint of making it a standard concrete. Self-compacting concrete is cast so that no additional inner or outer vibration is necessary for the compaction. With regard to its composition, self-compacting concrete consists of the same components as conventionally vibrated concrete, which are cement, aggregates, and water, with the addition of chemical and mineral admixtures in different proportions. Usually, these concretes have higher workability, superior mechanical properties and greater resistance to chemical attack as compared to traditional concrete.

It has proved beneficial economically because of a number of factors as noted below (Krieg [15], 2003 and ENFARC, 2005):

1. Faster construction,
2. Reduction in site manpower,
3. Easier placing,
4. Uniform and complete consolidation,
5. Better surface finishes,
6. Improved durability,
7. Increased bond strength,
8. Greater freedom in design,
9. Reduced noise levels, due to absence of vibration, and
10. Safe working environment.

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Research paper

Spectroscopic investigations on the charge transfer and hydrogen bonding effect of the potential bioactive agent 4-methyl-benzyl ammonium chloride hemihydrate: A combined experimental and quantum chemical approach

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Keywords:
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ABSTRACT

A quaternary ammonium compound, 4-methyl-benzyl ammonium chloride hemihydrate was synthesized and structural and electronic properties were analysed using vibrational spectra and density functional theory calculations. NBO analysis was performed to elucidate the various orbital overlaps resulting in the charge transfer interaction causing stabilization. The nature and strength of the typical non-covalent interactions were analysed using Hirshfeld surface analysis, Atoms in Molecules and reduced density gradient analyses. Molecular docking analysis was carried out to investigate the anti microbial activity which is prominent in systems with increased extent of hydrogen bonding effect.

1. Introduction

Quaternary ammonium compounds (QACs) are probably the best known surface-active agents with a structure adjoining organic and inorganic chemistry and possessing unique physicochemical properties [1,2]. Excellent water solubility and low cytotoxicity of QACs make it useful for a number of industrial and pharmaceutical purposes, including cleaning and disinfecting surfaces, waste water treatment, and antimicrobial treatment [3]. In addition, QACs are nowadays widely used as substrates, reagents, phase-transfer catalysts, ionic liquids, electrolytes, frameworks, surfactants, herbicides, and antimicrobials [1,4]. They have proven their prominent role in modified DNA studies which reveals that the replacement of a metal ion in DNA with QAC ions, results in formation of water soluble, hygroscopic materials, the thin film formed from which, exhibit many interesting optical and opto-electronic properties, including organic thin film transistor fabrication application.[5]. They have also recently received considerable attention owing to their potential application as micellar template in the preparation of silver nanoparticle, silver nanorods and nanowires [6] and also as modifier to change the structure of montmorillonite through cations exchange reaction and to enlarge the interlaminar distance [7,8]. The main QACs that are common in use are alkyldimethyl-benzyl-ammonium chloride, stearalkonium chloride, isothiazolium-benzalkonium chloride, cetrimonium chloride/bromide (cetrimide), cetylpyridinium chloride, alkyl amino alkyl glycines and di-decyldimethylammonium chloride [9–11].

4-methylbenzylammonium chloride hemihydrate (4MBAC), possess large third order susceptibility values, revealing its application in NLO devices [12,13]. It is well known that Density functional theory (DFT) approaches, especially those using hybrid functionals, have evolved to a powerful and very reliable tool, being routinely used for the determination of various molecular properties [14–17]. In the present investigation, a first time report on structural, electronic and thermal properties and a detailed vibrational spectral investigation of 4MBAC has been performed using the scaled quantum mechanical (SQM) force field technique based on density functional theory (DFT) calculations. The intermolecular and intramolecular hydrogen bonding were investigated using NBO, Hirschfeld, AIM, and reduced density gradient analyses. The electronic and photophysical properties were also analysed all of which has established the strong charge transfer interaction in the crystal. Molecular Docking analysis was performed to investigate the effect of the hydrogen bonding effects on the biological activity of 4MBAC.

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Structural, spectral and nonlinear optical analysis of aquachloro (L-prolinato) copper(II) crystal

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Abstract
A semi organic crystal, aquachloro (L-prolinato) copper(II) (ACLPC) has been grown by reacting L-proline and copper(II) chloride in equimolar ratio. It crystallizes in monoclinic noncentrosymmetric space group $P2_1$ with lattice parameters a = 8.1965(14) Å, b = 5.2142(9) Å, c = 9.5206(17) Å, and β = 109.411(5)°. The powder X-ray diffraction pattern of ACLPC was recorded and indexed. Elemental analysis has been carried out by energy dispersive spectrometry. The Fourier transform infrared and FT–Raman analysis were used to assign the functional group vibrations. The ^1H and ^{13}C NMR spectra were recorded to confirm the molecular structure. The optical transmittance region of the crystal is from 280 to 1100 nm. The second harmonic generation efficiency of the crystal was estimated by using Kutrz–Perry powder technique.

1 Introduction

The photonics and optoelectronic technologies demand useful nonlinear optical (NLO) crystals to convert frequency of laser light which is suitable for high speed processing of the data required for optical communication systems [1–4]. Many researchers have grown and reported several organic and inorganic NLO crystals. Both crystals possess unique features as well as some shortcomings. The organic crystals are well known for their NLO efficiency, large structural flexibility, fast response and large susceptibility. The inorganic crystals have good physicochemical stability, good mechanical strength, thermal properties [5], short UV cut-off wavelength and large second order nonlinearity [6]. But the semi-organic crystals comprise the features of both organic and inorganic complexes. One such semi-organic crystal aquachloro (L-prolinato) copper(II) (ACLPC) with molecular formula $C_5H_{10}ClCuNO_3$ is reported here.

In recent years, many complexes of amino acids have been identified for their NLO properties. They crystallize in noncentrosymmetric space groups and generates new frequencies by several NLO processes [7–10]. Second order NLO materials are well recognized in second harmonic generation (SHG) applications, electro-optic wave guide devices like modulators and switches and in optical parametric oscillators [11]. In this article semi organic single crystals of ACLPC has been grown by reacting L-proline ($C_5H_9NO_2$) and copper(II) chloride ($CuCl_2$). The grown crystals were characterized by single crystal XRD, powder XRD, energy dispersive X-ray spectroscopy (EDS), FT–IR, FT–Raman, NMR, transmission spectral methods and SHG measurement. Many semi organic NLO crystals like L-APCL, L-AHCL, L-AHBr, L-AHClBr and L-PSCM have SHG efficiency of < 0.4 times that of KDP [12–14]. The SHG efficiency of ACLPC crystal is 0.76 times that of KDP.

2 Growth of ACLPC

ACLPC crystal was synthesized by slow evaporation solution growth process from aqueous solution containing copper $CuCl_2$ and $C_5H_9NO_2$ in equimolar ratio. This was stirred well to obtain a homogenous mixture and filtered two times to remove impurities. Then the beaker was covered by polythene paper with few holes for slow evaporation. The growth period was 40 days. The photograph of grown crystals is given in Fig. 1. The reaction scheme is

$$C_5H_9NO_2 + CuCl_2 + H_2O \rightarrow C_5H_{10}ClCuNO_3 + HCl$$

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Arduino based Smart Pill Box for Diabetic Patients

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Abstract: **The project's main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. These problems in hospitals & people around us who have such kind of diseases and thus based on these two problems we made smart medicine box which solve these problems by Setting up time table of prescribed medicines through push buttons as given in prescription. Therefore at the time of taking medicine system generate Notification sound and display the Bright light in certain pill boxes. So, patient can know the specific number of box from which he has to take out medicines.. And also we have another future is that to find the heart rate of the patient.**

Index Terms – **Arduino UNO, Pill box, Buzzer,etc.**

I. INTRODUCTION

Currently, worldwide aging and regularity of persistent diseases are flattering a broad concern. Numerous countries are undergoing hospital restructuring by reducing number of hospital beds and escalating home healthcare, which is envisioned to perk up health care quality, has fascinated wide-ranging attention. In order to track the physical status of the elderly and, in the meanwhile, to keep them healthy, the proposed idea will be helpful.IOT expands the Internet into our everyday lives by wirelessly connecting various smart objects , and will bring significant hangs in the way we live and interact with smart devices. The new wave in the era of computing will be outside the sphere of the conventional desktop. Internet of Things (IOT) is a network where many of the objects that surround us will be networked in one form or another. By using this technology the health statistics of medication are observed. In this process of encryption the schedule data or doctor's prescription are send to pill box through mobile app. The LEDs are placed for indication and buzzer for alarm alerts and reset button is used to count for medicine in cloud platform. The existing techniques to the market for the reminder include a pill box. But this does not help in checking the medicine. This proposed idea is valuable solution to the medical noncompliance problem. The innovation scheme to help patient keep trail of their medicine consumption through a series LED alarm indicator signal and audio alarm indicator signals.

The main objectives of the project are:

- Dispense of medicines from pill box at scheduled time.
- Medical alerts to care taker and retailer.
- Online report generation of medicine.
- Real-time health statistics monitoring of medicines.
- Configuration data is send through IoT.
- Easy to find temperature and Heart Rate of the patient.

II. INTERNET OF THINGS

The Internet of Things (IOT) is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the "IOT revolution"— from new market opportunities and business models to concerns about security, privacy, and technical interoperability.

IOT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of "smart cities'', which help minimize congestion and energy consumption. IOT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing the availability of information along the value chain of production using networked sensors. However, IOT raises many issues and challenges that need to be considered and addressed in order for potential benefits to be realized

III. LITERATURE SURVEY

[1] A Smart Pill Box with Remind and Consumption Confirmation Functions Author: Huai-Kuei Wu, Member, Chi-Ming Wong, Pang-Hsing Liu, Sheng-Po Peng, Xun-Cong Wang.

Population aging could be a international issue that affects several developing countries like Taiwan. The natural decline in physical operate with aging results in a rise in incidences of assorted chronic diseases in older individuals, most patients with chronic diseases ought to take medications over a chronic amount of your time so as to stabilize their conditions. making certain that the patients consume the correct medication at the acceptable time becomes crucial. This paper proposes a wise pill box equipped with a camera

IoT Based Industrial Automation Control System Using Arduino

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Abstract: **Today, Automation plays an important role in human life. Industrial Automation allows us to monitor and control Industrial appliances like machines, motors, fans, lights and AC etc. It also provides security to the industries. Industrial Automation is not only meant for human efforts but also for energy efficiency and time saving. The main objective of industrial automation is to monitor and control all the industrial appliances and to alert the employees in critical situations. This paper put forwards the design of industrial Automation using Arduino with the help of Internet of Things (IOT). The proposed system is to find the gas leakage and flame, temperature and humidity and light intensity of the industry. This project uses MQ4 Sensor, DHT11 Sensor, LDR and Flame Sensor to detect the Gas, Temperature/Humidity, Light intensity and fire of the industry. And also two touch sensors is used to control the machine 1 and machine 2. The industrial appliances are connected to the Arduino processor and the communication is done through internet. The status of the appliances can be viewed in a webpage. The cost of the system is very low.**

Index Terms – **Industrial Automation; DHT 11, Flame Sensor, Internet of Things; Arduino**

1. INTRODUCTION

Recently, human's work and life are increasingly tight with the rapid growth in the development of communications and information technology. The society has changed human being's way of life as well as challenged the traditional residence and also living standard keeps raising up day by day that people have a higher requirement for abode functions. Industrial automation is the use of control systems that handles different processes and machineries in an industry to replace a human efforts. The purpose of automation was to increase productivity and to reduce the cost associated with human operators. Nowadays, the focus of automation has shifted to increasing quality and flexibility in a manufacturing process. Industrial automation eliminates healthcare costs and paid leave and holidays associated with a human operator. Although it is associated with a high initial cost it saves the monthly wages of the workers which leads to substantial cost savings for the industry. The maintenance cost associated with machinery used for industrial automation is less because it does not often fail. If it fails, only computer and maintenance engineers are required to repair it. Industrial automation fulfills the aim of the industry to run a manufacturing plant for 24 hours in a day 7 days in a week and 365 days a year. This leads to a significant improvement in the productivity of the industry. Automation alleviates the error associated with a human being. It produces better outcomes because of less errors. Industrial automation can make the production line safe for the employees by deploying robots to handle hazardous conditions.

2. INTERNET OF THINGS TECHNOLOGY

Internet of Things Technology The Internet of Things (IoT) is the network of physical objects that enables these objects to collect and exchange data through internet. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.

3. METHODOLOGY

A. *Existing System*

Currently there are no systems at cheaper prices. Various systems are very hard to install and difficult to maintain. The various existing systems are described below have some of the demerits.

1. Java-based automation system through World Wide Web integrated into a PC-based server at home:-In this system the drawback is PC should always on & connect to the server. The Implementation cost is very high.
2. Home automation system by using Bluetooth:- This system drawback is limited range and limited no of devices to be connected. The power consumption Bluetooth enabled devices was high.
3. Home automation system by using Zig bee:-This system is implemented based on Bluetooth. It overcomes some of the drawbacks of Bluetooth system but it is also lack of range.
4. Home automation system using GSM:-After rapid growth of GSM networks this system is implemented. Compared from above system this system consumes less power & standalone but the drawbacks are when GSM networks fails to deliver the commands in time major problems occurs.

Only less numbers of standards for an industrial. So we are developing the industrial automation which monitors and controls the different appliances from the remote place through the IoT.

IOT BASED SOCIAL DISTANCE MONITORING SYSTEM FOR COVID -19 SAFETY

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ABSTRACT:

With the growth of COVID-19 confirmed cases ,the u . s . maintains to place into impact tighter precautionary measures mainly with the re-beginning of company and government establishments in areas beneathneath General Community Quarantine. This paper proposes an automatic social distancing and body temperature detection sensor that uses ultrasonic, and infrared thermometer sensors to maximize overall performance and restriction cost. The ultrasonic sensor and coronary coronary heart beat sensor are coupled with a buzzer to show and maintain the social Keep your distance from the individual coming into the door. An automated non-touch frame temperature measurement system is installed at the end of the entrance to check people's body temperature before they finally enter the area. When the sensed body temperature is higher than the normal value, the buzzer will sound to notify the guard that the immediate action of the Arduino Uno will trigger the sensor and buzzer.

I.INTRODUCTION

As the world battles with the effect of COVID-19, organizations and governments are looking for approaches to securely restart worldwide trade and nearby economies to relieve the monetary effect of the infection. This will affect many individuals getting back to their work environments. Be that as it may, with progressing COVID-19 flare-ups and the danger of a subsequent wave actually present, the need to keep noticing social separating and contact following will be a significant component in any arrangement for the safe resuming of organizations and functional offices.

In numerous workplaces, industrial facilities, and different working environments, where individuals should be versatile to complete their work exercises, keeping a safe actual separation turns into a unique issue in light of the fact that the vicinity between laborers is continually evolving. A few laborers will move quicker than others, and regular traffic bottlenecks will happen inside work environments that lead to nearer levels of actual vicinity than others. Indeed, even the hour of day will turn out to be more applicable with regards to keeping suggested separations between collaborators and guests and following those contacts that do occur.

For most business pioneers, these contemplations are essentially new. While structures are intended to help a consistent progression of individuals, not many draftsmen might have imagined the requirement for a low thickness of traffic in common regions, doorways and ways out, halls, or other open spaces. The structure, despite how shrewd it could be, is probably not going to give the fundamental innovation to help social removing. It tumbles to new answers for give the appropriate response.

Today, the term "new normal" is used to describe the preventive measures that society must take to limit or prevent the threat of infectious diseases such as COVID19. Many scientists believe that at some point in the future, another virus is about to break out; no one can say with certainty how severe or widespread it may be Therefore, is to have precautionary measures geared up for deployment. For viruses that assault the breathing system, inclusive of COVID-19, preserving a bodily distance is an powerful manner of stopping its unfold, and make contact

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Effect of Temperature on Strength Properties of Fly ash based Geopolymer Concrete

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Abstract - *The major problem that the earth facing today is the environmental pollution. Within the housing industry mainly the assembly of Portland cement will cause the emission of pollutants ends up in environmental pollution. Globally, the assembly of cement contributes a minimum of 5 to 7% of CO_2. We can reduce the pollution effect on environment, by increasing the usage of commercial products in our housing industry. The major problem the globe is facing today is that the environmental pollution. This work carried on studies of temperature effect on strength of fly ash based geopolymer concrete. Geopolymer concrete is manufactured class F fly ash (100%). Sodium silicate solution and sodium hydroxide solution used as alkaline activator.Cubes of size 150mmX150mmX150mm were made at solution to ash ratio of 0.35. All specimens were cured in oven at 50°C, 60°C, 70°C & 80°C for different molarities 5M, 7M, 9M for a period of 20 hours. After oven curing, cubes moved to temperature for curing period. The slump cone test was carried to review the workability of concrete. After curing period of 7 days and 28 days UPV test and compressive test were performed. Concluded that different molarity Geopolymer Concrete attains maximum strength at different temperature conditions. Test results show that the 5M, 7M and 9M Geopolymer Concrete has optimum temperature of 70°C.*

Key Words: (Fly ash, Alkaline activators)

1.INTRODUCTION

Geopolymer concrete is associate unindustrialized material goes to be a revolution at intervals the analysis field and conjointly at intervals the development business. Increase of cement demand winds up within the increase of production of cement. Cement is that the foremost material from the concrete industry throughout the planet. Day by day, the need of cement at intervals the concrete business and at intervals the event field is increasing quite alarmingly. To overcome the greenhouse gas drawback towards atmosphere, Davidovits Joseph in 1978 introduced new kind of concrete named as Geopolymer concrete. Geopolymer cement might even be a binding system that hardens at temperature. Geopolymer concrete is eco-friendly construction material associated an alternate to hydraulic cement. Geopolymer binders are found to be the simplest alternate to cement binders. Use of geopolymer reduces the demand of hydraulic cement that is responsible for high dioxide emission. Geopolymer concretes are cement less concrete that utilize by product materials like ash at intervals the presence of base forming resolution to produce binders.

2.LITERATURE REVIEW

Geopolymer concrete was introduced by Davidovits Joseph in 1978. The cement is primary binding material in the concrete. As the increase in demand of cement, results in increase of production of cement which results emission of carbon dioxide in greater quantity into environment causing global warming. To overcome this issue, Davidovits Joseph from his research introduced geopolymers which are rich in silica and alumina containing cementitious properties. This geopolymers are wastages from chemical, thermal and steel plant industries. This geopolymers are used as primary binding material by replacing cement in concrete. This concrete known as geopolymer concrete. Geopolymer concrete has greater strength, durability, fire resistance and many advantages compare to normal conventional concrete. Generally, strength of geopolymer concrete is higher than normal concrete. Geopolymer concrete was manufactured replacing cement with fly ash, GGBS and other cementitious material.

3.EXPERIMENTAL STUDY

In this study mainly explains about the effect of geopolymer concrete attains smart strength beneath temperature condition. Once cured at warm temperature conditions the strength of geopolymer concrete will increase. Typically, ordinary hydraulic cement is cured by water treatment methodology. Geopolymer concrete exhibits distinctive nature beneath temperature impact. The base-forming resolution act as accelerator in geopolymer concrete once exposure in temperature. Geopolymer concrete attain strength >70 N/mm2 beneath warm temperature conditions. Geopolymer concrete can attain higher strength in one day. Increase in strength, durability, heat resistance once geopolymer concrete cured at warm temperature conditions.

3.1Mix Proportions

In the below tables awarded as different type of mixes as well indifferent proportions of constituent materials. which are shown in Tables below.

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:http://www.ijiemr.org/downloads.php?vol=Volume-09&issue=ISSUE-09

Title: EXPERIMENTAL INVESTIGATION ON CONCRETE WITHCOARSE AGGREGATE REPLACED WITH WASTE CONCRETE AGGREGATE
Volume 09, Issue 09, Pages: 24-28

Paper Authors

SHAIK MOHAMMAD ABRARTAHA, DR. K.RAJASEKHAR

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Design of a Structure Supported On a Solitary Column

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ABSTRACT

Now a days population growing very extensively so usage of every product and consumption of everything is also growing with it. As population increasing day by day the shelter for those people is our biggest question mark in front of us today. By using civil software and practical knowledge trying to develop an idea that design a structure that can constructed on a single column. This might be consider as one of best solution for providing shelter for population. So that by using auto cad , staad pro etc this project is executed .

Keywords: Auto cadd, staad pro, concrete suitability, multi story building, mix proportions, single column, stability, duration

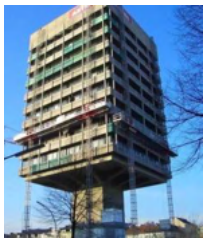
INTRODUCTION

Structure supported on a single column provides better architectural view compared to structure supported on many columns. They save ground space as requires less area for providing foundation and provides more space for parking. They are also unique. Single column structure can be made either by using RCC or Steel. RCC structures are more common now days in India. Reinforced concrete as a structural material is widely used in many types of structures. It is competitive with steel if economically designed and executed. It has a relatively high compressive strength and better fire resistance than steel. It has long service life with low maintenance cost. It can be cast into any required shape. Reinforced concrete is a composite material in which concrete's relatively low tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength and ductility. The modeling and analysis of structure supported on a single column is done by using STAAD Pro software. STAAD Pro is a structural analysis and design computer program originally developed by Research Engineers International in Yorba Linda. Various ways of supporting a structure on one single column.

Various steps involved in designing of reinforced concrete structure supported on a single column using STAAD pro-

Geometric Model → Material Properties → Sectional Properties → Supports → Boundary Conditions → Loads & Load combinations → Special Commands → Analysis Specification → Design Command.






Structures supported on single column

Objectives And Scope

The main objective of the project is to design a structure supported on single column using STAAD pro and compare its cost with multi column structure.

1. Design and analysis of structure supported on single column.
2. Design of multi column structure.
3. Cost comparison of single column structure and multi column structure.

Scope

1. STAAD pro is the software used for modelling of single column structure.
2. Analysis and design of single column structure is done using STAAD pro.

Arduino Based Gestures to Speech Converter Gloves for Deaf and Dumb People

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Abstract: ***Speech and gestures are expressions, which are mostly used in communication between human beings Getting the data is the first step. The second step is that recognizing the sign or gesture once it has been captured is much more challenging, especially in a continuous stream. In fact currently, this is the focus of the research. The objective of this paper is to design a simple embedded system based communicating device for deaf and dumb people. In our day to day life most of the task we carryout involves speaking and hearing. The deaf and dumb or paralyze people have difficulty in communicating with others who cannot understand sign language and miss-interpreters. In this paper, we designed a simple embedded system based device for solving this problem.. A brief description about various gestures and the implementation part is discussed in this paper. The glove is internally equipped with flex sensors (2). Two Flex sensors resistance changes according to the flexion Experienced. For every specific gesture, the flex detector produces a proportional amendment in resistance and measures the orientation of hand. These each gestures having some different indication of signals which appeared as in the form of output. The process of those hand gestures is finished in controller (Arduino). Using this device deaf-mute and a standard person can be able to communicate with each others in an affordable and convenient way.***

Index Terms: *Arduino, Bluetooth, Flex sensor etc.*

I. INTRODUCTION

Loss of hearing and speech can cause people to become isolated and lonely, having worse affect on both their social and working life. Looking up the meaning of a sign is not a straightforward task. Sign Language is a well structured code gesture where every gesture has a meaning assigned to it. Sign Language is the only means of communication for deaf people. With advancement of science and technology many techniques have been developed not only to minimize the problem of deaf and dumb people but also to implement it in different fields.

Sign language is a language which instead of voice or sound patterns uses manual communication and body language to convey the meaning. This involves mostly the combination of shapes, orientation and movement of the hands. Sign language is not only used by deaf but also who can hear, but cannot physically speak. All India Federation of the Deaf estimates around 4 million deaf people and more than 10 million people have hearing problem in India. The development of the most popular devices for hand movement acquisition, glove-based systems started about30 years ago and continues to engage a growing number of researchers. Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. Sign language is the language used by deaf and mute people that uses gestures instead of sound to convey or to express fluidly a speaker's thoughts. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. The main aim of this paper is to present a system that can efficiently translate Sign Language gestures to auditory voice. Several languages are being spoken all around the world. So this system aims to give the voice output in various regional languages.

Gesture to Speech Conversion [1-5] is a tool for converting gestures of the differently abled people of the world to speech i.e. converting gestures input to speech outp Gesture to Speech Conversion [1-5] is a tool for converting gestures of the differently abled people of the world to speech i.e. convert gestures input to speech output. Proposed system is portable and focuses on two way communication. Main goal of the system is to convert hand gestures to auditory speech for communication between mute and normal people.

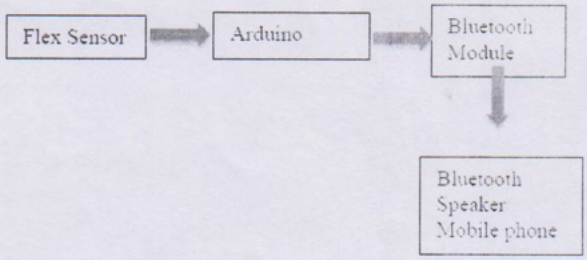

Fig. 1: Block Diagram

There are 2 flex sensors that are used. Each flex sensor is connected to different pins of Arduino UNO which is the controlling unit. Now the Tx and Rx pins of Arduino are connected to Rx and Tx pins of the Bluetooth module HC05 respectively. Now, the Bluetooth module is connected to a Bluetooth speaker of an app in mobile phone to give a speech output.

II.EXSISTING SYSTEM

In the image processing technique camera is used to capture the image/video, with the static images are analyzed and recognition of the image carried out using algorithms that produce sentences in the display. Algorithm

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A STUDY ON THE HARDENED PROPERTIES OF LIGHT WEIGHT AGGREGATE (PUMICE) CONCRETE

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ABSTRACT

Light weight concrete has become more popular in recent years owning to the tremendous advantages it offers over the conventional concrete. The main specialties of lightweight concrete are its low density and thermal conductivity. Its advantages are that there is a reduction of dead load, faster building rates in construction and lower haulage and handling costs. We are replacing the cinder instead of coarse aggregate; it is obtained from steel industries. The surface of the cinder is usually rough and high porous due to mineral structures. Low specific gravity of cinder in compression with natural aggregates resulted in the concrete made with cinder to be lighter than normal concrete. Based on the literature, the main function for usage cinder material is to minimize the cost and it is reduced to disposal of waste material and it helps in reduction of dead load. An experimentally study has been conducted on concrete with partial replacement of conventional coarse aggregate by another light weight aggregate. The M20 concrete mix is designed using ISI method. We make concrete by replacing coarse aggregate with cinder of different percentages like 0%, 20%, 40%, 60%, 80% and 100% with curing of 28 days. Among all the percentages the better compressive strength obtained percentage is selected.

INTRODUCTION

Light Weight Concrete

Lightweight concrete [1-4] can be defined as a type of concrete which includes an expanding agent in that itexpands the volume of the blend while giving extra qualities, for example, nailbility and diminished the dead weight. It is lighter than the customary cement. The principle fortes of lightweight solid are its low thickness and warm conductivity. Its preferences are that there is a lessening of dead load, speedier building rates in development and lower haulage and taking care of expenses.Lightweight cement keeps up its expansive voids and not framing laitance layers or concrete movies when put on the divider. Be that as it may, adequate water bond proportion is imperative to create satisfactory attachment in the middle of concrete and water. Deficient water can bring about absence of union between particles, subsequently misfortune in quality of cement. In like manner an excessive amount of water can bring about concrete to keep running off total to frame laitance layers, therefore looses quality [7].

Types of Light Weight Concrete

Lightweight solid can be arranged either by infusing air in its organization or it can be accomplished by precluding the better sizes of the total or notwithstanding supplanting them by an empty, cell or permeable total. Especially, lightweight solid can be classified into three gatherings:

- Lightweight total cement
- Aerated/Foamed cement

No-fines concrete

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Original research article

Interpretation of structural, spectral and nonlinear optical properties of a new semiorganic crystal: Rubidium bis(2-methyllactato) borate monohydrate

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ARTICLE INFO

Keywords:
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Crystal structure
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Z-scan analysis

ABSTRACT

Rubidium bis (2-methyllactato) borate monohydrate (RbMB) was developed by adopting slow solvent evaporation technique. Good crystalline nature of RbMB is confirmed by powder X-ray diffraction analysis. The optical transparency window is observed from 190 nm to 1100 nm. FTIR and FT-Raman spectral analysis endorses the formation of RbMB crystal. Thermal stability of RbMB extends upto 134 °C. Molecular structure of RbMB crystal is interpreted through the observed chemical shifts through ^{1}H NMR and ^{13}C NMR spectroscopy. The intermolecular interactions between organic and inorganic moieties are well established. These intermolecular interactions and electron delocalization enhances the third order nonlinear susceptibility ($\chi 3$) value and is found as 3.75354×10^{-6} esu. The self-defocusing and reverse saturable absorption nature gives negative non-linear refractive index (n_2) and positive nonlinear absorption co-efficient (β). This made RbMB a suitable candidate for using in Q-switching, optical pulse shorteners and optical energy limiters applications.

1. Introduction

The fast developments in the field of optoelectronics and photonics creates a demand in developing new and better nonlinear optical (NLO) crystals. These crystals finds greater applications in various fields [1–5]. The structure property relationship is the most important factor to develop an efficient NLO crystal. Combining the organic materials nonlinear optical efficiency and inorganic materials physical stability by choosing a proper precursor results in the formation of favourable semiorganic NLO crystal. Based on this view, authors made an attempt to develop 2-methyllactic acid based crystals. Four new 2-methyllactic acid based crystals were developed and the solved structures were reported by the authors [6–9]. Among the structures reported, Rubidium bis(2-methyllactato)borate monohydrate crystal is characterized using various characterization techniques and the structure-property relationship is reported in this article. The crystal structure consists of one 2-methyllacato borate anion, one rubidium cation and a water molecule. O—Rb···O and O—H···O hydrogen bonded intermolecular interactions present in the RbMB structure ensures enhanced (χ^3).

2. Materials and methods

RbMB was prepared by reacting 2-methyllactic acid, boric acid and rubidium carbonate in 4:2:1 molar ratio by using deionized water as solvent. The mixture is stirred well and filtered to remove impurities. The filtered solution is kept closed in a beaker using

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ORIGINAL PAPER

Check for updates

Analysis of Structural, Spectral and Magnetic Properties of Pure and Pb-/Zr-Substituted Strontium Hexaferrite

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Abstract
Zr- and Pb-doped strontium hexaferrite is synthesized by sol-gel auto combustion technique. Recorded powder X-ray diffraction (PXRD) patterns reveal the single phase hexaferrite formation. The synthesized samples are transparent up to 800 nm. Infrared spectral analysis establishes the tetrahedral and octahedral site metal-oxygen vibrations. Magnetic analysis reveals reduction in saturation magnetization (M_s), remnant magnetization (M_r) and increase in coercivity (H_c) due to the increase in dopant concentration. The study reveals that as the dopant concentration increases, the samples become more and more hard magnetic.

Keywords Sol-gel technique · Structural · FTIR · Magnetic properties

1 Introduction

Strontium hexaferrite ($SrFe_{12}O_{19}$) is widely used as a permanent magnetic material as it possesses large crystalline anisotropy with good chemical stability, large saturation magnetization (M_s) and high coercive force (H_c) high electrical resistivity and Curie temperature, good thermal durability and mechanical hardness [1–5]. These properties are improved by the modification of chemical composition, synthesis methods and cation distribution within the crystal lattices [6–10]. Recently a variety of routes were used to syntheses magnetic nanoparticles such as glass crystallization, co-precipitation, hydrothermal, microwave induction, hydrothermal, sol-gel auto combustion, high energy ball-milling and ceramic process [11–14]. The sol-gel auto combustion route has many advantages among others such as cost-effective, low calcinations temperature, less processing time, highest purity and crystallinity, good chemical homogeneity and procedural simplicity [15, 16]. Hence sol-gel auto combustion method was used to synthesize these samples. In the present study, the effect of Pb/Zr substitution on strontium hexaferrite is analysed and presented.

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2 Materials and Methods

The analytical grade chemicals of starting materials such as strontium nitrate, ferric nitrate, lead nitrate, zirconium nitrate and citric acid with 98% purity were taken. Metal nitrates and citric acids were dissolved in 50 ml de-ionized water in stoichiometric ratios of 1:1.5 metal-acid proportions. Here, citric acid acts as a chelating agent. Ammonium solution was added dropwise to control pH of the solution. This was placed on the hot plate and heated at 80–90 °C for 4–5 h with continuous stirring using magnetic stirrer.

After few hours, the water gets evaporated and the homogenous brown gel was formed. Furthermore, heat treatment was given to the solution at 500 °C for 3 h, and the gel was burnt completely. The maximum level impurities and water content have been removed from the precursor material, and ash-like powder was collected and grained further. The fine powder was calcinated at 950 °C for 5 h, and the required hexaferrite was obtained.

3 Result and Discussion

3.1 Powder XRD Analysis

PANalytical X'Pert PRO X-ray diffractometer was employed to investigate the lattice parameter and structural characteristics of synthesized samples, and the recorded powder XRD pattern is presented in Fig. 1. X-ray diffraction peaks corresponding to pure and doped samples show the presence of

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Structural, Spectral, and Optical Characterization of Potassium bis(2-methyllactato)borate Hemihydrate Crystal

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Potassium bis(2-methyllactato)borate hemihydrate (KMB) was grown by a solvent evaporation technique. Crystal structural analysis revealed that the potassium cation was pseudo-octahedrally coordinated by five O atoms from four bis(2-methyllactato)borate (MB) ligands and half-occupied water. The sharp peaks in the powder x-ray diffraction (PXRD) pattern confirmed the perfect crystalline nature of the KMB. Transparency was observed in the range from 215 nm to 1100 nm, and the bandgap of KMB was determined to be 2.15 eV. The molecular structure of KMB was established by interpreting the functional group vibrations through vibrational spectroscopy. The molecular structure was further confirmed by the nuclear magnetic resonance (NMR) spectral technique. The peak followed by valley nature observed is due to the self-focusing behavior of KMB. The minimum transmission near the focus in the open aperture curve is attributed to the reverse saturation absorption nature of KMB. The third-order susceptibility ($\chi^{(3)}$) of KMB is estimated to be 4.17694×10^{-5} esu. These results suggest that KMB can be used in optical sensors as well as other photonic and optoelectronic applications.

Key words: Crystal structure, solvent evaporation technique, NMR analysis, *Z*-scan technique

INTRODUCTION

Progress in the area of technology and communications has resulted in greater demand for the development of suitable nonlinear optical (NLO) materials.[1] The generation of different frequencies results in different laser sources, in turn enabling advances in the fields of photonics, optoelectronics, and optical communications.[2–5] To achieve these advances, current research is focusing on the development of efficient NLO crystals. Moreover, many researchers have developed and reported on several organic and inorganic NLO crystals. Organic crystals such as 4-*N*,*N*-dimethylamino-4′-*N*′-methyl-stilbazolium tosylate (DAST)[6] and 3-methyl-4-methoxy-4′-nitrostilbene (MMONS)[7] exhibit high NLO efficiency but lack mechanical and thermal stability. Meanwhile, inorganic crystals such as $KBe_2BO_3F_2$ (KBBF),[8] $K_3B_6O_{10}Cl$ (KBOC),[9] $Ba_4B_{11}O_{20}F$ (BBOF),[10] etc. exhibit good physiochemical stability and deep-ultraviolet (UV) generation but poor NLO efficiency. To overcome these shortcomings of organic and inorganic crystals, semiorganic crystals have emerged over the past few years. The functionalization of organic materials with suitable inorganic acids and salts leads to the formation of new semiorganic crystal structures with hydrogen bonding.[11,12] The formation of hydrogen bonds in the structure promotes the NLO efficiency of such crystal as well as their physical properties.[13,14] Our research group focuses on the development of new semiorganic-based NLO materials, e.g., using 2-methyllactic acid. Among the various organic moieties, 2-methyllactic acid is chosen due to its coordinating ability with aqueous media.[14] Cammas et al. established that, when

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Elucidation of the properties of Lithium bis(2-methyllactato) borate monohydrate crystal for laser applications

G. Gokila[1] · R. Aarthi[1] · C. Ramachandra Raja[1]

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Abstract
Lithium bis(2-methyllactato) borate monohydrate (LiMB) a semiorganic crystal is grown by solvent evaporation process. Sharp peaks present in powder XRD (PXRD) pattern reveals the good crystallinity. Linear transmission window is observed from 220 to 1100 nm. Functional groups such as CH_3, OH and B–O present in the crystal structure are established through FTIR and FT-Raman vibrational analyses. ^{1}H NMR and ^{13}C NMR spectroscopy confirms molecular structure of LiMB crystal. The organic part of LiMB is elucidated through the observed chemical shifts. The influence of intermolecular interactions was well identified and established. Thermal stability of LiMB extends upto 218 °C. The presence of electron delocalization and intermolecular interaction enhances the third-order susceptibility (χ^3) and it is 4.5517×10^{-5} esu. Nonlinear refractive index (n_2) and nonlinear absorption coefficient (β) are also found. The self-defocussing and reverse saturable absorption behavior of grown crystal made it useful for Q-switching, optical pulse shorteners and optical energy limiters applications.

1 Introduction

Nowadays materials research society focusses on developing semiorganic nonlinear optical (NLO) crystals for electronics and photonics applications because of their ability to combine the salient features of organic and inorganic moieties [1–3]. Nonlinear optical crystals such as L-Valium picrate, Triphenylmethane DAST and MMONS gives good NLO efficiency and can be utilized in the field of logic devices, biological imaging and optical switching [4, 5]. Semiorganic NLO crystals find more significance in the field of laser technology. The demand for lasers with various wavelength is increasing in the industries, medical field, communication, defence etc. [6–8]. Developing laser with various wavelength can be achieved through developing a good NLO crystal. Centrosymmetric crystal grown in polymeric structure with several intermolecular interactions gives better third-order NLO parameters [9]. Also, the centrosymmetric third-order nonlinear optical crystals gain more importance in the field of optical bistability, ultra fast optical switching, and optoelectronic devices [10–13]. The NLO crystals with negative third-order nonlinear refractive index and positive nonlinear absorption coefficient finds applications in the field of optical sensors and Q-switching applications. Joshua et al. synthesized a centrosymmetric Lithium bis(2-methyllactato) borate monohydrate, reported its structure [14] and is given in Fig. 1. In this article, the molecular structural confirmation of LiMB crystal through vibrational and NMR spectroscopies is reported. Also, the thermal stability, linear optical transmittance window and third-order nonlinear efficiency of LiMB crystal are reported. The reported O—Li—O intermolecular interactions were well acknowledged through the various characterization techniques and also it is responsible for the enhanced χ^3 value.

2 Experimental

Slow solvent evaporation method is utilized to grow LiMB crystal and was grown by reacting 2-methyllactic acid, boric acid and lithium carbonate in 4:2:1 molar ratio. 4.1644 g of 2-methyllactic acid, 1.236 g of boric acid and 0.7389 g of lithium carbonate were appropriately dissolved in 10 ml, 50 ml and 10 ml of deionized water and these solutions were mixed together using magnetic stirrer until to get the clear solution. The clear solution was filtered in a beaker and covered using a perforated paper. Then the beaker was left to stand at a room temperature. Slow evaporation of the solvent leads to growth of crystals in one month.

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Original research article

Structural, spectral and nonlinear optical analysis of Bis(2-methyllactato)borate tetrahydrate: a new nonlinear optical crystal for laser applications

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ARTICLE INFO

Keywords:
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Second harmonic generation
Z-scan analysis

ABSTRACT

A new nonlinear optical crystal, 'Bis(2-methyllactato)borate tetrahydrate' (BMBT) has been crystallized by slowly evaporating the solvent. It crystallizes in the space group $P2_12_12$. Sharp peaks present in powder XRD profile reveals the good crystallinity. Its transmission bandwidth (220 nm – 1100 nm) suggest that it can be used to generate UV radiation upto 220 nm and also in optoelectronic applications. Vibrations of functional groups (B—O, CH_3, CO) associated with the crystal structure have been identified through FTIR and FT-Raman spectral studies. OH stretching vibrations have been observed near 3000 cm^{-1} clearly endorses the existence of water molecule in the BMBT structure. The chemical shifts observed in ^1H and ^{13}C NMR spectral results establishes the molecular structure of BMBT crystal. Second harmonic generation (SHG) efficiency is obtained as 0.9 times of KDP. The third order nonlinear susceptibility ($\chi 3$), nonlinear refractive index (n_2) and nonlinear absorption co-efficient (β) were found using Z-scan technique. $\chi 3$ of title crystal is found to be 4.16×10^{-5} esu. The existence of SHG efficiency and the enhanced $\chi 3$ value are due to the hydrogen bonded intermolecular interactions present in the BMBT crystal structure. The observed results suggest that BMBT can be used in Q-switching, mode locking and optical sensors like night vision devices.

1. Introduction

Nonlinear optical (NLO) crystals are enormously developed due to their applications in photonics and optical communications [1–5]. Inorganic crystals such as BBO, LBO, KBBF, KBOC, BBOF, etc. possess greater physical properties and deep UV generation and possess low nonlinear efficiency [6–8]. Organic crystals are excellent NLO materials due to their tailoring ability and larger nonlinear response. Organic NLO crystals such as DAST and MMONS provide good NLO efficiency and finds applications in logic devices, biological imaging, optical switching etc [9,10]. But these crystals have low mechanical and thermal stability. Semiorganic crystals combines the properties of these crystals. Functionalizing the organic moiety with appropriate inorganic counterpart generates new crystal structures. Attempts are still made by solid state researchers to develop an ideal NLO crystal. It is reported that hydrogen bonded intermolecular interactions gives increased NLO efficiency with good physical properties [11]. Among various organic materials, 2-methyllactic acid promotes enhanced charge transfer mechanism due to their ability to coordinate in aqueous media by changing their solubility [12]. The crystal structure of Mn(IV), Mn(II), Zn(II) complexes of 2-methyllctic acid [12,13], polymeric lithium Bis(2-methyllactato)borate monohydrate [14] have already been reported. All these crystal structure consists of several

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Ber Analysis of Uplink of DMA- A Fuzzy Approch

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Abstract

High spectrum efficiency and resistant to interferences made frequency division multiplexing access (OFDMA)an exceptionally good choice for the realization of Long-Term Evaluation-Advanced (LTE-A)and other advanced mobile communication technologies. Besides the multiple merits, OFDMA in uplink communications is suffered due to higher carrier frequency offsets (CFO) and timing offsets (TO) in multiuser scenarios, which results in induced bit error rate (BER). In practical scenario, there are many techniques available to evaluate the accuracy of communication system by reducing the ICI and BER further. However, it is necessary to develop several influential hybrid methods for evaluation and mitigation of CFO, TO and BER performance improvement with least undesirable side effects. In addition, it is quite difficult to achieve high spectral efficiency while improving the performance of BER over fast fading channels. Thus, here in this article, OFDMA designed with an adaptive modulation to reduce bit errors with fuzzy logic interface, which is used to estimate the SIR performance. Finally, both time variant training and time invariant exact closed-form expressionis suggested for calculating the BER. This methodology implemented in Matlab environment, the proposed results shows the reduction in BER and reduced frequency and timing offsets, which achives the better SIR performance compared to conventional approaches.

Keywords :BER, OFDMA, MUI, CFO

I. INTRODUCTION

Related to symbol and carrier waves those are inter symbol interference (ISI). To overcome this problem, the design of The present fifth generation communications needs the high throughput demand to support over the audio, video and multimedia transmissions. For supporting this communication standards OFDMA is used as uplink physical medium. The fundamental operation of OFDMA consists of division of spectrum into frequency based orthogonal subcarriers achieves the higher throughput and data rates [1]-[2]. Now these subcarriers are faced with high frequency and time offsets. But due to the multiple divisions of spectrum allows the multiples users to communicate each other, but this environment create the interferences subcarriers plays a major role. In OFDMA unique subcarriers are used with different frequencies to support the continuous transmission where the bandwidths among the different users are allocated based on their frequency availability. Thus, the base station and end-users are in OFDMA communication environment are need to be synchronized in both uplink and downlink paths with the allocated frequencies. It is mandatory to maintain the mobile user to the base station communications such as uplink communications noise and error free. The noises are induced due to the time varying properties of channel, but the errors are generated due to the frequency and time offsets.
These offsets with the frequency properties are caused due to transmitter and recover frequency changes, and improper tuning of the local oscillator across the receivers. The change in neighborhood subcarriers frequency called as the CFO, this CFO causes to creates the not only ICI between

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Arduino Based Gestures to Speech Converter Gloves for Deaf and Dumb People

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Abstract: ***Speech and gestures are expressions, which are mostly used in communication between human beings Getting the data is the first step. The second step is that recognizing the sign or gesture once it has been captured is much more challenging, especially in a continuous stream. In fact currently, this is the focus of the research. The objective of this paper is to design a simple embedded system based communicating device for deaf and dumb people. In our day to day life most of the task we carryout involves speaking and hearing. The deaf and dumb or paralyze people have difficulty in communicating with others who cannot understand sign language and miss-interpreters. In this paper, we designed a simple embedded system based device for solving this problem.. A brief description about various gestures and the implementation part is discussed in this paper. The glove is internally equipped with flex sensors (2). Two Flex sensors resistance changes according to the flexion Experienced. For every specific gesture, the flex detector produces a proportional amendment in resistance and measures the orientation of hand. These each gestures having some different indication of signals which appeared as in the form of output. The process of those hand gestures is finished in controller (Arduino). Using this device deaf-mute and a standard person can be able to communicate with each others in an affordable and convenient way.***

Index Terms**:** *Arduino, Bluetooth, Flex sensor etc.*

I. INTRODUCTION

Loss of hearing and speech can cause people to become isolated and lonely, having worse affect on both their social and working life. Looking up the meaning of a sign is not a straightforward task. Sign Language is a well structured code gesture where every gesture has a meaning assigned to it. Sign Language is the only means of communication for deaf people. With advancement of science and technology many techniques have been developed not only to minimize the problem of deaf and dumb people but also to implement it in different fields.

Sign language is a language which instead of voice or sound patterns uses manual communication and body language to convey the meaning. This involves mostly the combination of shapes, orientation and movement of the hands. Sign language is not only used by deaf but also who can hear, but cannot physically speak. All India Federation of the Deaf estimates around 4 million deaf people and more than 10 million people have hearing problem in India. The development of the most popular devices for hand movement acquisition, glove-based systems started about30 years ago and continues to engage a growing number of researchers. Communication involves the exchange of information, and this can only occur effectively if all participants use a common language. Sign language is the language used by deaf and mute people that uses gestures instead of sound to convey or to express fluidly a speaker's thoughts. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. The main aim of this paper is to present a system that can efficiently translate Sign Language gestures to auditory voice. Several languages are being spoken all around the world. So this system aims to give the voice output in various regional languages.

Gesture to Speech Conversion [1-5] is a tool for converting gestures of the differently abled people of the world to speech i.e. converting gestures input to speech outp Gesture to Speech Conversion [1-5] is a tool for converting gestures of the differently abled people of the world to speech i.e. convert gestures input to speech output. Proposed system is portable and focuses on two way communication. Main goal of the system is to convert hand gestures to auditory speech for communication between mute and normal people.

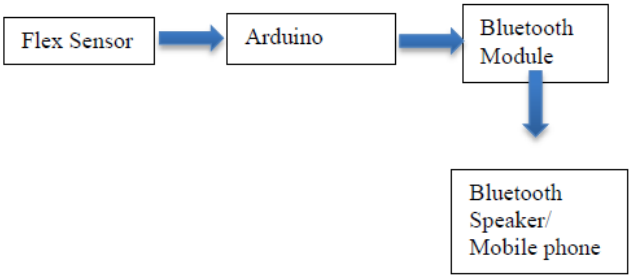

Fig. 1: Block Diagram

There are 2 flex sensors that are used. Each flex sensor is connected to different pins of Arduino UNO which is the controlling unit. Now the Tx and Rx pins of Arduino are connected to Rx and Tx pins of the Bluetooth module HC05 respectively. Now, the Bluetooth module is connected to a Bluetooth speaker of an app in mobile phone to give a speech output.

II.EXSISTING SYSTEM

In the image processing technique camera is used to capture the image/video, with the static images are analyzed and recognition of the image carried out using algorithms that produce sentences in the display. Algorithm

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Experimental Study on Light Weight Concrete by Partial Replacement of Coarse Aggregate by Pumice Stone and Cement by GGBS

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ABSTRACT

Light weight concrete has become more popular in recent years owing to the tremendous advantages it offers over the conventional concrete. Even Light concrete but at the same time strong enough to be used for the structural purpose. Lightweight concrete has been successfully used since the ancient Roman times and it has gained its popularity due to it slower density and superior thermal insulation properties Compared with Normal weight concrete, Lightweight concrete can significantly reduce the dead load of structural elements, which makes it especially attractive in multi-storey buildings. The most important characteristic of light weight concrete beside its light weight is its low thermal conductivity. This property improves with decreasing density. The adaptation of certain class of light weight concretes gives an outlet for industrial wastes and dismantled wastes which would otherwise create problems for disposal. The conventional mix has been designed for M30 grade concrete. Coarse aggregate replaced with Pumice aggregate in volume. Percentages of 25% and 35% further Cement replaced with the GGBS in weight percentages of 5%,10%,15%, 20%, 25%, 30% for study in the present investigation. The properties like Compressive strength, Split tensile strength, Flexural strength of above combinations were studied and compared with conventional design mix concrete. It is observed that there is retardation in Compressive strength, Split tensile strength, Flexural strength for the light weight aggregate replaced concrete when compared to the concrete made with normal aggregate. For these light weight aggregate concrete mixes when 'cement' was replaced by 'GGBS' it is noticed that there is a marginal improvement in the properties studied. For 25% and 35% replaced light weight aggregate when cement was replaced by 5%,10%,15%, 20%, 25%, 30%. GGBS maximum gain in compressive strength of 37.25 MPa and 37.25 MPa at 28 days is observed for 20% replacement of GGBS. Similarly the gain in split tensile strength and flexural strength 4.86 MPa and 6.47 MPa is observed at 20% replacement of GGBS respectively.

INTRODUCTION

Light Weight Concrete

Lightweight concrete [1-4] can be defined as a type of concrete which includes an expanding agent in that it expands the volume of the blend while giving extra qualities, for example, nailbility and diminished the dead weight. It is lighter than the customary cement. The principle fortes of lightweight solid are its low thickness and warm conductivity. Its preferences are that there is a lessening of dead load, speedier building rates in development and lower haulage and taking care of expenses.

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Evaluating the Bond Characteristics of Fiber Based Self Compacting Concrete

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ABSTRACT

Self compacting concrete (SCC) is a development of ordinary concrete, in which the use of vibrator for compaction is no more needed/demanded. Self-compacting concrete was first developed in 1988 to (accomplish or gain with effort) (able to last through tough conditions) concrete structures. Since then, different (acts of asking questions and trying to find the truth about something) have been carried out and this type of concrete has been used in practical structures in Japan mainly by large construction companies. The use of self compacting concrete (SCC) can help the placement of concrete in crowded and blocked (strengthening item/reward/supplies) in the (related to what holds something together and makes it strong) members. This is especially important in deep (related to what holds something together and makes it strong) members and wall elements where concrete can separate (because of race, religion, etc.) and show bleeding and settlement which can result in local (related to what holds something together and makes it strong) defects that can reduce mechanical properties. (acts of asking questions and trying to find the truth about something) for beginning and building on a clear and sensible mix-design method and self-compactability testing methods have been carried out from the viewpoint of making self-compacting concrete a standard concrete.

Several studies in the past have showed/told about the usefulness of fibers to improve the properties of concrete like (the ability to be flattened or drawn into wire), post crack resistance, energy (mental concentration/picking up of a liquid) ability (to hold or do something) etc. Fiber reinforced self compacting concreting combines the benefits of self compacting concrete in fresh state and shows an improved performance in the hardened state due to the addition of fibers. Fibers bridge cracks and retard their spread, they add/give to an increased energy (mental concentration/picking up of a liquid) compared with plain concrete. In this Cem-FIL anti-crack high breaking up/spreading out glass fibers and steel fibers were added to self compacting concrete and Fiber Reinforced Self Compacting Concrete was developed by using (press or force into a smaller space)ible packing model. Several tests, such as slump flow, L-box, J-ring, V-funnel tests were carried out to get the properties for flowability and workability of fresh concrete. An experimental (act of asking questions and trying to find the truth about something) was performed to study the bond between (not formed or appearing correctly) bars, plain and fiber reinforced SCC with different embedment lengths (100mm, 150mm, 300mm.) for 16mm Î¦ bar. The results shows that bond stress was decreased with an increased embedment length of a grade of self compacting concrete and also bond stress was increased by the addition of steel fibers for all grades of SCC and corresponding slip increases for same (distance or line from one edge of something, through its center, to the other edge) of bar with constant embedment length.

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An Experimental Investigation on the Strength Properties of Concrete by Partial Replacement of Fine Aggregate with Quarry Dust and Cement with GGBS and Nano-Silica

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ABSTRACT

Concrete is the most widely used construction material in civil engineering fields because of its high structural strength and stability. The concrete industry is constantly looking for supplementary cementations material with objective of reducing the solid waste disposal problem. Ground granulated blast furnace slage (GGBS) and Quarry dust are among the solid waste generated by industry. Natural sand is most commonly used fine aggregate in concrete increasing construction activities requires production of more and more quality of concrete, which needs more and more natural sand and coarse aggregate. Owing to acute shortage in many areas, cost and environmental factors, an alternative for the same is pondered, during the process of production of coarse aggregate in crushing plants, a huge quantity of quarry dust is produced which is considered worth less for any substantial use. The use of crushed fine aggregate in concrete as partial replacement of fine aggregate will be an alternative material up to some extent, besides helping in environment protection and disposal quarry dust in abundance.

Cement is the major component in making the concrete. Due to urbanization and industrialization, the production of concrete is increasing day by day. A recent survey shows that for production of every tone of Cement, around one tone of Carbon dioxide is liberated. So, in the present scenario it has become a matter of prime importance, to reduce the cement production and increase the use of substitute materials to the save the environment. In the present study Quarry Dust is used as partial replacement of fine aggregate by weight at varying percentage of 25%, 50%, 75% and 100% respectively. Cement is used as replacement of GGBS by weight at varying percentages of 20%, 40% and 60%, and Nano silica by weight at varying percentages of 3 %. The combined influence of quarry dust and GGBS, Nano Silica on Compressive strength, Split Tensile Strength and Flexural Strength of M40 grade of concrete investigation. The test results of concrete prepared using different combinations of quarry dust and GGBS, Nano-Silica are compared with that of controlled concrete. Based on the experimental investigation, the increase in the strength properties of the materials has been observed and the optimum replacement percentages of GGBS and Quarry Dust are 40% and 50% respectively.

INTRODUCTION

In India, the manufacturing of Portland cement was commenced around the year 1912. The beginning was not very promising and growth of cement industry was very slow. At the time of independence in 1947, the installed capacity of cement plants in India was approximately 4.5 million tons and actual production around 3.2 million tons per year. The large construction activity undertaken during the various 5 years plans

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Original research article

Structural, spectral, thermal and nonlinear optical analysis of 4-fluoro salicylideneaniline crystal

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ARTICLE INFO

Keywords:
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ABSTRACT

4-fluoro salicylideneaniline (4FSA) (IUPAC Name: 4-Fluoro-2-[(phenylimino)methyl]phenol) crystals were grown by condensation reaction. The lattice constants and crystal system were determined from X-ray diffraction (XRD) analysis. 4FSA crystallizes in monoclinic centrosymmetric space group $P2_1/c$. The chemical composition of 4FSA was confirmed by carbon, hydrogen and nitrogen (CHN) elemental study. The vibrational frequencies of the crystal were identified by Infrared and Raman spectra. NMR spectroscopy was employed to ascertain the molecular structure. Thermogravimetric (TG) / Differential scanning calorimetry (DSC) analysis reveals that 4FSA is melting at 75 °C. The region of optical transmission of 4FSA has been studied by UV–Vis–NIR spectroscopy. The nonlinear refractive index (n_2), nonlinear absorption coefficient (β) and the third-order nonlinear optical (NLO) susceptibility ($\chi^{(3)}$) were calculated by Z-scan analysis.

1. Introduction

Current trend among the crystal researchers is to grow new crystals that are suitable for laser technology [1–5]. Now a day's much attention is being paid on probing third harmonic generating materials (THG) for all-optical switching in waveguides. The optical signal processing devices require a crystal with large third-order nonlinearity [6,7]. Organic compounds exhibit extremely large second order optical nonlinearities [8,9].

Weiguo Yu et al have reported six Schiff base materials which offer good NLO properties [10]. Aniline consists of a phenyl group attached directly to an amino group. Aniline and its derivatives can serve as precursors in synthesis of materials with good nonlinear optical response [11]. Aniline and substituted aniline molecules are being extensively investigated as they possess good NLO properties [12–16]. In this work, the fluorinated Schiff base crystal 4FSA is grown by condensation reaction of 5-fluorosalicylaldehyde (5-FS) with aniline. The powder XRD analysis, CHN analysis, FT-IR, FT-Raman, NMR, thermal, optical characteristics and third-order optical nonlinearity of the crystal are reported.

2. Crystal growth

The 4FSA crystal was grown as reported in literature [17]. The chemical reaction of 5-fluorosalicylaldehyde and aniline is as follows,

$$C_7H_5FO_2 + C_6H_7N \rightarrow C_{13}H_{10}FNO + H_2O$$

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Growth, structural, optical, spectral and thermal characterization of third order nonlinear optical crystal: Diammonium fumarate

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ABSTRACT

Single crystals of diammonium fumarate were grown from aqueous solution by slow evaporation method. The lattice parameters and the crystal system are estimated from single crystal X-ray diffraction analysis. The transmission range of the crystal was revealed from UV-Vis-NIR analysis. The vibrational modes of different molecular groups present in the crystal was identified from IR and Raman spectroscopy. The NMR analysis confirms the molecular structure of the grown crystal. The thermal properties were analyzed from TG/DTA thermograms. The nonlinear refractive index and third order nonlinear optical susceptibility were determined from Z-scan technique.

1. Introduction

In the present scenario, nonlinear optics and photonic fields are important in the development of applications in many disciplines of research and in industries. A variety of nonlinear optical materials can serve as radiation detectors, solid state lasers, harmonic generators, transducers and crystalline thin films for microelectronics and computer industries. Organic materials are prominent owing to its good nonlinear optical response, but they suffer from low mechanical and thermal stability. The inorganic materials exhibit good mechanical, thermal and deep UV transmission properties, but have low nonlinear efficiency. The combination of organic and inorganic materials with large nonlinear optical characteristics, leads to the investigation of semi organic materials [1–3]. The semi organic crystals are grown due to their stable physiochemical properties, that are essential for fabrication of devices and in applied research [4,5]. The hydrogen bonding interaction between cations and anions in organic and inorganic compounds, produces high second and third harmonic generation efficiency, good transmittance in UV-Vis region and better chemical, mechanical and thermal stability [6–9]. Semiorganic crystals with centrosymmetric space group produce third harmonic generation that are used in information processing and optoelectronic devices [10]. The nonlinear optical properties of many crystal derivatives of ammonium are already reported [11,12]. Here in this report, the crystals of diammonium fumarate have been grown using solvent evaporation solution growth method. The structure of diammonium fumarate has already been reported [13]. Apart from the description of crystal structure, the studies on the growth and characterization have not been carried out. Hence the grown crystal were characterized by single crystal X-ray diffraction analysis, UV-Vis-NIR spectroscopy, FTIR spectroscopy, Raman spectroscopy, NMR spectroscopy, and Thermal analysis. The third order nonlinear optical susceptibility was measured from Z-scan technique.

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Confirmation of supramolecular structure and its impact on nonlinear optical properties of Bis(4-methylbenzylammonium) tetrabromido zincate: A new semiorganic crystal

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ABSTRACT

Supramolecular structure exhibits good nonlinear optical (NLO) properties due to the enhanced proton transfer process. Semiorganic Bis(4-methylbenzylammonium) tetrabromido zincate (4MLTBZ) crystal was developed by functionalizing 4-methylbenzylamine (4MLBA) with hydrobromic acid and zinc bromide. Amine group of 4MLBA gets protonated by H^+ cation of hydrobromic acid. Zinc bromide was linked with 4MLBA through C–H ···Br and N–H ···Br interactions which forms supramolecular structure and crystallized noncentrosymmetric space group $Pna2_1$. Raman and FTIR spectral analysis provides the evidence for the protonation of amine (NH_3^+) group. Raman spectrum reveals the coordination of $ZnBr_4$ in 4MLTBZ crystal structure through the observed Zn–Br vibrations between 50 and 400 cm^{-1}. The impact over the shift in vibrational frequencies of NH and CH functional groups due to C–H ···Br and N–H ···Br interactions were discussed. The 'Carbon–Hydrogen' frame work of 4MLTBZ crystal was established by ^1H NMR and ^{13}C NMR spectroscopy. The UV–Vis–NIR spectrum of 4MLTBZ showed very good transparency in the region from 260 nm to 1100 nm. The enhanced SHG efficiency and third order nonlinear optical susceptibility (χ^3) are interpreted through hydrogen bonds.

1. Introduction

The structure-property relationship plays a vital role in crystal physicochemical and nonlinear optical (NLO) properties. Crystal engineering society continues to grow new supramolecular structures as crystalline solids. Also, the molecules participating in the formation of supramolecular system gives stability and charge transfer capabilities. This enhances the scope of suitable intermolecular interactions which promotes the proton transfer process [1]. Current research focusses on the growth of crystals with overwhelmed physio-chemical and NLO properties [2]. This blossoms the organically modified supramolecular structure with metal complexes [3]. The present study focusses on the formation of semiorganic crystals resulting from the interaction of organic 4-methylbenzylamine with an acid and inorganic salt which results in the formation of supramolecular structure. This structure contains different modes of anion and cation complexes due to the intermolecular interactions resulting in charge transfer process. In this context, we are working on developing 4-methylbenzylamine based metal coordination complexes based semiorganic crystals for NLO applications. We have identified four new crystals in 4-methylbenzylamine family and solved their structures and reported in IUCR data reports [4–7]. In this article, the properties associated with the supramolecular structure of 4MLTBZ was identified through various spectral techniques and the results are discussed. From the molecular structure shown in Fig. 1, it is clear that the HBr donates the H^+ cation to NH_2 group of 4MLBA and it gets protonated as NH_3^+. The anion and cation are connected by several C–H ···Br and N–H ···Br hydrogen bonds. These hydrogen bonds are well acknowledged by the enhancement of SHG efficiency and χ^3 values.

2. Synthesis and crystal growth

4MLTBZ crystals were grown by low temperature solution growth technique. The precursors, 4-methylbenzylamine (4MLBA), hydrobromic acid (HBr) and zinc bromide ($ZnBr_2$) were purchased from Sigma Aldrich with 99.9% purity. 4MLBA, HBr and zinc bromide were reacted in 2:2:1 M ratio in double distilled water. The

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Spectral and optical characterization of the new semi-organic crystal: 4-methylbenzylammonium chloride hemihydrate, to establish protonation and the effect of resultant hydrogen bonding

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Abstract. 4-Methylbenzylammonium chloride hemihydrate (4MLBACH) single crystals were obtained by slowly evaporating the solvent. The characterization of the title crystal was first carried out and reported in this article. The crystal system and space group of the title crystal are identified as monoclinic and *C*2/*c*, respectively. The lattice parameter values were also calculated. Using Fourier transform infrared spectroscopy the protonation of 4-methylbenzylamine by hydrochloric acid and the formation of the crystal 4MLBACH were confirmed. The transmission window of the grown crystal is between 261 and 1100 nm. The protonation of the amine group is confirmed by nuclear magnetic resonance spectral analysis. *Z*-Scan analysis was carried out to determine the nonlinear optical parameters. It reveals that the nonlinear susceptibility (χ^3) value is greater than some reported crystals. The title crystal exhibits saturable absorption and self-defocussing effects.

Keywords. 4-Methylbenzylammonium chloride hemihydrate; space group; protonation; molecular structure; third-order nonlinear susceptibility.

1. Introduction

Single crystals play a vital role in the field of nonlinear optics. Efforts are being made throughout the world to identify better nonlinear optical (NLO) crystals [1,2]. Even though organic crystals are dominant in controlling the phase transitions, polarization and frequency of light have received very little attention in terms of their mechanical and thermal properties [3,4]. On the other hand, inorganic materials attracted interest because they exhibit good second-harmonic generation efficiency along with these superior mechanical and thermal properties. While these inorganic ionic bonded crystals have high-melting point and chemical inertness they possess low NLO properties [5,6]. Obviously, the semi-organic crystals exhibit the properties of both crystals. These hybrid compounds show potential applications in linear and nonlinear optics [7–10]. Attempts have been made by several researchers, to synthesize and grow semiorganic crystals which may exhibit the properties of both organic and inorganic crystals.

The authors have identified a new semiorganic crystal '4-methylbenzylammonium chloride hemihydrate' (4MLBACH) and its structure is reported by us [11]. This paper reports, the structural, spectral, linear and NLO properties of the title crystal. The structure of the crystal was dominated by the formation of a cationic hydrogen bond and anionic chloride interactions, which owes to a significant change in linear and nonlinear properties.

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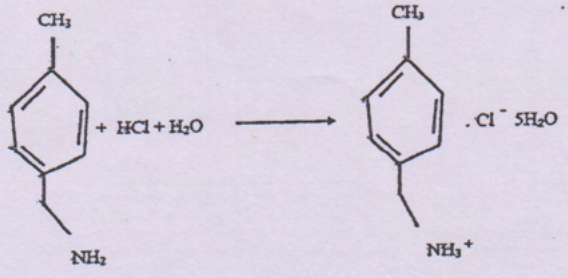
2. Experimental

2.1 *Materials and methods*

The crystal with the general formula $C_8H_{12}N^+ \cdot Cl^- \cdot 0.5H_2O$ was synthesized by crystallization in solution at 37°C adopting a slow evaporation solution growth method. The chemical precursors 4-methylbenzylamine and hydrochloric acid are of 99.9% purity (Sigma Aldrich). The growth of the crystal has been reported by the authors [11]. Good quality crystals of dimension $1 \times 1 \times 1$ mm^3 are obtained in a period of 15 days. The reaction scheme is given below.



3. Results and discussion

3.1 *Single-crystal XRD analysis*

This study was conducted using a BRUKER NONIUS CAD4 diffractometer and radiation used is MoKα with the

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Probing the structure–property relationship of a new semiorganic nonlinear optical crystal: catena-poly[bis(4-methylbenzylammonium) [[dibromidocadmate(II)]-di-l-bromido]]

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Abstract

A new semiorganic single crystal, catena-Poly[bis(4-methylbenzylammonium) [[dibromidocadmate(II)]-di-l-bromido]],[4MLBDCB], has been developed by evaporating the solvent at a 37 °C. It crystallizes in centrosymmetric space group Pnma. In the crystal structure, 4-methylbenzylammonium cation and tetrabromido cadmate anion are connected by N–H···Br and C-H···Br hydrogen bonds. Functional groups vibrations of 4MLBDCB were analysed by FT-Raman and FTIR spectroscopy. The stretching vibration of NH and CH shifted towards lower frequency side and their bending vibrations (–NH, –CH) to higher frequency when compared with pure 4 methylbenzylamine (4MLBA) vibrations. The observed variations in CH bond length are discussed. Presence of Raman active $CdBr_4^{2-}$ vibrations ensures the formation of the molecule. Transmittance bandwidth of the crystal extends from 260 and 1100 nm. In ^1H and ^{13}C NMR spectra, the observed variations in the chemical shifts are interpreted through intermolecular interactions. The presence of hydrogen bonds enhances the third order nonlinear susceptibility (χ^3) value of the grown crystal and found to be 5.04×10^{-6} esu. The third order nonlinear optical parameters such as absorption coefficient (β) and refractive index (n_2) are also determined using Z-scan technique.

1 Introduction

To satisfy the needs of modern society in the field of photonics and optical communications, development of new nonlinear optical crystals is very essential [1, 2]. The new nonlinear optical crystal with higher third order nonlinear susceptibility values are more attractive because of their application in the field of telecommunication, optical computing and optical storage [3, 4]. Organic crystals possess large NLO efficiency but have usually poor mechanical and thermal properties and are susceptible for damage [5]. Inorganic crystals have excellent mechanical and thermal properties, but possess relatively modest optical nonlinearity because of the lack of extended π-electron delocalization [6]. Semi-organic crystals combines the positive aspects of organic and inorganic crystals. These crystals finds importance in the field of nonlinear optics due to their good optical nonlinearity, chemical flexibility, thermal stability and higher optical, mechanical and thermal properties [7]. Hence the present day research activities focusses on the growth and characterization of semiorganic crystals. Several cadmium based crystals such as L-alanine cadmium chloride, KBr crystals doped cadmium bromide, cadmium thiosemicarbazide bromide, 4-methylbenzylammonium tetrachloridocadmate have been grown and their NLO characteristics are reported [8–12]. Our research group is concentrating on developing new semiorganic NLO crystals. So far, 4 new structures belonging to 4-methylbenzylamine (4MLBA) based derivatives were reported by the authors [13–16]. In this article, a new semiorganic crystal, 4MLBDCB is developed and its structure–property relationship is investigated. From the molecular structure shown in Fig. 1a, it is clear that the amine group of 4-methylbenzylamine (4MLBA) gets protonated through H^+ cation donated by HBr. In the crystal structure, 4-methylbenzylamine cations and tetra bromidocadmate anions are connected by hydrogen bonds. These bonding interactions are well established through various spectral techniques. These hydrogen bonded interactions are acknowledged by the enhancement of χ^3 values.

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Growth and characterization studies on L-threoninium p-toluenesulfonate monohydrate crystal

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Abstract

L-threoninium p-toluenesulfonate monohydrate (LTPTM) (IUPAC name: 1-carboxy-2-hydroxypropan-1-aminium 4-methylbenzenesulfonate monohydrate), a new organic nonlinear optical (NLO) crystal, is grown by solution growth method at room temperature. It crystallizes in monoclinic crystal system with noncentrosymmetric space group $P2_1$. Presence of NH_3^+ and SO_3^- vibrations in IR and Raman spectra confirms the formation of LTPTM molecule. The ^1H and ^{13}C nuclear magnetic resonance (NMR) spectra establish the molecular structure. In the ^1H–NMR spectrum of LTPTM, the chemical shift corresponding to H-SO_3 (6.57 ppm) of p-toluenesulfonic acid monohydrate is absent. This is due to the fact that the hydrogen in H–SO_3 is released and combines with the amine group of L-threonine. This ensures the formation of LTPTM molecule. The O5-H5A…O3 intermolecular interaction is also established by the observed upfield shift of COOH group in LTPTM molecule. The crystal is thermally stable up to 73 °C. LTPTM is transparent from 235 to 1100 nm. The second harmonic generation (SHG) conversion efficiency of LTPTM is 0.77 times that of KDP. Third order nonlinear optical susceptibility ($\chi^{(3)}$) of the title crystal is 1.3035×10^{-7} esu which is higher than some reported NLO crystals.

Keywords Crystal growth · Optical properties · TG–DTA · Organic nonlinear optical crystal · Second harmonic generation · Z-scan technique

1 Introduction

The invention of LASER source offers more technological advancements in the field of optoelectronics and optical communication (Hann and Bloor 1989; Newman et al. 1990; Gupte et al. 2001; Chemla and Zyss 1987; Dmitriev et al. 1999; Razzetti et al. 2002; Wong et al. 1996). These technologies can be realized only by suitable nonlinear optical (NLO) crystals. Many amino acids crystallize noncentrosymmetrically and can be used to develop new NLO crystals (Bhat and Dharmaprakash 2002). One of the amino acids L-threonine is a polar uncharged optically active acid which has SHG efficiency higher

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Structural, spectral, thermal and nonlinear optical analysis of potassium tartrate hemihydrate crystal

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Abstract
The semi-organic, non-linear optical (NLO) single crystals of potassium tartrate hemihydrate (PTH) were grown successfully by solvent evaporation method. It crystallizes in monoclinic crystal system. Functional group vibrations were analysed through FT-IR and FT–Raman spectroscopy. Molecular structure was established by NMR spectroscopy. PTH is transparent from 190 to 1100 nm. Thermal characteristics of PTH was analysed by TGA/DTA. SHG capability of PTH was tested by Kurtz–Perry method and the frequency doubling efficiency is measured as 0.9 times that of KDP. Third order nonlinear susceptibility (χ^3) is found by Z scan method. Wide transmission bandwidth coupled with good thermal stability and favorable NLO properties of the crystal may be exploited to make photonic devices.

1 Introduction

Materials exhibiting large non-linearity in optical performance have noncentrosymmetric molecular structure. Owing to their capability to create new frequencies of the laser light passing through them, nonlinear optical (NLO) materials play a vital role in optical applications [1–3]. Developing such materials is the latest situation in the field of crystal growth. There is a need for materials having excellent NLO behavior with good mechanical strength and thermal stability, which has led to the exploration of semi-organic materials [4–6]. These materials possess large optical nonlinearity as well as high chemical stability and mechanical strength [7]. The studies of different tartrate compounds proved their efficiency in various applications. Rubidium hydrogen tartrate and sodium–potassium tartrate have ferroelectric and optical properties [8, 9], potassium–chromium tartrate used in medicine [10] and antimony–barium tartrate in veterinary drugs [11]. Many authors have studied different properties of various tartrate compounds such as thermal and electrical studies of cadmium tartrate [12], barium tartrate and antimony sodium tartrate [13, 14]. Owing to their interesting properties these salts received considerable attention from research workers. The authors have reported the thermal and NLO properties of ammonium tartrate crystals [15].The present work reports the properties of potassium tartrate hemihydrate (PTH) crystal.

2 Materials and methods

PTH was grown by reacting potassium carbonate and tartaric acid in 1:1 molar ratio in double distilled water. 6.9 g of K_2CO_3 and 7.5 g of $C_4H_6O_6$ were dissolved in 50 ml distilled water separately. Both clear solutions were mixed by adding in drops with constant stirring in optimum rotational speed. A clear saturated solution was obtained after 4 h and the final solution was filtered and covered with a polythene paper with few holes for slow evaporation of the solvent. This was kept at 40 °C in a dust free environment and undisturbed till the growth completes. Good quality crystals were obtained in 2 months and the photograph is presented in Fig. 1.

3 Results and discussion

3.1 Single crystal XRD analysis

Bruker kappa APEX3 automated diffractometer operating at $\lambda = 1.5406$ Å was employed to determine the cell parameters.

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Synthesis, structural, spectral and optical studies of (4-methylphenyl) methanaminium bromide hemihydrate: a new semiorganic crystal for laser applications

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Abstract

Semiorganic single crystals of (4-methylphenyl)methanaminium bromide hemihydrate (4MMBH) have been grown by reacting 4-methylbenzylamine (4MLBA) and hydrobromic acid in deionized water (1:1 molar ratio). Hydrobromic acid donates H^+ cation to NH_2 group of 4MLBA and protonates it. Single crystal X-ray diffraction analysis reveals that 4MMBH is isostructural with its chloride congener and crystallizes in monoclinic crystal system with centrosymmetric space group C_2/c. Intramolecular (C–H···Cg) and intermolecular (C–H···Br, O–H···Br, N–H···Br, and N–H···O) interactions were observed in the structure of the title crystal. These interactions shifts the NH, OH and CH stretching vibrations to lower frequency and their bending vibrations (–NH, –OH, –CH) to higher frequency when compared with pure 4MLBA vibrations. CH stretching vibration frequency is explained by difference in the bond length observed in the crystal structure. Also, the Br^- vibration predicted through Raman spectral analysis ensures the association of bromide anion in the molecular structure. The molecular structural framework was established through ^{13}C and ^1H NMR spectral analysis. In ^1H NMR, the interaction of Br^- with protonated NH_3^+ group causes the deshielding of NH_3^+ protons results in downfield shift and was observed at 8.211 ppm and the same for pure 4MLBA is observed at 1.42 ppm. C–H···Br interaction shifts the carbon signal of CH_2 towards downfield due to electronegative Br^- which deshields CH_2 group and the hydrogen bond associated with NH_3^+ group splits the signals as quartet. The lower cut off wavelength of 4MMBH was found to be 260 nm and the crystal is transparent from 260 to 1100 nm. The third order nonlinear susceptibility $\chi^{(3)}$ value is found to be 3.15758×10^{-5} esu and this is due to the inter and intramolecular interactions of hydrogen bond present in the crystal.

1 Introduction

The researchers of nonlinear optical (NLO) society were showing enormous interest in growing and investigating the properties of NLO crystals to satisfy the technological challenges. Several organic crystals which exhibits excellent NLO properties fails to give good physical and mechanical properties [1]. Inorganic crystals pave good physical and mechanical properties but the nonlinear efficiency is less pronounced [2]. Recently, solid state society focusses on synthesizing semiorganic crystals resulting from the reaction between halogen based inorganic moiety and organic moiety as aminoacids, amines and amino alcohols [3]. The structural formation of semiorganic crystal with inter and intramolecular interactions through hydrogen bond results in good physical, mechanical and NLO properties [4]. Based, on this concept halogen based inorganic moiety (Br) and organic molecule (4-methylbenzylamine—4MLBA) have been chosen for the present study. The organo-inorganic framework of 4-methylbenzylammonium based crystals are expected to give good NLO efficiencies. We are concentrating on developing 4MLBA based NLO crystals. So far, four new structures belonging to 4MLBA based derivatives were reported by the authors [5–8]. In this article, the new semiorganic (4-methylphenyl)methanaminium bromide hemihydrate (4MMBH) crystal is characterized and the structure–property relationship is reported. From the molecular structure shown in Fig. 1, it is clear that the HBr donates the H^+ cation to NH_2 group of 4MLBA and it gets protonated as NH_3^+. Inorganic anion Br^- connected to organic moiety through the protonated hydrogen bond as N–H···Br and it undergoes various intermolecular interactions such

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Structural, spectral and nonlinear optical analysis of aquachloro (L-prolinato) copper(II) crystal

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Abstract
A semi organic crystal, aquachloro (L-prolinato) copper(II) (ACLPC) has been grown by reacting L-proline and copper(II) chloride in equimolar ratio. It crystallizes in monoclinic noncentrosymmetric space group $P2_1$ with lattice parameters a = 8.1965(14) Å, b = 5.2142(9) Å, c = 9.5206(17) Å, and β = 109.411(5)°. The powder X-ray diffraction pattern of ACLPC was recorded and indexed. Elemental analysis has been carried out by energy dispersive spectrometry. The Fourier transform infrared and FT–Raman analysis were used to assign the functional group vibrations. The ^1H and ^{13}C NMR spectra were recorded to confirm the molecular structure. The optical transmittance region of the crystal is from 280 to 1100 nm. The second harmonic generation efficiency of the crystal was estimated by using Kutrz–Perry powder technique.

1 Introduction

The photonics and optoelectronic technologies demand useful nonlinear optical (NLO) crystals to convert frequency of laser light which is suitable for high speed processing of the data required for optical communication systems [1–4]. Many researchers have grown and reported several organic and inorganic NLO crystals. Both crystals possess unique features as well as some shortcomings. The organic crystals are well known for their NLO efficiency, large structural flexibility, fast response and large susceptibility. The inorganic crystals have good physicochemical stability, good mechanical strength, thermal properties [5], short UV cut-off wavelength and large second order nonlinearity [6]. But the semi-organic crystals comprise the features of both organic and inorganic complexes. One such semi-organic crystal aquachloro (L-prolinato) copper(II) (ACLPC) with molecular formula $C_5H_{10}ClCuNO_3$ is reported here.

In recent years, many complexes of amino acids have been identified for their NLO properties. They crystallize in noncentrosymmetric space groups and generates new frequencies by several NLO processes [7–10]. Second order NLO materials are well recognized in second harmonic generation (SHG) applications, electro-optic wave guide devices like modulators and switches and in optical parametric oscillators [11]. In this article semi organic single crystals of ACLPC has been grown by reacting L-proline ($C_5H_9NO_2$) and copper(II) chloride ($CuCl_2$). The grown crystals were characterized by single crystal XRD, powder XRD, energy dispersive X-ray spectroscopy (EDS), FT–IR, FT–Raman, NMR, transmission spectral methods and SHG measurement. Many semi organic NLO crystals like L-APCL, L-AHCL, L-AHBr, L-AHClBr and L-PSCM have SHG efficiency of < 0.4 times that of KDP [12–14]. The SHG efficiency of ACLPC crystal is 0.76 times that of KDP.

2 Growth of ACLPC

ACLPC crystal was synthesized by slow evaporation solution growth process from aqueous solution containing copper $CuCl_2$ and $C_5H_9NO_2$ in equimolar ratio. This was stirred well to obtain a homogenous mixture and filtered two times to remove impurities. Then the beaker was covered by polythene paper with few holes for slow evaporation. The growth period was 40 days. The photograph of grown crystals is given in Fig. 1. The reaction scheme is

$$C_5H_9NO_2 + CuCl_2 + H_2O \rightarrow C_5H_{10}ClCuNO_3 + HCl$$

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Original research article

Structural, spectral, thermal and nonlinear optical analysis of 4-fluoro salicylideneaniline crystal

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ABSTRACT

4-fluoro salicylideneaniline (4FSA) (IUPAC Name: 4-Fluoro-2-[(phenylimino)methyl]phenol) crystals were grown by condensation reaction. The lattice constants and crystal system were determined from X-ray diffraction (XRD) analysis. 4FSA crystallizes in monoclinic centrosymmetric space group $P2_1/c$. The chemical composition of 4FSA was confirmed by carbon, hydrogen and nitrogen (CHN) elemental study. The vibrational frequencies of the crystal were identified by Infrared and Raman spectra. NMR spectroscopy was employed to ascertain the molecular structure. Thermogravimetric (TG) / Differential scanning calorimetry (DSC) analysis reveals that 4FSA is melting at 75 °C. The region of optical transmission of 4FSA has been studied by UV–Vis–NIR spectroscopy. The nonlinear refractive index (n_2), nonlinear absorption coefficient (β) and the third-order nonlinear optical (NLO) susceptibility ($\chi^{(3)}$) were calculated by Z-scan analysis.

1. Introduction

Current trend among the crystal researchers is to grow new crystals that are suitable for laser technology [1–5]. Now a day's much attention is being paid on probing third harmonic generating materials (THG) for all-optical switching in waveguides. The optical signal processing devices require a crystal with large third-order nonlinearity [6,7]. Organic compounds exhibit extremely large second order optical nonlinearities [8,9].

Weiguo Yu et al have reported six Schiff base materials which offer good NLO properties [10]. Aniline consists of a phenyl group attached directly to an amino group. Aniline and its derivatives can serve as precursors in synthesis of materials with good nonlinear optical response [11]. Aniline and substituted aniline molecules are being extensively investigated as they possess good NLO properties [12–16]. In this work, the fluorinated Schiff base crystal 4FSA is grown by condensation reaction of 5-fluorosalicylaldehyde (5-FS) with aniline. The powder XRD analysis, CHN analysis, FT-IR, FT-Raman, NMR, thermal, optical characteristics and third-order optical nonlinearity of the crystal are reported.

2. Crystal growth

The 4FSA crystal was grown as reported in literature [17]. The chemical reaction of 5-fluorosalicylaldehyde and aniline is as follows,

$$C_7H_5FO_2 + C_6H_7N \rightarrow C_{13}H_{10}FNO + H_2O$$

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Low Complexity in Dual-Mode Double Precision Floating Point Division with Reduced Area

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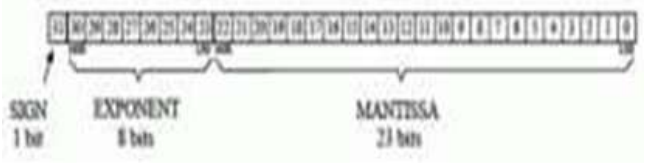
Abstract: ***Floating point is a core arithmetic widely used in scientific and engineering applications. This paper is used in proposed at architecture for dual mode double precision floating point division. It aimed to work on dual-mode functionality for single and double precision. It is used in the two pairs of single precision operands in parallel or double precision operand. A Radix-4MB multiplier is used for the mantissa computation. Other key components of floating point division flow (Such as leading one detection, left/right dynamic shifters, rounding etc.) are also re-designed for the dual mode operation. This model is synthesized under Xilinx tool and compared the results with the single precision floating point division. The proven results is proposed design in efficient over the many related works of past over the area and delay.***

Keywords: Arithmetic, configurable architecture**,** dual- mode division, floating point division, multi precision arithmetic

1. Introduction

Floating point arithmetic (FPA) architecture underwent momentous progression by specific research in the earlier period of several decades. FPA is a basic component of a large set of scientific and engineering domain application. To boost the application performance, the FPA architectures developed from scalar to vector architectures in various processing platforms. Arrays of single precision and double precision computing units are being used for the floating vector-processing. That is, instead of having separate vector arrays of single precision and double precision, it can have an array of configurable floating point arithmetic blocks. This configurable block array arrangement can be lead to significant area improvement, while providing the required performance.

Our examination work is centered round the engineering outline of configurable coasting point math pieces. This paper is focused on the intent of configurable dual-mode double precision division arithmetic unit. Floating point (FP) division is a core calculation is necessary in a multitude of applications. FPD is a composite arithmetic operation which requires large area with reduced presentation than the basic arithmetic operations (such as adder, subtractor and multiplier). In this application at huge area required for division arithmetic per unit of calculation, this worked is designed for this calculation. The process of structural design is configured either for a double precision or two parallel single precision division computations, and named as DPdSP.



The main contributions of this work can be summarized as follows:

- The proposed dual-mode DPdSP division architectures with normal and sub-normal computational support, along with all the exceptional case handling. These architectures can be dynamically configured either for a double precision division or two parallel single precision division.
- A novel dual-mode Radix-4 Modified Booth multiplier architecture is proposed, which becomes the base of the proposed dual-mode mantissa division architecture.
- All the key components of the FPD flow is designed for efficient dual-mode functional with minimal overhead.
- Proposed architectures are fully pipelined and, designed in an iterative fashion for area efficient.

2. Existing System

The existing system can be proposed till now for this FPA point arithmetic especially division in our work. With this algorithm which incorporates the positive attributes of the division architectures mentioned. The floating point representation, where mantissa of dividend and divider are each 23-bit wide. The basic algorithm for the considered design is as follows: First and foremost, the sign-bit of result is obtained by performing logical XOR of sign bits of dividend and divisor. The exponential point is evaluated by subtracting 8-bit exponent of divisor from the 8 bit dividend and then adding the bias value (+127). Lastly, 23-bit mantissa of the result is computed using division logic for which as follow as: 1. Pad leading zeroes before dividend making its width, double the width of mantissa. 2. Pad leading zero before a divisor and trailing zeros after the divisor making. 3. Subtraction of dividend and divisor.4. Differences is negative put zero in the quotient else 1. 5. Right shift divisor. 6. Lift shift quotient.

A. Underlying Mantissa Division Method

The mantissa division is the most complex piece of the FP division number juggling execution.

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Shape Adaptive Discrete Wavelet Transform for Denoising of Images

T. Venkata Ramana, S. A. K. Jilani

Abstract*— The image acquired from a sensor is always degraded by some form of noise. The noise can be measured and eliminated by the process of denoising the image. Recently, Shape Adaptive methods of denoising have gained popularity. The Shape Adaptive Discrete Wavelet Transform (SADWT) transforms and codes the arbitrarily-shaped regions obtained by a segmentation of the image. The arbitrary shapes preserve the edges, articrafts and produce a high quality images. The features of the SADWT's include the number of pixels in the original visual images is same as the number of coefficients after SADWT's, the spatial correlation, locality properties of wavelet transforms and self-similarity across sub-bands are maintained well. For a rectangular region, the SADWT is similar to the traditional wavelet transforms. In this paper, the SADWT is evaluated for various images by comparing in terms of peak signal to noise ratio and improves the signal to noise ratio.

Index Terms*— Denoising, ISNR, PSNR, Shape Adaptive Methods.

1. INTRODUCTION

The Multimedia applications require noise free pictures for handling. The cutting edge visual coding benchmarks, for example MPEG-4[1]-[2] gives awesome adaptability in controlling visual protests in mixed media applications and could possibly enhance image quality in low piece rate coding. The discretionarily molded visual protest must safeguard its shape and surface i.e., the pixels inside the question district. The current strategies incorporate coding rectangular-molded pictures and video. The bouncing box straight away of the subjectively molded visual protest, at that point the qualities are cushioned in the pixel positions and the pixels inside the question are coded and are cushioned in the rectangle jumping box utilizing the customary strategies, which may be wasteful [3]-[7].

Consequently arbitrary molded locales are utilized, prevalently known as Shape Adaptive Methods. These incorporate SA-DCT Method, which creates an indistinguishable number of coefficients from the quantity of pixels in a subjectively formed picture square. The SA-DCT calculation accomplishes change effectiveness like the shape-versatile Gilge DCT [8], [10]. However it is executed with lower multifaceted nature. Since SA-DCT dependably changes tests in a self-assertively formed square to a specific edge of a rectangle jumping hinder before applying line or section DCT changes, some spatial relationship might get lost. It isn't proficient in performing section DCT changes on an arrangement of coefficients that are from various recurrence groups after the column DCT changes [10], [11], [12], [13].

There are few strategies proposed for coding discretionarily molded picture objects utilizing the wavelet changes by cushioning methods [14], [15], [16], [17] i.e., the ordinary wavelet change is done in the cushioned rectangle area. Coding coefficient choice and coding coefficient inclusion procedures were utilized to enhance coding productivity. The other strategy utilized is macro block-district based wavelet coding [18], [23], [25] which first cushions indistinct locale with zeros, after that apply the wavelet changes to the cushioned rectangular area. So as to utilize zero-tree coding (ZTC), a subjective shape was quantized in the wavelet square limit. Hence the wavelet change unavoidably obscures the edges of the discretionarily formed protests and thus results in a larger number of coefficients are coded compared with the quantity of pixels in the question. These two strategies made a change on the clear cushioning techniques and don't take care of the key issue of how to productively perform wavelet change specifically to a subjectively formed locale and effectively code simply enough wavelet coefficients. Therefore, the execution of these systems isn't focused.

Li et al. [19] – [21], [24] proposed a novel shape versatile discrete wavelet change (SADWT) for discretionarily formed protest coding which can be specifically connected to the self-assertively formed district. The SA-DWT changes the examples in the self-assertively formed district into an indistinguishable number of coefficients from the sub-band area, while maintaining the spatial relationship, territory, and self-likeness crosswise over sub-bands. Methodologies applying the SADWT plan to install zero tree wavelet coding and vector wavelet coding plans were discussed [6].

The proposed paper evaluates the shape adaptive wavelet coding scheme as applied to denoise various images. Section II details about the Shape Adaptive Discrete Cosine Method, in Section III SA-DWT wavelet transform developed for arbitrarily shaped regions.

Results of SADWT with different images are compared with other coding schemes in Section IV. Section V conclude the paper.

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A Novel Secure KNN Classifier with a Light Weight highly Secure Encryption Scheme over Encrypted Data in the Cloud

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Abstract: Data Mining has wide applications in many areas such as banking, medicine, scientific research and among government agencies. Classification is one of the commonly used tasks in data mining applications. For the past decade, due to the rise of various privacy issues, many theoretical and practical solutions to the classification problem have been proposed under different security models. However, with the recent popularity of cloud computing, users now have the opportunity to outsource their data, in encrypted form, as well as the data mining tasks to the cloud. Since the data on the cloud is in encrypted form, existing privacy-preserving classification techniques are not applicable. In this paper, we focus on solving the classification problem over encrypted data. In particular, we propose a secure k-NN classifier with light-weight highly secure encryption scheme over encrypted data in the cloud. The proposed protocol protects the confidentiality of data, privacy of user's input query, and hides the data access patterns. To the best of our knowledge, our work is the first to develop a secure k-NN classifier over encrypted data under the semi-honest model. Also, we empirically analyze the efficiency of our proposed protocol using a real-world dataset under different parameter settings.

Index Terms **- Classifiers, cloud computing, data mining, encryption.**

I. INTRODUCTION

Recently, the cloud computing paradigm is revolutionizing the organizations' way of information processing, storage, and delivery in which highly centralized physical resources are furnished to remote clients on demand .Rather than purchasing actual physical devices—servers, storage, and networking equipment clients lease these resources from a cloud provider as a outsourced service that abstracts away physical devices [1][2]. As an emerging computing paradigm, cloud computing attracts many organizations to consider seriously regarding cloud potential in terms of its cost efficiency, flexibility, and offload of administrative overhead. Cloud computing is flexible and portable in that it can be accessed anytime from anywhere. By using redundant sites and backup storage, cloud providers can also provide greater reliability than local computing systems. Most often, organizations delegate their computational operations in addition to their data to the cloud. Despite tremendous advantages that the cloud offers, privacy and security issues in the cloud are preventing companies to utilize those advantages [3]. When data are highly sensitive, the data need to be encrypted before outsourcing to the cloud. However, when data are encrypted, irrespective of the underlying encryption scheme, performing any data mining tasks becomes very challenging without ever decrypting the data. There are other privacy concerns, demonstrated by the following example [4][5].

II. EARLIER WORK

In this section, we first formally dene the privacy preserving k-NN problem, then briefly review the privacy preserving protocol, upon which our work is built.

2.1 Privacy preserving Data mining

In privacy-preserving Data mining where private data and private knowledge must be protected, two main approaches to preserve privacy are data medication approach and cryptographic approach. Our paper takes the latter approach where secure multiparty computation (SMC) plays a critical role. In this setting, data is distributed across multiple parties either horizontally (the records are distributed among the parties) or vertically (columns of a record are distributed among the parties). The parties want to conduct a computation based on their private inputs such that they learn the outputs without revealing their own inputs or outputs to others, and no party can infer anything other than what can be learned from its own input and output.

2.2 Query Processing over Encrypted Data

For the past decade, query processing on relational data has been studied extensively, and many theoretical and practical solutions to query processing have been proposed under various scenarios. With the recent popularity of cloud computing, users now have the opportunity to outsource their data as well as the data management tasks to the cloud. However, due to the rise of various privacy issues, sensitive data (e.g., medical records) need to be encrypted before outsourcing to the cloud. In addition, query processing tasks should be handled by the cloud; otherwise, there would be no point to outsource the data at the first place. To process queries over encrypted data without the cloud ever decrypting the data is a very challenging task. In this paper, we focus on solving the k-nearest neighbor (kNN) query problem over encrypted database outsourced to a cloud: a user issues an encrypted query record to the cloud, and the cloud returns the k closest records to the user.

RESEARCH ARTICLE OPEN ACCESS

Investigation on Giant Data leaning Data Analyzing and Processing knowledge

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ABSTRACT
At present, enterprises have urgent needs to conduct an effective and stable statistical analysis on big data. With a view to solving the issue of analysis and processing of big data in respect of enterprise business, this essay proposes a hybrid structure mode based on the Map Reduce technology and the parallel database technology, discusses the principle on which the mode is used to realize the analysis and processing of big data and its advantages, and analyzes, expounds and proves the hybrid structure and provides a practical plan on big data processing. It is expected that this study has certain reference value in related researches.
Keywords:- data leaning, processing knowledge, big data

I. INTRODUCTION

With the continuous improvement of informatization construction, most enterprises have completed the deployment of informatization system and the research and development, design and promotion of new products and new services have been greatly improved in respect of the operation efficiency of compared to traditional enterprises. However, although the enterprises have realized a high-efficiency and elaborate management, masses of business data are concurrently accumulated. Furthermore, there are categories of data and the requirement of being real-time is quite high. This is so- called “big data”. All of the internet of things, cloud computing, mobile Internet, large-scale e-commerce, mobile phone, tablet computer and the various sensors spread all over each corner of the earth are data sources or the carrying way[1]. At present, as a relatively new concept, big data is not proposed directly as the proper noun to give policy support by the Chinese government. However, in December 8, 2011, the Ministry of Industry and Information Technology of People’s Republic of China issued the Internet of things "Twelfth Five-Year Plan", put forward as the information processing technology is the analysis of massive data storage, data mining, image and video intelligent analysis, which are important parts of big data [2]. The other 3 key technical innovation projects including information technology, information technology, information security technology, are closely related with the large data. Large data has four characteristics: first, a huge amount of data, using PB as the unit; second, various data types, including network log, video, pictures, geographic location information and other data; third, the low density of value, with video as an example, the valuable data may be only one or two seconds in the continuous monitoring process; fourth, fast processing speed, this point is essentially different with the traditional data mining. Big data contains masses of valuable mode and information. For example, Wal-Mart, a global retail giant, will mine geographic locations, sales performance and social information of stores in big data to improve customers’ understanding [3]. For enterprise organizations, the value of big data is reflected in the two aspects: analysis and use and secondary development. The enterprises need to rely upon the technical platform on informatization system to mine in big data any needed important information and conduct intensive analysis and processing of these big data so as to construct a data warehouse and application and analysis platform based on important data information. By analyzing and processing the masses of the data information of enterprises, it will provide a correct guidance and policy-making for the existence and development of enterprises [4].

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Basalt Aggregate as Coarse Aggregate in High Strength Concrete Mixes

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ABSTRACT

Concrete technology has been changing rapidly and constantly since its discovery. The process of selecting suitable ingredients of concrete and determining their relative amounts with the objective of producing a concrete of the required, strength, durability, and workability as economically as possible, is termed the concrete mix design. The scope of this work is limited to the development of a suitable mix design to satisfy the requirements of workability and strength of the concrete mix using basalt aggregate as a coarse aggregate. To evaluate the workability of concrete mixes using basalt aggregate as coarse aggregate. To evaluate the strength of hardened concrete using basalt aggregate as coarse aggregate The results of the compressive strength tests will be conducted on the trial mixes containing 0%,25%, 50%,75% and 100% basalt, respectively. The compressive strength will be tested as the percentage of basalt content in the mix is increased. Five mixes were prepared; namely 0% basalt (as a control mix), 25% basalt, 50% basalt, 75% basalt and 100% basalt for each set of design mix. The composition of each mix was 60% coarse aggregate of 20 mm size and 40%coarse aggregate of 10mm size. Fine aggregate confines to zone-I.

INTRODUCTION

Cement is the most regularly utilized material as a part of different sorts of development, from the deck of a hovel to a multi storied skyscraper structure from pathway to an airplane terminal runway, from an underground passage and remote ocean stage to skyscraper fireplaces and TV Towers [1]. In the most recent thousand years concrete has requesting prerequisites both as far as specialized execution and economy while extraordinarily differing from building perfect works of art to the least complex of utilities. It is hard to call attention to another material of development which is as adaptable as concrete [2].

Cement is one of the flexible heterogeneous materials, structural building has ever known. With the approach of cement structural designing has touched most noteworthy pinnacle of innovation. Cement is a material with which any shape can be thrown and with any quality. It is the material of decision where quality, execution, strength, impermeability, imperviousness to fire and scraped area resistance are required. It is very much perceived that coarse total assumes a critical part in cement.

Coarse total commonly possesses more than 33% of the volume of cement, and research demonstrates that progressions in coarse total can change the quality and crack properties of cement. To anticipate the conduct of cement under general stacking requires a comprehension of the impacts of total sort, total size, and total substance. This comprehension must be increased through broad testing and perception [3].

There is solid proof that total sort is a component in the quality of cement. Ezeldin and Aitcin (1991) contrasted cements and the same blend extents containing four distinctive coarse total sorts. They inferred that, in high-

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Mechanical Properties of Concrete by Using Micro Silica and Synthetic Fibers

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ABSTRACT

It was observed and noted that since decade the cost of the building materials is so high that to do meaningful construction. Industrial by-products can be used in concrete as admixtures in cement, raw materials in cement clinkers or as coarse aggregates in concrete. Ordinary Portland cement (OPC) is acknowledged as the major construction material throughout the world. The most replacement materials are fly ash ,silica fume, non-silica and metakaolin, whose using with cement and concrete is thus likely to give significant development of concrete technology in the coming few decades.

This study is to compare mechanical properties as well as fresh properties of concrete containing Silica Fume, Fibrillated fiber and Ordinary Portland Cement. The aim of the study is to enable the evaluation of the suitability of mechanical properties. Concrete mixes will be prepared with Portland cement with the addition of silica fume and fiber.

INTRODUCTION

Concrete is considered as sturdy and solid material. Strengthened concret [1] is a standout amongst the most well known materials utilized for development around the globe .Reinforced concret [2] is presented to decay in a few areas particularly in beach front locales. Therefore scientists around the globe are coordinating their endeavors towards building up another material to defeat this issue. Innovation of huge development plants and gear's far and wide added to the expanded utilization of material. This situation prompted the utilization of added substance materials to enhance the nature of concrete. As a result of the analyses and looks into bond based solid which meets unique execution as for workability, quality and strength. Utilization of high strength concrete in development segment, has expanded because of its enhanced mechanical properties contrasted with standard concrete [3]. High-quality solid alludes to solid that has a uniaxial compressive strength more prominent than the typical strength concrete got in a specific locale. This definition does exclude a numerical strength for compressive strength demonstrating an exchange from a typical strength to high strength concrete. In 1950's, concrete with a compressive strength of M35 MPa was considered as high strength concrete. In the 1990's solid with a Compressive strength [4] more noteworthy than 110MPa was utilized as a part of created nations. In any case this numerical strength (110MPa) could be impressively lower contingent upon the attributes of the neighborhood materials utilized for these solid items.

Report of ACI council 363 in 1979 characterized high-strength concrete as having compressive strength more than 41.37 MPa (6000 Psi). at present days high strength and superior concrete are in effect broadly utilized everywhere throughout the world. Most utilizations of high strength concrete have been in elevated structures, long traverse spans and in some uncommon applications in structures. In created nations, utilizing high strength concrete as a part of structures today would bring about both specialized and practical preferred standpoint. In high strength concrete, it is important to lessen the

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An Investigation on Strength and Durability Properties of Concrete of Cement Partially Replaced With Granite Slurry

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ABSTRACT

Granite quarry slurry is the waste from rock preparing in quarries and crusher units. The fines are at introduced arranged by filling in infertile land causing genuine natural issues. On the off chance that this material is conceivable to be utilized for partial concrete replacement it is of benefit both economically and naturally. The impact on strength properties of concrete in replacing some bit of cement by quarry dust acquired from a nearby crusher unit is investigated. The examination work did incorporated a test examination on strength properties of concrete made with 5% to 20% substitution of concrete by quarry dust of under 75 micron molecule estimate. The tests were done to locate the compressive strength and flexural strength. Results demonstrated that up to 10 % substitution of concrete by quarry dust there was no decrease in compressive strength, flexural strength, Split tensile strength. The durability properties are sorptivity and RCPT values are shown moderate values.

INTRODUCTION:

Rapid industrial development causes serious problems all over the world. Currently India has taken a major initiative on developing the infrastructures such as express highways, power projects and industrial structures etc., to meet the requirements of globalization, in the construction of buildings and other structures.

Concrete plays the key role and a large quantum of concrete is being utilized in every construction practices [1]. River sand, which is one of the constituents used in the production of conventional concrete, has become very expensive and also becoming scarce due to depletion of river bed. In the present study, the hardened and durable properties of concrete using granite slurry were investigated. Also, the use of granite slurry as replacement of cement decreases the cost of concrete production [2]. This paper reports the experimental study which investigated the influence of 100% replacement of cement with granite slurry. Design mix of M25 grade concrete with replacement of 0%, 25%, 50%, 75%, and 100% of quarry dust organized as M1, M2, M3, M4 and M5 respectively have been considered for laboratory analysis viz. slump test, compaction factor test, compressive strength ,split tensile strength and flexural strength of hardened concrete. In the present paper, the hardened properties of concrete using quarry dust were investigated and durable properties sorptivity, water absorption, were determined

In the construction industry river sand is used as an important building material and the world consumption of sand in concrete generation alone is around 1000 million tons per year making it scarce and limited [3]. The excessive and non scientific methods of mining sand from the river beds has led to lowering of water table and sinking of bridge piers.

GRANITE CUTTING SLLURY:

Granite cutting slurry can be defined as residue, tailing or other non-voluble waste material after the extraction and processing of granite rocks to form fine particles

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A Complete Study on Behaviour of Geo-Polymer Concrete with Admixtures

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ABSTRACT

Concrete is made up of cement, aggregates, water & additives is the world's most consumed construction material since it is found to be more versatile, durable and reliable. Concrete is the second most consumed material after water which required large quantities of Portland cement. The production of Ordinary Portland Cement (OPC) causes havoc to the environment due to emission of CO_2 as well as mining also results in unrecoverable loss to the nature. Hence, there is the need to find an alternative material to the existing most expensive cement-concrete. Geopolymer concrete (GPC) is an innovative construction material which shall be produced by the chemical action of inorganic molecules. This paper presents the progress of the research on making geopolymer concrete using fly ash and metakaolin with different activator ratios from 2 to 3. These materials react with alkaline solution and produce alumino silicate gel that acts as the binding material for the concrete. This GPC is an excellent alternative construction material to plain cement concrete without using any amount of ordinary Portland cement. In our present investigation the specimens of the GPC with different activator ratios from 2 to 3 are made, and the tests like compressive test, split tensile test and flexural strength are conducted on them. At the end of the investigation it is found that the mechanical properties of the specimens have been increased with increase of activator ratio from 2 to 3.

Keywords: ***Geopolymer concrete, fly ash, metakaolin, sodium silicate, sodium hydroxide.***

INTRODUCTION

After wood, concrete is the most often used material by the community. Concrete is conventionally produced by using the ordinary Portland cement (OPC) [1-3] as the primary binder. The environmental issues associated with the production of OPC are well known. The amount of the carbon dioxide released during the manufacture of OPC due to the calcination of limestone and combustion of fossil fuel is in the order of one ton for every ton of OPC produced. In addition, the amount of energy required to produce OPC is only next to steel and aluminium. On the other side, the abundance and availability of fly ash worldwide create opportunity to utilise this by-product of burning coal, as partial replacement or as performance enhancer for OPC. Fly ash in itself does not possess the binding properties, except for the high calcium or ASTM Class C fly ash. However, in the presence of water and in ambient temperature, fly ash [4] reacts with the calcium hydroxide during the hydration process of OPC to form the calcium silicate hydrate (C-S-H) gel. This pozzolanic action [5] happens when fly ash is added to OPC as a partial replacement or as an admixture. The development and application of high volume fly ash concrete, which enabled the replacement of OPC up to 60-65% by mass (Malhotra 2002; Malhotra and Mehta 2002), can be regarded as a landmark inthis attempt. In another scheme, pozzolans such as blast furnace slag and fly ash

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Role of Embedment Length on the Bond Characteristics of Fiber Based Self Compacting Concrete

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ABSTRACT

Self compacting concrete (SCC) is a development of conventional concrete, in which the use of vibrator for compaction is no more required. Self-compacting concrete was first developed in 1988 to achieve durable concrete structures. Since then, various investigations have been carried out and this type of concrete has been used in practical structures in Japan mainly by large construction companies. The use of self compacting concrete (SCC) can facilitate the placement of concrete in congested reinforcement in the structural members. This is especially important in deep structural members and wall elements where concrete can segregate and exhibit bleeding and settlement which can result in local structural defects that can reduce mechanical properties. Investigations for establishing a rational mix-design method and self-compactability testing methods have been carried out from the viewpoint of making self-compacting concrete a standard concrete.

Several studies in the past have revealed the usefulness of fibers to improve the structural properties of concrete like ductility, post crack resistance, energy absorption capacity etc. Fiber reinforced self compacting concreting combines the benefits of self compacting concrete in fresh state and shows an improved performance in the hardened state due to the addition of fibers. Fibers bridge cracks and retard their propagation, they contribute to an increased energy absorption compared with plain concrete. In this investigation Cem-FIL anti-crack high dispersion glass fibers and steel fibers were added to self compacting concrete and Fiber Reinforced Self Compacting Concrete was developed by using compressible packing model. Several tests, such as slump flow, L-box, J-ring, V-funnel tests were carried out to obtain the properties for flowability and workability of fresh concrete. An experimental investigation was performed to study the bond between deformed bars, plain and fiber reinforced SCC with different embedment lengths (100mm, 150mm, 300mm.) for 16mm Φ bar. The results shows that bond stress was decreased with an increased embedment length of a grade of self compacting concrete and also bond stress was increased by the addition of steel fibers for all grades of SCC and corresponding slip increases for same diameter of bar with constant embedment length.

INTRODUCTION

Background of self compacting concrete

Self compacting concrete (SCC) [1-4] represents one of the most significant advances in concrete technology for decades. In recent years, self-compacting concrete (SCC) has gained wide use for placement in congested reinforced concrete structures with difficult casting conditions. For such applications, the fresh concrete must possess high fluidity and good cohesiveness. Self-compacting concrete (SCC) is considered as a concrete which can be placed and compacted under its self-weight with little or no vibration effort, and which is at the same time, cohesive enough to be handled without segregation or bleeding. It is used to facilitate and ensure proper

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Design of a Structure Supported on a Single Column

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ABSTRACT

The design and analysis of RCC structure supported on a single column is done in this project. Cost Comparison is done between RCC single column and RCC multi column structure. This paper presents structural modelling, stress, bending moment, shear force and displacement design considerations for a structure and it is analyzed using STAAD Pro. Various steps involved in designing of RCC structure supported on a single column using STAAD pro are Geometric Modelling, providing material properties and sectional Properties, fixing supports and boundary Conditions, providing loads & load combinations, Special Commands, Analysis Specification and Design Command. The influence of plan geometry has an important role in static analysis. Maximum values of stresses, bending moments, shear forces and displacements are presented. The acting loads considered in the present analysis were self weight, floor load, wind load and earthquake load. In these cases the floor load was applied perpendicular to the RCC structure. Comparison of RCC single column and RCC multi column is done.

INTRODUCTION

Structure supported on a single column provides better architectural view compared to structure supported on many columns. They save ground space as requires less area for providing foundation and provides more space for parking. They are also unique. Single column structure can be made either by using RCC or Steel. RCC structures are more common now days in India.

Reinforced concrete [1] as a structural material is widely used in many types of structures. It is competitive with steel if economically designed and executed. It has a relatively high compressive strength and better fire resistance than steel. It has long service life with low maintenance cost. It can be cast into any required shape.

Reinforced concrete is a composite material in which concrete's relatively low tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength and ductility.

The modeling and analysis of structure supported on a single column is done by using STAAD Pro software [2]. STAAD Pro is a structural analysis and design computer program originally developed by Research Engineers International in Yorba Linda. Various ways of supporting a structure on one single column is shown in Fig. 1.1

Various steps involved in designing of reinforced concrete structure supported on a single column using STAAD pro-

- Geometric Modelling
- Material Properties
- Sectional Properties
- Supports
- Boundary Conditions
- Loads & Load combinations
- Special Commands
- Analysis Specification
- Design Command

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Mechanical Properties of Concrete with Fine Aggregate Partially and Fully Replaced With Copper Slag

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ABSTRACT

Characteristic assets are draining worldwide while in the meantime the created wastes from the industries are expanding generously.

The manageable improvement for development includes the utilization of nonconventional and imaginative materials, and reusing of waste materials with a specific end goal to repay the absence of common assets and to discover elective ways saving nature. So experimental examination completed to assess the mechanical and durable properties of solid blends in which fine aggregates (sand) was replaced with Copper Slag. The fine aggregates (sand) was replaced with rates 0% (for the ostensible blend), 10%, 20%, 30%, 40%, 50%, 60%,70%, 80%,90% and 100% of Copper Slag by weight. Tests were performed for properties of new concrete and Hardened Concrete. Compressive strength and Flexural strength, split tensile strength, sorptivityand RCPTwere resolved at 7, 28 and 56days.

The outcomes demonstrate that workability increments with expansion in Copper Slag rate. Test results demonstrate critical change in the strength properties of plain concrete by the incorporation of up to 80% Copper slag as substitution of fine aggregates (sand), and can be successfully utilized as a part of basic concrete. Likewise as rate of Copper Slag expanded the thickness of concrete expanded. The workability of concrete increased with expansion in rate of copper slag. Durability of copper slag is observed to be more, which increases the compressive and flexural strength of concrete.

Introduction

Research concerning the utilization of by products and mechanical squanders to enlarge the properties of concrete has been continuing for a long time. In the late decade, the endeavors have been made to use industry by-items, for example, fly ash , silica fume, ground granulated impact heater slag (GGBFS) [1], glass cullet, and so on., in the common developments. The potential utilization of modern by-items in concrete as halfway total substitution or as fractional bond substitution (partial or fully replacement), contingent upon their synthetic synthesis and molecule size. The utilization of these materials in concrete emerges because of ecological requirements, in the sheltered transfer of these by items.

Enormous consideration is being centered around the earth and protecting of regular assets and reusing of squanders materials. Really numerous commercial enterprises are delivering countless which join scrap (deposits). In the most recent 20 years, a ton of works concerning the utilization of a few sorts of urban squanders in building materials industrials process have been distributed. Numerous specialists have been stretched out to concentrate new sorts of squanders to examine profoundly specific angles [2]. The expansion of squanders, aside from the natural advantages, additionally delivers great impacts on the properties of definite items.

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Experimental Investigation on Synthetic Fiber Reinforced Concrete Pavements

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ABSTRACT

If properly designed, constructed and maintained, reinforced or pre-stressed concrete structures are generally very durable. However, for structures in aggressive environment, corrosion of steel can be significant problem. Shrinkage cracking of concrete is a major problem in plain cement concrete pavements especially in tropical regions. Examples of structures that may be particularly at risk include marine structures, bridges subjected to de-icing salts and industrial buildings. In the last decade, there has been a considerable increase in interest in the use of non-metallic reinforcement to cope with this corrosion problem at many institution, advanced composite reinforcing materials have been developed, typically consisting of align continuous fibers embedded in resin and shaped to form beams and slabs, grid shape structures.

To overcome corrosion and shrinkage cracking of plain concrete, sometimes the addition of synthetic fiber to the concrete mix is suggested. Synthetic fibers used in our study are Polypropylene and Polyester. Recron'3s Fibers are engineered micro fibers with a unique "Triangular" Cross-section, used as secondary reinforcement of Concrete. It complements Structural Steel in enhancing Concrete's resistance to shrinkage cracking and improves mechanical properties such as Flexural / Split Tensile and transverse Strengths of Concrete along with the desired improvement in Abrasion and Impact Strengths.

Six concrete mixes with fiber dosages 0.1%, 0.2% and 0.3% by volume fraction besides the control concrete mix were manufactured. In this work, the results of strength properties of synthetic fiber reinforced concrete are presented. Also conducted the conventional tests for concrete such as the compressive strength and flexural strength of concrete samples are made with different amounts.

Compressive strength test and flexural strength test was conducted on the cubical and beam specimens respectively for all the mixes at different curing periods as per IS 516 (1991). The cubes of size 150 mm x 150 x 150 mm were cast and tested for compressive strength. The beams of size 500 mm x 100 x 100 mm were cast and tested for flexural strength.

INTRODUCTION

Plain concrete has a low tensile strength, little imperviousness and limited ductility to cracking. Interior miniaturized scale cracks are naturally exhibit in the concrete and its poor strength is because of the propagation of such micro cracks, eventually leading to brittle crack of the concrete [1].

In plain concrete and similar brittle materials, micro cracks grow even before loading, especially because of drying shrinkage or different reasons for volume change. The width of these introductory cracks from time to time exceeds a few microns; however their other two measurements may be of higher magnitude [2].

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A Study on the Variation of Strength and Durability Properties of Concrete with Partial Replacement of Cement Using Nano-Silica (NS) and Fly Ash (FS)

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ABSTRACT

This paper studies the recent investigations and development of combined application of Pozzolanic additions - Nano-Silica (NS) and Fly Ash (FA) on the strength properties of concrete for sub sequential growth of concrete industry. This investigation not only saves the natural resources but also controls the environmental pollution by usage of wastes. The limited work is done on partial replacement of Fly Ash and Nano-Silica in cement paste, mortar and concrete. In the present study the cement is partially substituted by 20% and 30% of Fly Ash and Nano-Silica 1.0%,2.0%,3.0%, 4.0%,5.0% and 6.0% by weight. To understand the application of Fly Ash and Nano-Silica various literatures have been reviewed and their influence on Compressive Strength, Bending Strength (Flexural Strength), Elastic Modulus or Young's Modulus and Tensile Strength abd RCPT of M25 grade of concrete is investigated. The experimental investigation results of concrete are tabulated using the combination of various proportions of Fly Ash and Nano-Silica are collate with that of Controlled Concrete. The mechanical strength development and durability properties of concrete are greatly influenced because of this combined application of Nano-Silica and Fly Ash compared to the Controlled Concrete properties. The sustainable increase in the various strength characteristics of concrete prepared using Nano-Silica and Fly Ash can be accredited to the efficacious packing of colloidal particles and the need of additional mix in the application of Fly-Ash and Nano-Silica

INTRODUCTION

Concrete has been recommended as a construction material in wide range. At present in construction, prior to strength, the durability of concrete also has importance. The minimum cement content to satisfy the strength and durability requirements. The Indian standard code of IS 456:2000 for plain concrete design is used. This results in usage of cement in huge content. The cement production results in evolution of lots of carbon dioxide resulting in environment mortification [1]. By usage of additive Pozzolanic alternative materials [2] instead of cement upto certain proportion will be another solution for this problem. Earlier studies show that the usage of Fly-Ash (FA), Micro Silica (MS), Ground Granulated Blast Furnace Slag and Kaolinite as replaced materials [3] which results in increases in strength and durability. By introducing Nano sized materials as a partial replacement of cement which improves the performance of cement.

Because of many experimental researches on Nano particles, Nano-Silica is available as replacing material of cement in making concrete. Nano-Silica (NS) [4] is a Nano-sized, highly reactive nebulous silica. Because of Nano-Silica particle is as small as other particles and also having very large surface area as the substitute materials, its usage comparatively intensify the concrete performance upto extensive range. This amalgamation of

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Basalt Aggregate as Coarse Aggregate in High Strength Concrete Mixes

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ABSTRACT

Concrete technology has been changing rapidly and constantly since its discovery. The process of selecting suitable ingredients of concrete and determining their relative amounts with the objective of producing a concrete of the required, strength, durability, and workability as economically as possible, is termed the concrete mix design. The scope of this work is limited to the development of a suitable mix design to satisfy the requirements of workability and strength of the concrete mix using basalt aggregate as a coarse aggregate. To evaluate the workability of concrete mixes using basalt aggregate as coarse aggregate. To evaluate the strength of hardened concrete using basalt aggregate as coarse aggregate The results of the compressive strength tests will be conducted on the trial mixes containing 0%,25%, 50%,75% and 100% basalt, respectively. The compressive strength will be tested as the percentage of basalt content in the mix is increased. Five mixes were prepared; namely 0% basalt (as a control mix), 25% basalt, 50% basalt, 75% basalt and 100% basalt for each set of design mix. The composition of each mix was 60% coarse aggregate of 20 mm size and 40%coarse aggregate of 10mm size. Fine aggregate confines to zone-I.

INTRODUCTION

Cement is the most regularly utilized material as a part of different sorts of development, from the deck of a hovel to a multi storied skyscraper structure from pathway to an airplane terminal runway, from an underground passage and remote ocean stage to skyscraper fireplaces and TV Towers [1]. In the most recent thousand years concrete has requesting prerequisites both as far as specialized execution and economy while extraordinarily differing from building perfect works of art to the least complex of utilities. It is hard to call attention to another material of development which is as adaptable as concrete [2].

Cement is one of the flexible heterogeneous materials, structural building has ever known. With the approach of cement structural designing has touched most noteworthy pinnacle of innovation. Cement is a material with which any shape can be thrown and with any quality. It is the material of decision where quality, execution, strength, impermeability, imperviousness to fire and scraped area resistance are required. It is very much perceived that coarse total assumes a critical part in cement.

Coarse total commonly possesses more than 33% of the volume of cement, and research demonstrates that progressions in coarse total can change the quality and crack properties of cement. To anticipate the conduct of cement under general stacking requires a comprehension of the impacts of total sort, total size, and total substance. This comprehension must be increased through broad testing and perception [3].

There is solid proof that total sort is a component in the quality of cement. Ezeldin and Aitcin (1991) contrasted cements and the same blend extents containing four distinctive coarse total sorts. They inferred that, in high-

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Comparative Study of OPC and PSC with Partial Replacement of Different Pozzuloic Materials

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ABSTRACT

In the present investigation an attempt is made to compare various compressive strengths of cement mortar cubes. Mathematical models were elaborated to predict the strength of mortar cubes with 10% partial replacement of cement by various types of mineral admixtures with and without super plasticizers. The strength of cubes with different types of cement (OPC, PSC) after 3,7,28 and 90 days with 28 days curing and also durability tests after 60 days, have been analysed to evaluate the effect of addition content, the time of curing and the type of cement on the changes in compressive strength. The test results of selected properties of binders and hardened mortar cubes with admixtures are also included. The analysis showed that mortar cubes with admixtures is characterized by advantageous applicable qualities.

The investigation revealed that use of waste materials like fly ash, micro silica, rice husk ash and ground granulated blast furnace slag, which are otherwise hazardous to the environment may be used as a partial replacement of cement, leading to economy and in addition by utilizing the industrial wastes in a useful manner the environmental pollution is also reduced to a great extent.

INTRODUCTION

The greatest challenge before the construction industry is to serve the two pressing needs of human society namely the protection of the environment and meeting the infrastructure requirement of our growing population and consequentially needs of industrialization [1] and urbanization in the past. The concrete industry has met these needs very well. However for a variety of reasons, the situation has been changed now.

The cement and concrete industries due to their large size are unquestionably feasible scope for economic and safe disposal of millions of tonnes of industrial by products such as fly ash, microsilica, slag, rice husk ash [2-4]. Due to their properties, by-products can be used in certain amount such as cement replacement material than in the practice today. In fact, these mixes replaced by 15% of by-products have shown high strength and durability at relatively early ages. This development has removed one of the strong objections to the use of high volume of by products in mortar cubes.

Therefore, it should be obvious that certain scale cement replacement with industrial by products is highly advantageous from the stand point of cost, economy, energy efficiency, durability and overall ecological and environmental benefits [3].

The advantageous in concrete technology method of construction and type of construction have paved the way to make the best use of locally available materials by judicious mix proportioning and proper workmanship so as to result in a construction industry satisfying the performance requirements. Proper design of mixes is intended to obtain such proportioning of ingredients that

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EFFECT OF WASTE FOUNDRY SAND ON MECHANICAL PROPERTIES IN CONCRETE

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Abstract-**This experimental investigation was performed to evaluate the strength of concrete mixes, in which manufactured sand was partial by replaced with Waste Foundry Sand. Manufactured Sand (M Sand) was used as fine aggregate and it was replaced with five percentages (0%, 10%, 20%, 30%, 40% and 50%) of WFS by weight. Compression test, Split Tensile strength test and Flexural Strength test were carried out to evaluate the strength properties of concrete at the age of 28 days. Test results indicate a marginal increase in strength properties of plain concrete by inclusion of WFS as a 30% partial replacement of fine aggregate.**

Key words- **Waste Foundry Sand, Compressive Strength, Split Tensile Test, Flexural Strength.**

1. INTRODUCTION

Due to ever increasing quantities of waste materials and industrial by-product, solid waste management is the prime concern in the world. Scarcity of land-filling space and because of its ever increasing cost, recycling and utilization of industrial by-products and waste materials has become an attractive proposition to disposal. There are several types of industrial by- products and waste materials. The utilization of such materials in Concrete not only makes it as an economical Experimental Study on utilization of Waste Foundry Sand in Concrete as a Fine Aggregate, but also helps in reducing disposal concerns. The physical and chemical characteristics of foundry sand will depend on the type of casting process and the industry sector from which it originates. In modern foundry practice, sand is typically recycled and reused through many production cycles. Industry estimates that approximately 100 million tons of sand is used in production annually out of which 6 - 10 million tons is discarded annually and is available to be recycled into other products and industries. The automotive industries and its parts are the major generators of foundry sand. Foundries purchase high quality size-specific silica sands for use in their moulding and casting operations.

The raw sand is normally of a higher quality than the typical bank run or natural sands used in construction sites. The sand forms the outer shape of the mould cavity. These sands normally rely upon a small amount of Bentonite clay to act as the binder material. Chemical binders are also used to create sand "cores". Depending upon the geometry of the casting, sand cores are inserted into the mould cavity to form internal

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Original research article

Impact of intermolecular charge transfer interactions on structural, spectral and third-order nonlinear optical properties of a semiorganic crystal: Poly (bis 4-methoxybenzylammonium) tetra-μ-chlorido-cadmate (II)

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ABSTRACT

The correct crystal system and space group of the title crystal are reported. Powder X-ray diffraction (PXRD) study validates the crystal structure of poly (bis 4-methoxybenzylammonium) tetra-μ-chlorido-cadmate (II) (4MBACD) crystal. The crystal exhibits the optical transmittance from 270 to 1100 nm. The vibrations of different functional groups, formation of crystal, coordination of metal and the intermolecular hydrogen bonding impact in the crystal were analyzed by FT-Raman and ^{1}H nuclear magnetic resonance (NMR) spectroscopy. The ^{1}H NMR spectrum of 4MBACD crystal is recorded in DMSO and D_2O solvent but the protonation of amino moiety is revealed only in DMSO solvent. The mechanical stability was determined by Vicker's microhardness study. The Z-scan analysis was carried out to know the nonlinear refractive index (n_2), the nonlinear absorption coefficient (β) and third-order nonlinear susceptibility ($\chi^{(3)}$). The result reveals that the crystal possesses saturable absorption and self-defocusing properties. 4MBACD crystal exhibits higher third order nonlinear susceptibility $\chi^{(3)} = 6.21 \times 10^{-6}$ esu compared to some well-known crystals due to the impact of intermolecular charge transfer interactions. This ensures the suitability of 4MBACD crystal for nonlinear optical (NLO) applications.

1. Introduction

The progress of single crystals led to the development of modern science and technology in various fields of photonics, lasers, sensors, optoelectronics and biomedical applications for the past few decades. NLO crystals are utiliszed mainly for optical devices such as optical modulators and frequency converters [1–5]. NLO crystals can be used to generate new frequencies that are not readily available with the present sources of laser. Recently researchers are keen on exploring novel semiorganic crystals which overcome the limitation of organic and inorganic crystals. To improve the efficiency of NLO crystals, it is essential to understand the relationship between macroscopic qualities and microscopic structures [6].

The title compound has the general formula AMX_4 where A is an organic 4-methoxybenzylamine (4MBA) cation, M is cadmium (Cd) II metal and X is Cl. 4MBACD is an effective semiorganic crystal, which has greater NLO coefficient influenced by the organic part and has high optical transmittance dominated due to the d^{10} configuration of metal ions [7]. The whole crystal system is

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Research Paper

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Synthesis, Growth, Investigation of Structural, Spectral and Optical Properties of Solution Grown Dipotassium Fumarate Dihydrate Crystal

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Abstract— Single crystals of dipotassium fumarate dihydrate (DKFD) have been grown by slow solvent evaporation method. The structural characteristics of the grown crystals was studied from single crystal and powder X-ray diffraction analysis. The crystal system of the grown crystal was found to be monoclinic. The lower cut-off wavelength of DKFD was found at 300 nm and good transparency window was observed from 300 to 1100 nm. The existence of various functional groups was established from FTIR and FT Raman spectroscopy. The study of the molecule is established using NMR spectroscopy. The thermal stability and decomposition behaviour of the grown crystal is analysed using TGA/DTA analyses. Third order nonlinear susceptibility χ^3 of the crystal was measured at the wavelength of 532 nm by z-scan technique. The observed high value of χ^3 is attributed to the hydrogen bond present in the structure of the crystal.

Keywords— *Dipotassium fumarate dihydrate, Single crystal XRD, Powder XRD, NMR analysis, Z-Scan technique.*

I. INTRODUCTION

The motive of the research is to synthesis a new compound in order to fulfil the requirements for the technological development in various fields. Organic crystals produce large nonlinear optical response, low UV cut off wavelength, but have poor mechanical and thermal stability. Inorganic crystals have high melting point, high mechanical strength but possess poor optical nonlinearity. The combination of organic and inorganic compounds that are easily grown from solution growth technique leads to find a material suitable for device applications. The semiorganic crystals are grown due to their stable physiochemical properties, that are essential for fabrication of devices and in applied research [1,2,3]. Semiorganic crystals are of great interest and found its applications in the field of optical computing, data storage, optical information processing and light emitting diodes [4,5]. Semiorganic materials with hydrogen bonding interactions between cations and anions possess large nonlinearity, low angular sensitivity, large polarizability, better transmittance in UV-Vis region, good mechanical and thermal stability [6-9]. Ionic salt materials provide an important and intense flexible approach for the material development that are used over a broad range of frequencies [10].

II. RELATED WORK

The structure of the title crystal was already reported [11]. In this work the semiorganic DKFD crystals were grown using low temperature solution growth method. The grown crystals were characterized using single crystal X-ray and powder X-ray diffraction method, UV-Vis-NIR spectroscopy, FT-IR and FT-Raman spectroscopy, NMR spectroscopy, Thermal analysis and Z-Scan analysis.

III. MATERIALS AND METHODS

DKFD crystals was obtained from solvent evaporation technique by reacting potassium carbonate and fumaric acid in a molar ratio of 1:1. The weighed reactants were dissolved in deionised water and stirred continuously with magnetic stirrer for about 3hours, and then filtered using Whatman filter paper. The filtered solution was kept in a crystal growth vessel, and covered with polythene paper. Few holes were made in the polythene paper to achieve slow evaporation. After a period of 70 days colourless crystals were grown. Figure 1, shows the reaction scheme of DKFD crystal.

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GROWTH AND CHARACTERIZATION OF SOLUTION GROWN NONLINEAR OPTICAL AMMONIUM TARTRATE CRYSTAL

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ABSTRACT

Ammonium tartrate single crystals were grown by a solvent evaporation method. The single crystal and powder X-ray diffraction studies determine the lattice parameter and showed that the crystal is monoclinic. The lower cut off wavelength was found at 220nm. The functional groups such as OH, NH_4^+, COO^-, and CH declares the formation of ammonium tartrate crystal. The molecular structure was established from the NMR analysis. The thermal studies were carried out from TG/DTA experiments. The second harmonic generation efficiency was measured through Kurtz-Perry technique. The observed second harmonic generation efficiency was found to be higher than KDP and some of the reported nonlinear optical crystals.

Keywords: Ammonium tartrate, XRD analysis, FTIR analysis, NMR analysis, Second harmonic generation efficiency.

INTRODUCTION

Nonlinear optical crystals, in recent years, were studied widely due to their wide application in various technologies like optical information processing, data storage and computing[1-5]. They are useful in various fields as a result of its high second-order optical nonlinearity, wide transmission range, good thermal and mechanical stability. In semi-organic crystals, the organic molecule binds and form a stable complex with an inorganic host which results in the development of new crystal having high optical nonlinearity[6]. The proper combination of organic and inorganic compound results in a good quality semi-organic crystal and they can play a better role in various linear and nonlinear applications[7]. The crystal derivatives of ammonium are used as optical modulators and frequency converters[8]. The tartaric acid is a α- hydroxyl carboxylic acid which when reacts with various salts produces a material that is suitable for second harmonic generation process. This article reports the growth of ammonium tartrate crystal from solution growth method. The structural characterization of ammonium tartrate crystal was reported by Yadav et al.[9], the characterization of ammonium tartrate crystal was done here.

MATERIALS AND METHODS

Ammonium tartrate crystal was obtained by solution grew solvent evaporation method. Ammonium carbonate and tartaric acid were taken in an equimolar ratio (1:1) and the solvent used here was double distilled water. The mixture was stirred well using a magnetic stirrer and a homogeneous saturated solution was obtained after 3 hours. This saturated solution was filtered using Whatmann filter paper. Then the filtered solution was covered using polythene paper and a few holes were made for solvent evaporation.

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Interpretation of molecular structure and third-order nonlinear optical studies of 4-methylbenzylammonium nitrate single crystal

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Abstract

4-Methylbenzylammonium nitrate ($4MLBANO_3$) has been successfully synthesized and good-quality single crystals have been grown from aqueous solution by slow solvent evaporation solution growth technique. The grown crystals have been analysed by different characterization techniques. Single-crystal X-ray diffraction analysis reveals that the grown crystal belongs to monoclinic crystal system with space group $P2_1/c$. UV–Vis–NIR spectral analysis shows that the crystal is transparent from 231 to 1100 nm. The functional groups, protonation of NH_2 and the formation of $4MLBANO_3$ crystal have been established from FTIR analysis. The molecular structure has also been confirmed by NMR spectroscopy. The protonation of NH_2 to NH_3^+ group is confirmed by shifts in the carbon signals observed in ^{13}C NMR analysis. The chemical shift of methylene group bonded with NH_2 group is observed at 46.21 ppm in pure 4-methylbenzylamine (4MLBA). In $4MLBANO_3$ this has been shifted upfield due to adjacent protonated NH_3^+ and it is observed at 42.32 ppm. In ^1H NMR, the NH_2 chemical shift of 4MLBA is observed at 1.42 ppm which is shifted to 8.096 ppm in $4MLBANO_3$. This confirms the protonation of NH_2. The third-order optical nonlinear susceptibility (χ^3), nonlinear refractive index (n_2) and absorption coefficient (β) have been calculated and the values are found to be 3.57×10^{-6} esu, 6.97×10^{-8} cm^2/W and 0.06×10^{-4} cm/W, respectively. The observed third-order nonlinear susceptibility value (χ^3) of $4MLBANO_3$ has been compared with $LiKB_4O_7$, VMST, $KBe_2BO_3F_2$, MMST and KDP single crystals.

1 Introduction

For the past few decades nonlinear optical crystals have become more significant in various disciplines of research. They contribute to many processes ranging from second harmonic generation (SHG), third harmonic generation (THG), frequency mixing, electro-optic modulation, optical parametric oscillation and optical bi-stability [1, 2]. Organic nonlinear optical crystals such as L-valinium picrate, 4*N*,*N*-dimethylamino-4-*N*-methyl stilbazolium tosylate (DAST), triphenylmethane, etc., exhibit good nonlinear optical properties [3–5]. Due to the low thermal and physical stability, organic crystals hardly withstand any laser beam impact. Also growing a bulk crystal for device application is difficult [6]. On the other hand, inorganic crystals such as potassium fluoroboratoberyllate (KBBF), barium calcium borate (BCB) exhibit good thermal, mechanical and deep UV transmission properties, though posses low nonlinear efficiency [7, 8]. To strike a balance between these two types of crystals and to improve their nonlinear, mechanical and thermal properties, organo-inorganic hybrid crystals like 4-dimethylaminopyridine potassium chloride, bis(L-asparaginato)zinc(II) are developed [9, 10]. In the past few years semi organic crystal growth has well evolved as a research discipline because of the presence of aromatic rings and existence of anion and cation exchange between organic and inorganic moiety. This owes a lot to its attractive properties such as high SHG and THG efficiency and better chemical, mechanical stability [11–13]. Semi-organic crystals that are grown in a centrosymmetric space group generate THG and are used in information processing and optoelectronic devices. Of these crystals, the metal coordination complexes of optimum polarizable organic molecules together with hydrogen bonds never inhibit transparency while increasing the thermal and mechanical stabilities of the crystal [14]. Attempts have been made by the several researchers to develop semi-organic crystals with good thermal and mechanical stability, good optical transparency and greater nonlinear efficiency. 4-Methylbenzylamine based semi-organic crystals such as

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Molecular structural confirmation and influence of hydrogen bond on third order nonlinear properties of bis(4-methylbenzylammonium) tetra chloridocadmate (II) single crystal

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ABSTRACT

An organo–inorganic optical crystal, Bis(4-methylbenzylammonium) Tetra chlorido cadmate (II) [4MLBACD], was synthesized and grown by solution growth solvent evaporation technique at a temperature of 37 °C. The single crystal X-ray diffraction study showed that grown crystal belongs to orthorhombic crystal system with *Pnma* space group. It has various functional groups such as protonated NH_3^+, Cd-Cl and CH which was well established by FT-Raman spectroscopy. The lower cut off wavelength of 4MLBACD was found at 219 nm and the good transparency range was observed from 219 nm to 1100 nm. The molecular structure was confirmed by ^1H NMR and ^{13}C NMR spectroscopy. The carbon-hydrogen framework of the organic part of 4MLBACD and the influence of inorganic moiety over organic moiety was well identified and established. The presence of hydrogen bond in the molecular structure enhances the third order susceptibility ($\chi 3$) and the value was found to be 4.03×10^{-6} esu. It was analysed by Z-Scan technique. The third order optical nonlinear parameter such as absorption coefficient (β), refractive index (n_2) and susceptibility ($\chi 3$) were also found.

1. Introduction

Chemists and Physicists of solid state research society were showing greater interest in synthesis and investigation of nonlinear optical nonlinear single crystals. The prominent quality initiates the fabrication of many novel devices in the field of optoelectronics and optical communication such as optical modulator, optical data storage and optical switches [1–4]. Generally organic crystals exhibit a better nonlinear optical efficiency but it was prone to its lower efficiency in physical and mechanical properties [5]. This results in the challenges to grow bulk crystal and going for device applications. To overcome this flaw the growth of semiorganic crystals was emerged. The semiorganic crystal has both the organic and inorganic quality, make the resultant crystal become a good candidate for various linear and nonlinear applications [6]. Usually to achieve nonlinear activity amino acids were considered to be a promising nominee due to their natural existence of dipolar nature (NH_3^+ and COO^-) [7]. In the present scenario, production of outstanding high potential new materials

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