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4	Dr. Kavitha S	Automated Error Detection for Python using Jenkins	Computer Science	Automated Error Detection for Python using Jenkins - International Research Journal of Engineering and Technology	2018	2395-0072
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PERCEPTION OF WORKING WOMEN INVESTORS ON VARIOUS INVESTMENT ALTERNATIVES, AT VELLORE DISTRICT

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ABSTRACT

Purpose: To identify the perception of women investors that influence the investment decision in the investment alternatives. To find out the purpose for choosing a particular investment alternative. To estimate the period of investment and level of investors preference on the best alternatives.

Research Methodology: Survey method is used for this empirical study.

Data collection: Self-administered questionnaire was used for collecting primary data. Convenience sampling method was used and 100 questionnaires were taken for analysis. Secondary data were also used.

Statistical tools: Frequency table and percentage analysis were used to analyse the data.

Findings: Safety and risk-free instruments form the reason for choosing a particular investment mode. The levels of preference of investment avenues are at higher level and return and sectors contribute much for their preference in their current investment. The study revealed that the bonds and debentures are less popular in Indian capital market.

Suggestions: Since recommendations is the significant factor in influencing investment behaviour for women investors, the study revealed that level of return and portfolio management plays a vital role in persuading the investors to decide on investment avenues. Women investors need more investment alternatives for their investment in Vellore city.

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SYNCHRONIZATION OF TIME AND WORK

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Abstract

Time has been explored different dimensions – spatial dimension – temporal dimension – objective time is related to public time – subjective time is interdependent –viewed in terms of validity – time is money is a modern interpretation of time – time work and money are inseparable faculties for success in life – money value of time – time wasters – Golden rules for the time orientation.

Introduction

Time has been explored by scientists, philosophers, historians and artists in different dimensions. It is one of the concepts with multiple images that provides a variety of experiences of time. Readers value time based on their experience of time. Some people view the spatial dimension of time, while others are concerned with the temporal dimension of time. Temporal dimension of time can be both subjective and objective. Subjective time has neither past nor future, and it is value an individual gives to time. Objective time is the time an individual synchronizes his or her private experience of time for the purpose of social action and communication. Objective time is related to public time and is noticed by the use of clocks and calendars. The personal or subjective time is interdependent on objective time, when time is viewed in terms of validity.

Time is of supreme value as it produces things of value in terms of the material conditions of life and in terms of the production of marketable goods. In today's world time is the most important commodity because it makes possible the production of all commodities. "Time is money" is a modern interpretation of time. Recent perception of time considers, man as a commodity and refers to 'man-hours'. History views time as a fragment on earth while economics has reduced man to a

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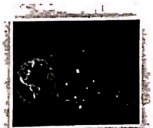

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ANALYSING CODE QUALITY FOR RUNTIME CODE SMELL DETECTION USING McCabe

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ABSTRACT

Code smells are code fragments that can hinder the evolution and maintenance of software systems. Their often informal definitions lead to the implementation of multiple detection techniques and tools. Therefore, the dissertation performs one exploratory two experimental evaluations to evaluate four code smell detection tools, namely inFusion, JDeodorant, JSpIRIT, and PMD, considering the detection of God Class, God Method, and Feature Envy. Investigated the evolution of code smells by manually identifying instances in all versions of two software systems. The tools to all versions of both systems to analyze their recall and precision in detecting the code smells previously identified and code smells are present from the moment of creation of a class or method in 74.4% of the cases of MobileMedia and 87.5% of Health Watcher. McCubes radio are used to test code quality is mapped with issues handing performance techniques. The test code quality measured by Java Script. To describes our experience on using different tools for code smell detection. The experimental result show that the probability measuring for coding script, visual Inspection and computation of time complexity. The quality of code detection to improve by 0.15 to 6.0E-5 gets the error similarity.

INRODUCTION

Software systems are increasingly important to society, making software quality control essential. Software quality is largely dependent on the structural quality of code; that is, structural issues can negatively impact the overall quality of software systems. Structural issues can manifest in a system as code smells. Code smells are symptoms of poor design and implementation choices. The presence of code smells indicates that there are issues with code quality, such as understandability and changeability, which can lead to a variety of maintenance problems, including the introduction of faults. For instance, a God Class is a class that concentrates the responsibilities of a system. In other words, more and more responsibilities were added to a single class until it became too complex and harder to understand. Misunderstandings during changes of this class can increase even more code complexity or even introduce faults in the system. Therefore, God Classes and other code smells can negatively impact the development and maintenance process of software systems.

The main goal of the research is to analyze code smell detection tools with the purpose of evaluating,

(a) A ability to detect actual code smells instances, and

(b) A level of agreement, from the point of view of developers and researchers in the context of Java.

LITERATURE SURVEY

Code smells refer to any symptom in the source code of a program that possibly indicates a deeper problem (Fowler 1999). They are symptoms of poor design and implementation choices that may cause problems for further development, maintenance, and evolution of software systems (Lanza and Marinescu 2006) (Yamashita and Counsell 2013). Once code smells are located in a system they can be removed by refactoring the source code (Fowler 1999). However, detection in large software systems is a time and resource-consuming, error-prone activity (Travassos et al. 1999), and manual inspection is slow and inaccurate (Langelier et al. 2005). Tools for automatic or semi-automatic detection of code smells support developers in the identification of "smelly" entities. The implementation of detection techniques allows the tools to highlight the entities that most likely present code smells. Fortunately, there are many software analysis tools available for

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AUTOMATED ERROR DETECTION FOR PYTHON USING JENKINS

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Abstract:

The Python programming language is typically not seen as a language that can be formally verified. This research attempts to bridge the gap by introducing novel techniques to annotate Python programs with type specifications, contracts, and translate them to statically verifiable components. In this proposed method a novel has introduced a tool, Python Correct, which uses these techniques to perform extended static checking (ESC) on Python programs, as well as to generate executable test cases through symbolic execution. These analyses serve to improve code quality and development productivity. One of the problems that occur when writing contracts is that whenever the program cannot be verified by an automatic verifier, the cause could lie in three different reasons. Aim to show that Python programs can benefit from existing static verification tools and techniques if they are simply made available to Python developers. The goal of program verification is to prove mathematically that the given program fulfils a given formal specification. The consequence is that for every input that fulfils the precondition, post condition and all loop invariants have to hold. The experimental result shows that accuracy of error code and validates the run time process in the framework. To reduce the minimum time of error detection.

Introduction

Software testing is well established as an essential part of the software development process and as a quality assurance technique widely used in industry. Furthermore, literature suggests that 30 to 50% of a project's effort is consumed by testing. Developer testing (a developer test is "a codified unit or integration test written by developers") in particular, has risen to be an efficient method to detect defects early in the development process. In the form of unit testing, its popularity has been increasing as more programming languages are supported by unit testing frameworks (e.g., JUnit, NUnit, etc.).

The main goal of testing is the detection of defects. Developer testing adds to this the ability to point out where the defect occurs. The extent to which detection of the cause of defects is possible depends on the quality of the test suite. In addition, Beck explains how developer testing can be used to increase confidence in applying changes to the code without causing parts of the system to break. This extends the benefits of testing to include faster implementation of new features or refactoring. Consequently, it is reasonable to expect that there is a relation between the quality of the test code of a software system and the development team's performance in fixing defects and implementing new features.

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RESEARCH ARTICLE OPEN ACCESS

A COMPARATIVE ANALYSIS OF OPEN SOURCE AUTOMATED WEB TESTING TOOLS

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Abstract: *To improve the performance of software engineering processes and imperative to identify and eliminate rework that could have been avoided. While security or its absence is a property of running software many aspects of software requirements, design, implementation and testing contribute to the presence or absence of security in the finished product. Software is continues to function correctly under malicious attack. Verification and validation (V&V) techniques like security testing, code review and formal verification are becoming effective means to reduce the number of post release vulnerabilities in software products. The aim of reduce the dimensionality, removing irrelevant data, increasing learning accuracy and improving result comprehensibility. The feature subset selection algorithm and support vector machine as involves identifying a subset of the most useful features that produces compatible results as the original entire set of features. A feature subset selection algorithm may be evaluated from both the efficiency and effectiveness points of view. A feature subset selection algorithm is used for software vulnerabilities such as verification and validation. The support vector machines are supervised learning models with associated learning algorithms that analyze data and anomaly detection, predict the vulnerabilities in software. The used for classification and regression analysis to result.*

Keyword: ***Quality of Software Product, Malicious Attack, Measurement Feature, Testability, anomaly Detection***

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I. INTRODUCTION

Project Management is a process. Tasks and activities are planned, organized, assigned resources and executed within a given budget and period. There are several software management models that are used in the process of managing a software project. Since there are many techniques and models, some of them are selected and analyzed. This is to help managers in making a decisions to choose a tool to use depending on their needs. The main reason for looking at the software models is the limited information on the usage of the models.

The purpose of this thesis is to research on the most used software project management models. The models that are reviewed are the currently being used. General information on each of the selected models will be discussed with emphasis on their key points, advantages and disadvantages. There are several software development models that will be highlighted. The models that will be discussed to software project management include; Rational Unified Process (RUP), Dynamic Systems Development Method (DSDM) and extreme Programming (XP).

Software Project

A project is a well-defined task, which a collection of several operations is done in order to achieve a goal every project may have a unique and distinct goal. Project is not a routine activity or day to day

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SECURING DIGITAL IMAGE USING STENOGRAPHY AND HYBRID CRYPTOGRAPHY

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Abstract-

Steganography is a method of hiding secret messages in a cover object while communication takes place between sender and receiver. Image based encryption in data transmission. At present, AES, MD5 and RSA various cryptography algorithms have been proposed and implemented. Those algorithms are classified into symmetric and asymmetric algorithms based on the number of keys used. Even though several algorithms are used for data security, they are compromise the security of the encrypted and decrypted image files using the hybrid algorithm. The integrity can be checked while pre-processing the image before encryption. This may enhance the security of the image files and the execution time of the hybrid algorithm may be reduced by changing the combination of the algorithms. The experimental result shows how of hybrid algorithm improved the security of image encryption. The performances, security, computational cost and throughput are evaluated through the NS2 based simulation on different parameters.

Introduction:

Cryptography is a technique used to avoid unauthorized access of data. It has two main components the encryption algorithm, and the Key. The strength of these encryption algorithms depends upon their key strength. Multiple keys can also be used for encryption. Strong encryption algorithms and optimized key management techniques are used to achieve confidentiality, authentication and integrity of data and to reduce the overheads of the system. Cryptography is basically divided into two categories the Symmetric Cryptography and Asymmetric Cryptography.

In symmetric cryptography the key used to encrypt the message is the same as the key used for decrypting the message whereas in asymmetric cryptography different keys are used for encryption and decryption. Asymmetric algorithm are relatively slower than symmetric algorithms but provides a good security.

Digital images are a commonly shared and exchanged through the network. To protect the information from attackers and to communicate the information in a secure manner the two techniques cryptography and steganography are combined. Cryptography or secret writing involves scrambling of a message or creating a digest of the message. Steganography or covered writing means concealing the message by covering it with something else.

Cryptography also known as secret writing, is used to cipher the information, that is it scrambles the information by using a key so that a third person cannot access the information without the key and its goal is to make a data unreadable by a third party.

The goals of cryptography are as follows,

Authentication: The process of proving one's identity.

Confidentiality: Ensuring that no one can read the message except the intended receiver.

Integrity: Assuring the receiver that the received message has not been altered in any way from the original.

Non-repudiation: A mechanism to prove that the sender has really sent the message.

New image steganography techniques are presented to answer the need for software that makes optimum use of hiding space in an image without creating any visible distortions. Along with a highly secure method for randomized encoding, techniques for adaptive encoding were incorporated with the design of the software. These techniques include capacity evaluation, minimum-error

GOODS AND SERVICES TAX A MILESTONE IN INDIAN TAXATION SYSTEM

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Abstract

The Goods and Services Tax has revolutionized the Indian taxation system. The GST Act was passed in the Lok Sabha on 29th March, 2017, and came into effect from 1st July, 2017.The previous tax structure in India was awfully dense. Multiple taxes were imposed on a single commodity. Central Excise Duty, Central Sales Tax and Service Tax are levied by Central Government and State VAT, Entertainment and Amusement Tax, entry tax, octroi, taxes on lottery and gambling etc. are levied by State Government. Now all these taxes are subsumed into GST. This research will provide the valuable information regarding GST, its mechanism and benefits.

Keywords: Input Tax credit, Intra State Supply, Inter State Supply, Cascading Effect, Unified Tax

I. INTRODUCTION

Tax policies play an important role on the economy through their impact on both efficiency and equity. A good tax system should keep in view issues of income distribution and, at the same time, also endeavour to generate tax revenues to support government expenditure on public services and infrastructure development.

Goods and Services Tax (GST)is one of the indirect tax systems which is already adopted by more than 160 countries all over the world and France is the first country ever with introduction of GST. Every country has its own taxation system by their tax structure and methods.

The introduction of Goods and Services Tax (GST) would be a very significant step in the field of indirect tax reforms in India. By amalgamating a large number of Central and State taxes into a single tax, it would mitigate cascading or double taxation in a major way and pave the way for a common national market.

GST is a consumption-based tax. It is based on the "destination principle." GST is applied on goods and services at the place where the final consumption takes place. It is collected on value-added goods and services at each stage of sale or purchase in the supply chain.

GST rates of some countries are given below

Country	Rates of GST
Australia	10%
France	20%
Canada	5%
Germany	19%
Japan	8%
Singapore	7%
New Zealand	15%

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SYNTHESIS, CHARACTERIZATION AND PHOTOLUMINESCENCE PROPERTIES OF CONDUCTING POLY (*O, M, P*- AMINOTHIOPHENOL)/CuO NANOCOMPOSITES

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ABSTRACT

The poly (o,m,p-aminothiophenol)/CuO nanocomposites were synthesized by in situ chemical oxidative polymerization method using ammonium persulphate as an oxidant in an aqueous HCl. The synthesized polymer nanocomposites were characterized using FTIR, UV-VIS, XRD, SEM and TEM. The thermal stabilities of the synthesized polymer CuO nanocomposites were determined from TGA/DTA studies. The electrical conductivity and photoluminescence studies were carried out for the synthesized Poly (o,m,p-aminothiophenol)/CuO nanocomposites. The study of electrical conductivities of the synthesized poly (o,m,p-aminothiophenol)/CuO nanocomposites showed that they were semiconducting in nature and the conductivites were in the order of $\times 10^{-4}$. The results of photoluminescence studies of poly (o,m,p-aminothiophenol)/CuO showed that they can act as blue light emitters and hence they can be used in the light emitting diodes.

KEY WORDS

Conducting polymers, nanocomposites, aminothiophenol, electrical conductivity, photoluminescence study.

1. INTRODUCTION

Nanocomposites are a special class of materials having unique properties and wide applications in diverse areas. [1-4] In recent years, researchers focused on synthesizing polymer metal nanocomposites, due to their unique electronic, optical, mechanical, magnetic, and chemical properties. Important aspects of the chemistry involved in the formation of these systems are uniformity, phase continuity, domain sizes, and the molecular mixing at the phase boundaries, which all have a direct influence on optical, physical, and mechanical properties.[5] Copper oxide (CuO) generally has the characteristics of stable oxides of copper, but its nanocomposite has change in its physical, chemical and magnetic properties.[6] It has many spectrums of applications such as electro optical properties, catalysis, sensors, solar cells and conducting film.

Polyaniline has received much attention because of its high electrical conductivity and ease of preparation at low cost. Metal oxides dispersed polymer composites have attracted a great deal of interest from researchers, because they frequently exhibit unexpected hybrid properties synergistically derived from both components. A derivative of polyaniline, aminothio phenols (ATP) are interesting electrochemical materials since thiol and amine have different reactivities, [7-9] the effective use of this molecular assembly may give rise to unique morphologies leading to multi-purpose chemical strategies. Moreover, the aromatic (conjugated π-electron system) ring of ATP intensifies the electrical coupling. Therefore, they can show electrochemical behavior resembling anilines and phenols. In recent years, electrical, optical, and dielectric properties of conducting polymers like polyaniline and substituted

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Adsorption of Methylene Blue dye using Polymethacrylic acid modified with dihydroxy benzene-Redox polymer

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ABSTRACT *In the present work, Poly Methacrylic Acid was synthesized by radical polymerization and functionalized with catechol and hydroquinone by an oxidative decarboxylation using potassium dichromate as an oxidant. The percentage of substitution was found to be 91% and 94.5% for PMAA/CAT and PMAA/HQ respectively. The modified polymers were used as an adsorbent to remove Methylene Blue dye from aqueous solution. The effect of various parameters, such as contact time, pH, dye concentration, and adsorbent dosage, were systematically examined and fixed the optimum time, pH, dye concentration and the adsorbent dosage for the effective removal of methylene blue from the aqueous solution. The adsorption capacity of PMAA/CAT and PMAA/HQ were found to be24.3mg/g and24.5mg/g with the adsorption efficiencies of 97% and 98% at pH 7 studied for 50 minutes with the initial dye concentration of 25mg/L for 0.1g/L of the adsorbents. The changes on the surface of the polymers before and after the adsorption was analysed using FTIR specra and SEM images and found to have considerable changes after the adsoption of the methylene blue. Equilibrium isotherms like Langmuir and Freundlich models were carried out for modified PMAA and were found to follow Langmuir adsorption isotherm model better than the Freundlich model. The adsorption kinetic study were carried out for pseudo first-order and pseudo-second order and results showed that the adsorption of MB on modified PMAA were controlled by pseudo- second- order kinetics.*

Keywords: *Polymethacrylic acid, Catechol, Hydroquinone, Methylene Blue, Adsorption Isotherm, Adsorption Kinetics.*

1. Introduction

Effluents from industries like textile, paper, leather dying, cosmetics, pharmaceutical and food coloring, etc are the main contributors to colored effluent and water pollution. There are more than 1,00,000 commercially available with over 7×10^5 tons of dyes manufactured per year. It was observed that 2% of dyes discharged from manufacturing unit, while 10 percent was discharged from textile and other industries [1-3]. Discharging of highly colored effluent in surface water bodies can hinder penetration of light, photosynthesis, and food chain in aquatic ecosystem and also affect aesthetic merits of the environment. In addition, some dyes have been reported either toxic or mutagenic and carcinogenic for the aquatic organism and human being[4-6]. Methylene blue (MB) is the widely used organic substance for dying cotton, wood, and silk and it can cause eye burns which may lead to permanent injury to the eyes of human beings and animals. On inhalation, it affects the respiratory system and may cause nausea, vomiting, profuse sweating, mental confusion, and methemoglobinemia. Therefore it is important to remove MB from wastewater[7]. Most of the dyes are stable to photodegradation and biodegradation [8-10]. Thus colored wastewater poses a challenge to the conventional wastewater treatment techniques. There are several methods such as coagulation and flocculation[11], membrane separation[12], oxidation or Ozonation[13, 14], electrocoagulation[15] and adsorption[16] have been employed for removing dyes. Among these techniques, adsorption is the excellent, cheap, effective and potential technique for removing dyes from industrial effluents [17].

Polymeric adsorbents are superior to other solid adsorbents due to their large surface area and adjustable surface chemistry. Polymers bound with redox units, being either internal parts of the polymer matrices or connected once are distinguished by oxydo-reduction chemistry features. The redox entities are an organometallics such as metallocenes and organics such as mercaptyl, catechol, hydroquinone and pyridinium salts. Their functional groups of redox type are a pendant group or an internal part of the polymeric chain. The redox polymers exhibit redox properties, adsorption of metal cations through their chelating ability [18-20] of polymers with desired functional groups and it can be obtained either synthesizing new monomers with functional group interacting with the target cations, followed by polymerisation or by converting the groups in the existing polymer in to the desired functional group by suitable chemical reaction[21].

In the present investigation, an attempt was made to modify the polymethacrylic acid with dihydroxy benzenes like catechol and hydroquinone. The modified polymethacrylic acid such as PMAA/CAT and PMAA/HQ were used to remove Methylene blue, a cationic dye from an aqueous solution and their adsorption capacities and efficiencies were compared. To examine the optimum adsorption capacity, the effective

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Adsorption of Methylene Blue Dye Using Polymethacrylic Acid Functionalized with Dihydroxy Benzene

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Abstract

Poly Methacrylic Acid was synthesized by radical polymerization and functionalized with dihroxy benzenes like catechol and catechol-hydroquinone by an oxidative decarboxylation using potassium dichromate as an oxidant. The percentage of substitution was found to be 91% and 95.7% for the synthesized PMAA/CAT and PMAA/CAT-HQ respectively. The modified polymers were used as an adsorbent to remove Methylene Blue dye from aqueous solution. The effect of various parameters, such as contact time, pH, dye concentration, and adsorbent dosage, were systematically examined and fixed the optimum time, pH, dye concentration and the adsorbent dosage for the effective removal of methylene blue from the aqueous solution. From the study, the adsorption capacity of PMAA/CAT and PMAA/CAT-HQ were found to be13.3mg/g and14.7mg/g with the adsorption efficiencies of 95% and 98% at pH 7 studied for 50 minutes with the initial dye concentration of 25mg/L for 1.0g/L of the adsorbents. The changes on the surface of the polymers before and after the adsorption was analysed using FTIR spectra and SEM analysis and found to have considerable changes after the adsorption of the methylene blue. Adsorption isotherms like Langmuir and Freundlich models were carried out and were found to follow Langmuir adsorption isotherm model better than the Freundlich model. The adsorption kinetic studies were carried out for pseudo first-order and pseudo-second order and results showed that the adsorption of MB on modified PMAA was controlled by pseudo- second- order kinetics.

Keywords

Polymethacrylic acid, Catechol, Hydroquinone, Methylene Blue, Adsorption Isotherm, Adsorption Kinetics.

*****

1.INTRODUCTION

The introduction of waste products into the environment is a significant problem. Dyes have been commonly used in many branches of industry, such as textile, paper, leather dying cosmetics, pharmaceutical and food, effluents from those industries are the main contributor to water pollution. There are more than 1,00,000 commercially available dyes with over 7×10^5 tons of dyes manufactured per year. It was observed that 2% of dyes discharged from manufacturing unit,

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Dielectric Properties and Fluorescence Applications of Conducting Poly (M-Aminothiophenol) and Its Nanocomposites

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Abstract

Poly(m-aminothiophenol) and its ZnO, CuO nanocomposites are synthesized by chemical oxidative polymerization method using ammonium persulphate as an oxidant in an aqueous HCl. The synthesized poly(m-aminothiophenol) and its nanocomposites are characterized using UV-VIS, FT-IR, XRD, TGA, SEM and TEM. The study of electrical conductivity shows that the synthesized polymer poly(m-aminothiophenol) and its nanocomposites are semiconducting in nature with the order of $\times 10^{-5}$ and $\times 10^{-4}$. The conductivity values are higher for the polymer ZnO and CuO nanocomposites compared to the polymer. The dielectric studies of the polymer and its nanocomposites show that they are lossless materials, and this could be widely applied in the fields of semiconductor, batteries etc. Fluorescence properties of poly(m-aminothiophenol) and its nanocomposites are studied. The results of fluorescence studies of polymer and its ZnO and CuO nanocomposites exhibiting blue light emission and hence they can be used as the light emitting diodes in photonic and electronic applications.

Keywords

Conducting polymers, Poly(aminothiophenol), nanocomposites, dielectric properties, fluorescence.

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INTRODUCTION:

Conducting polymers are the subject of scientific interest due to their unique high electrical conductivity and numerous potential applications. Conducting polymers are typically utilized in electrical, optical and electronic devices. The dielectric properties of heterogeneous polymers [1] play an important role in device applications such as high-performance capacitors, electrical cable insulation, electronic packaging etc. Conducting polymers are usually poly-conjugated structures, which are insulators in their pure state; but when treated with oxidizing or reducing agents they can be converted into polymer salts having reasonable electrical conductivity. Polyaniline (PANI) is one of the most promising conducting polymers because of its unique properties like ease of preparation in aqueous medium, good stability in air, simplicity in doping, improved electronic properties, controllable by oxidation and protonation state, excellent environmental stability, moderately high conductivity in the doped state and its potential applications in electronic devices.[2,3] Incorporation of

Chemical Synthesis, Spectral Characterization and Electrical Conductivity Behavior of Poly(2-Methoxyaniline-Co-2-Chloroaniline) and its CuO Nanocomposite and Polypropylene Glycol Blend

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Abstract

Copolymerization of 2-chloro aniline and 2-methoxy aniline was achieved chemically by oxidative polymerization technique using ammonium persulphate as the oxidizing agent in acidic medium in the presence of sodium lauryl sulphate, an anionic surfactant. Copolymerization was also carried out in the absence of the surfactant to study the effect of surfactant on the thermal stability and electrical conductivity. The copolymer composite with CuO nano particles and blend with poly propylene glycol (PPG) has been reported for the first time. The materials synthesized are soluble in common organic solvents such as CCl_4, DMSO, ethanol and DMF. The characterization has been carried out using FTIR spectroscopy, UV-Visible spectroscopy, ^1H NMR, XRD and TEM. The presence of sodium lauryl sulphate reduces the thermal stability of the copolymer as shown by TGA/DTA analysis. The composite and blend are thermally more stable than the copolymer. The electrical conductivity measured is in the semiconducting range and of the order of 10^{-3} Scm^{-1}. The change in conductivity due to the addition of SDS during the copolymerization is only marginal. The TEM image suggests that the copolymer CuO nanocomposite has been formed in which the CuO particles are embedded in the copolymer matrix.

Keywords: poly (2-methoxy aniline-co-2-chloro aniline); conducting polymer; nanocomposite

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INTRODUCTION

Conducting polymers have in the last few decades attracted researchers both from fundamental and applied research perspectives due to their varied applications in electronics. Typical conducting polymers include polyacetylene, polyaniline, polypyrrole, polythiophene, poly(para phenylene), poly(phenylenevinylene), poly furan etc. [1]. Among the whole class of conducting polymers, polyaniline has a special situation because of its simple synthesis, environmental stability and doping with protonic acids[2,3]. The applications of polyaniline in various important fields include active electrodes[4], electromagnetic shielding materials, microelectronic materials and electrochromic devices[5], anti-fouling- corrosive coatings[6,7], anti-static coating[8], rechargeable batteries[9,10], energy storage and transfer, redox colloids for steric stabilization[11], indicators and sensors [12,13].

In spite of the various advantages, poly aniline has certain limitations when it comes to its applications as it is neither soluble nor fusible in organic solvents as well as water [14]. Inorder to overcome such disadvantages, attempts have been made by the use of molecular design, modification of the monomer structure, use of functionalized acid dopant, formation of blends/composites and copolymerization [15, 16]. Among the techniques developed for improving the processability, copolymerization is the easiest and the best method of introducing changes in the polymer properties and widely used in the production of commercial polymers.

With regard to poly aniline based copolymers, a pioneering work have been done by Weist et al. [17, 18] who showed that aniline could be copolymerized with o-toluidine to control conductivity in a broad range. Bergeron and Dao [19] have reported the electrosynthesis of

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Synthesis and Characterization of Poly(2-Chloroaniline), Its Starch and Silk Blends and ApplicationsIn Lithiumion Batteries

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Abstract

Poly(2-chloroaniline) and its blends, poly(2-chloroaniline)–blend-starch and poly(2-chloroaniline)-blend- silk were synthesized via interfacial polymerization using ammonium per sulphate as oxidant, HCl as dopant and chloroform as the solvent. This technique is very simple and flexible to make nanofibers by suppressing the secondary growth stage. The resulting polymer and its blends were characterized by FT-IR spectroscopy,revealed that there is a strong interaction between poly(2-chloroaniline) chains and starch/silk chains. Thermal stability of these polymer materials were confirmed by using thermogravimetric analysis and electrical conductivity measured indicate the semiconducting behaviour. The poly (2-chloroaniline)-blend silk has been tested as anode in Li ion batteries

Selection and peer-review under responsibility of the scientific committee of the Materials For Energy and Environment.

Keywords: Poly (2-chloroaniline); interfacial polymerization; blends; nanofibres; Li ion battery.

1. INTRODUCTION:

Conducting polymers are rapidly gaining attraction with improved processable materials having unique electrical, electrochemical and optical properties [1,2].The major problems of the conducting polymers are the non-processability by solvent or multitechniques and degradation before reaching the melting point. Several efforts to improve the processability of the most important conducting polymers have been reported [3].Among the conducting polymers, polyaniline occupies a prime position, because of its unique characteristics like inexpensiveness, ease of processing and excellent stability in air and potential applications such as sensors, light

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Interfacial Polymerization and Characterization of Poly (2-Chloroaniline)-$Nife_2o_4$ Nanocomposite

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Abstract
Due to an increase in the demand of power technologies for portable electronics, conductive polymers integrated with inorganic metal oxides have emerged as materials for energy storage and conversion devices such as batteries and fuel cells. In this study, binary metal oxide was prepared by simple co precipitation method and mixed with poly(2-chloroaniline) *via* interfacial polymerization. The resulting nanocomposite material was characterized by X-ray diffraction (XRD), Fourier Transform Infrared spectroscopy (FT-IR) and Ultraviolet - Visible spectroscopy (UV-Vis) and EDAX. The thermal stability of the nanocomposite was investigated by thermogravimetric analysis (TGA).

Keywords
nanocomposite, interfacial polymerization, metal oxide, poly(2-chloroaniline)

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INTRODUCTION:

Rapid increase in global energy use and growing environmental concerns have prompted in the development of low-cost, efficient, safer, environmentally benign materials for electrochemical energy conversion and storage. Some electrochemical devices like fuel cells, batteries, and super capacitors show great promise for large scale energy conversion and storage applications.

Conducting polymers are competing materials for organic-inorganic hybrid composites in lithium batteries due to their electrical conductivity and high coulombic efficiency. Among the conducting polymers, poly(3,4-ethylenedioxythiophene), polypyrrole and polyaniline, have attracted great interest in energy storage, sensors and electrochromic devices since the discovery in 1960 [1]

Many transition metal oxides such as $LiCoO_2$ and $LiNiO_2$ have been investigated as cathode materials for lithium ion batteries. [2] Metal oxides usually have the lithium storage properties but lacking in the conductivity and cyclability that are vital for industrial applications.

Metal oxide modified conducting polymers which result due to the incorporation of conducting polymer with inorganic redox oxide act as a hybrid or composite, suitable for electrochemical Li intercalation and is used as electrodes for rechargeable lithium batteries. The successful incorporation of inorganic moieties into the conducting polymer matrix enhances the electron transfer rate at the modified surface/electrolyte interface. [3]

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Synthesis, Characterization and Electrical Conductivity Studies on Poly (2-Chloroaniline-Co-2-Methoxyaniline)-Composite-Na Bentonite Clay

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Abstract

The poly(2-chloroaniline-co-2-methoxyaniline)/Na-Bentonite nanocomposite was prepared by *in situ* chemical oxidative polymerization method using ammonium persulphate (oxidant), HCl (dopant) and sodium lauryl sulphate(surfactant). The material was characterized with FTIR and UV-Visible spectroscopic techniques, TGA/DTA analysis and conductivity measurements. The crystallinity of the copolymer composite was reduced when compared to pure copolymer. The conductivity of the copolymer composite was 2.305 x 10^{-6} S/cm and it was greater than the conductivity of the pure copolymer. The electrical conductivity measurements have been discussed in detail using dielectric constant, dielectric loss spectra, modulus spectra and tangent loss spectra.

Keywords

copolymerization, electrical conductivity, Na- Bentonite, poly(2-chloroaniline-co-2-methoxyaniline), dielectric constant.

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INTRODUCTION:

Conducting polymers are named as "synthetic metals" due to their electric, electronic, magnetic and optical properties inherent to metals or semiconductors. [1-3] The conductivity of conducting polymers assigned to the delocalization of π- bonded electrons over the polymeric backbone, show electronic properties, such as low ionization potentials and high electron affinities.[4,5] Use of conducting polymers gives us impedence type gas sensors[6,7] for low cost, which are highly sensitive and selective at room temperature.[8] Recently, conducting polymer nano materials have offered a great possibility for novel applications.[9-13] Polymer based composites with electroconductive properties have been used in numerous high technology applications such as inorganic light emitting diodes (OLED), polymer solar cells, sensors, energy storage, electro-optical devices wireless communication, satellite television, heating systems and electromagnetic shielding [14-16]. Among organic-inorganic nano composites, polymer-clay nano composites are most prevalent and interesting due to their unique properties as well as wide applications,

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ARTICLE

Structure investigation, spectral characterization, electronic properties, and antimicrobial and molecular docking studies of 3′-(1-benzyl-5-methyl-1*H*-1,2,3-triazole-4-carbonyl)-1′-methyl-4′-phenyl-2*H*-spiro[acenaphthylene-1,2′-pyrrolidine]-2-one

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A new compound, 3′-(1-benzyl-5-methyl-1*H*-1,2,3-triazole-4-carbonyl)-1′-methyl-4′-phenyl-2*H*-spiro[acenaphthylene-1,2′-pyrrolidin]-2-one (BTANP), was prepared, analyzed by Single Crystal X-ray Diffraction (SCXRD), and investigated spectroscopically, which includes NMR, FT-IR/Raman, UV–Vis, and fluorescence studies. All the computations have been made with the resource of density functional theory (DFT) (B3LYP/6-311G [d,p]) and compared with the measured values. The vibrational assignments with potential energy distribution (PED) percentages were figured out using the VEDA4 program. The computed ^{1}H-NMR and ^{13}C-NMR chemical shifts were acquired using the gauge invariant atomic orbital (GIAO) technique and were contrasted with determined records. The computed electronic (NBO, NLO, HOMO-LUMO, chemical reactivity descriptors) and thermodynamic properties were also scrutinized and elucidated. The BTANP was evaluated for antimicrobial activity toward few bacterial and fungal strains and was also compared with standard drugs. In addition, molecular docking mockups were executed on BTANP against topoisomerase II gyrase and human lanosterol 14 α-demethylase enzymes.

KEYWORDS

biophysics, density functional calculations, molecular modeling, spectral, spiro [acenaphthylene-1,2′-pyrrolidine], structure activity relationship

1 | INTRODUCTION

The growth and spread of multidrug and extensively drug-resistant microbes have stimulated research exertions worldwide. The molecular exploitation of auspicious prime molecules results in a leading line of a method to widen novel drugs.[1] Hence, the innovation of new as well as influential antimicrobial activity is the finest method to overwhelm microbial confrontation and extend new therapy routes.[2] In the modern era, much consideration has been centered on spiro compounds, specifically on spiro acenaphthylene pyrrolidines, because of their exciting biological properties. They are found to exhaust many biological activities, such as antimicrobial, antitumor, and antibiotic activities.[3] Due to the numerous bioactive and medicinal features of pyrrolidines and associated heterocyclic compounds, the compound has received significant interest in the medical field because of widespread medical needs.[4] The remarkable biological properties of these molecules are instigated by the heterocyclic center, which includes pyrrolidine-2,4-dione (natural tetrameric acids).[5]

Molecular simulation is a hypothetical tactic to detect the latest medications and to locate the interaction between ligand and protein as a way to envisage the nature of ligand in the active location of an objective enzyme. Topoisomerases II

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Thermal and Electrical Transport Properties of O-Substituted Polyanilines Encapsulated with Sio_2 Nanoparticles

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Abstract
Poly (2-chloroaniline)/SiO_2 and Poly(2-methylaniline)/SiO_2 nanocomposites were synthesized by *in situ* chemical oxidative polymerization technique. The nano composites were characterized by FTIR, NMR and UV- visible spectroscopic techniques, XRD, TEM, TGA and DTA. The thermal stability was confirmed by the IPDT and OI calculations. The electrical conductivity and dielectric properties were investigated. The dielectric constant decreased with increase in frequency in the low frequency region due to electrical relaxation process. At high frequencies, dielectric constant was independent of frequency. At low frequency there was a strong frequency dispersion of permittivity and above 3 Hz, a frequency independent behavior in permittivity was observed.

Keywords
Nanocomposites, Oxidative polymerization, Electrical conductivity, Dielectric, Electrical relaxation.

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INTRODUCTION:

Conducting polymer nanocomposites possess the advantages of both low dimensional systems like nanostructure filler and organic conductors like conducting polymer. The reinforcement of polymers is done by fillers, which play a major role in strengthening the properties of the nanocomposites. Uniform dispersion of the nanosized filler particles produces ultra large interfacial area per volume between the filler and the host polymer [1]. Polymer-based composites were reported in the 1960s as a new paradigm in material science. In the past twenty years, three major inorganic materials acting as nanofillers have been used to prepare organic-inorganic nanocomposites (1) layered materials such as clay[2, 3], (2) tubular materials such as carbon nanotubes (CNTs)[4], and (3) spherical materials such as SiO_2 particles[5] as well as other synthetic materials[6]. Conducting Polymer inorganic nanocomposites attracted both fundamental and practical interest because of their different chemical, biological and physical properties and application in high density magnetic recording, catalysis, magnetic resonance imaging, energy conversion etc. [7-10]. Among all the conducting polymers, Polyaniline is one of the most promising conducting polymers due to its ease of preparation, good environmental stability, better electronic properties, low cost, low density and its applications in electrochromic displays, electro

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Wollastonite/forsterite composite scaffolds offer better surface for hydroxyapatite formation

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Abstract. The present work deals with a comparative study of ceramic/ceramic composites for the development of scaffolds for biomedical applications. Wollastonite and forsterite were synthesized by a sol–gel combustion method. The influence of constituents and composition on apatite deposition was studied by fabricating wollastonite/forsterite composites. The X-ray diffraction pattern explains the bone like-apatite deposition within early stages of immersion. The atomic force microscopy micrographs revealed that with an increase in wollastonite content in the composites the roughness was enhanced. Dissolution studies further confirmed the rapid consumption of Ca and P ions from the simulated body fluid. Hence, apatite formation was observed to be more on the surface of a composite containing a higher amount of wollastonite. The results suggest that composites have more influence on the biomineralization activity when compared with pure bioceramics.

Keywords. Wollastonite; forsterite; composites; roughness; simulated body fluid; apatite.

1. Introduction

The major requirements for a typical biomaterial are biodegradability, enough strength and excellent efficiency to interact with the surrounding tissues and bones in the body. These criteria can be achieved by developing bioactive porous ceramic–ceramic scaffolds which can trigger the regeneration of new bone tissues and the biomechanical load tolerance during bone formation [1–4]. Forsterite (Mg_2SiO_4) is a bioceramic having mechanical properties superior to hydroxyapatite (HAp) and bioglass [5]. The role of divalent cations like Mg^{2+} in bone remodelling, skeletal development, human metabolism and cellular processes is well established. The *in-vitro* studies of forsterite reveal poor apatite deposition ability and an extremely slow degradation rate [6]. Moreover, the apatite formation on the surface of forsterite can be induced by fabricating its composites [7]. It is reported that nanocrystalline forsterite can enhance the fracture toughness of the bioactive glass matrix without deteriorating its biomineralization properties [8]. The HAp–forsterite–bioactive glass nanocomposite on a 316 litres stainless steel shows an increase in the HAp formation with an increase in the forsterite amount in the composite [9]. Recently, a calcium silicate/HAp nanocomposite has shown improved mechanical properties and bioactivity for HAp with the increase in calcium silicate concentration [10].

There are several reports claiming the enhancement of mechanical properties with the incorporation of forsterite but very few studies have been published to enhance the apatite deposition ability of forsterite bioceramic. Thus, the present work is an attempt to improve the reactivity of forsterite by fabricating its composites with bioactive wollastonite. Wollastonite and forsterite powders were synthesized by the sol–gel combustion method and mixed in different ratios. The properties of composites were compared based on their compositions. The fabricated composites were characterized using different characterization techniques, and the influence of the compositional ratio on the apatite formation ability was evaluated.

2. Materials and method

Sodium chloride (99.9%, AR, SDFCL), sodium bicarbonate, Extrapure (99.5%, AR, SRL), potassium chloride (99.5%, AR, SDFCL), di-potassium hydrogen orthophosphate (99.0%, AR, SDFCL), magnesium chloride (99.0%, AR, SDFCL), hydrochloric acid (35–38%, LR SDFCL), calcium chloride

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CONDENSED MATTER

Crystal Structure, Spectral, Electronic, NLO Studies, and Bioactivity of 3′-(1-Benzyl-5-Methyl-1H-1,2,3-Triazole-4-Carbonyl) -4′-(4-Bromophenyl)-1′-Methyl-2H-Spiro [Acenaphthylene-1,2′-Pyrrolidine]-2-One

Helda Malarkodi Jesudoss[1] · Murugavel Saminathan[2] · Rosaline Ezhilarasi Jesudoss[3] · Dinesh Murugan[4] · Ponnuswamy Alagusundaram[4]

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Abstract
The novel compound 3′-(1-benzyl-5-methyl-1H-1,2,3-triazole-4-carbonyl)-4′-(4-bromophenyl)-1′-methyl-2H-spiro [acenaphthylene-1,2′-pyrrolidine]-2-one (BTBANP) is synthesized and characterized by FT-IR/Raman, ^{1}H-NMR, ^{13}C-NMR, fluorescence, UV-Vis, and single-crystal X-ray diffraction. The molecular structure of BTBANP in the ground state is optimized using density functional theory (DFT/B3LYP) method with 6-311G (d, p) basis set and compared with the experimental data. Kurtz powder technique is employed to determine the non-linear optical (NLO) effect of BTBANP and thus the charge delocalization and stability of the compound are discussed. The efficiency of second-harmonic generation (SHG) of BTBANP is 1.53 times more than that of potassium dihydrogen phosphate (KDP). DFT/B3LYP/6-311G (d, p) technique is also utilized to compute NLO, NBO, HOMO-LUMO, global chemical descriptors, and thermodynamic properties at different temperatures. The molecular docking study of BTBANP reveals good inhibitory activity against topoisomerase II and lanosterol 14 α-demethylase enzymes.

Keywords NMR · FT-IR/Raman · Fluorescence spectrum · NLO · SHG · Antimicrobial study

HIGHLIGHTS
- Synthesis and structural analysis of 3′-(1-benzyl-5-methyl-1H-1,2,3-triazole-4-carbonyl)-4′-(4-bromophenyl)-1′-methyl-2H-spiro [acenaphthylene-1,2′-pyrrolidine]-2-one.
- Comparison of experimental and theoretical vibrational assignments (FT-IR and FT-Raman) with PED percentage.
- Comparing the structural parameters obtained by DFT with XRD data.
- Analysis of non-linear optical (NLO), electronic, and thermodynamic properties.
- Molecular docking studies based on the results obtained from the antimicrobial activity.

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Molecular Structure, Spectral, Electronic and Thermodynamic, First-Order Hyperpolarizability, NBO and Molecular Docking Studies of Novel Acenaphthylene Pyrrolidine Derivative

Helda Malarkodi,[a] Murugavel Saminathan,*[b] Rosaline Ezhilarasi,[c] Dinesh Murugan,[d] and Alagusundaram Ponnuswamy[d]

The compound 3'-(1-benzyl-5-methyl-1H-1,2,3-triazole-4-carbonyl)-1'-methyl-4'-(3-nitrophenyl)-2H-spiro[acenaphthylene-1,2'-pyrrolidin]-2-one [BTNANP] was synthesized and characterized by (FT-IR/FT-Raman), NMR (^{1}H and ^{13}C), UV-Visible, Fluorescence and XRD studies. The molecular geometry was optimized using density functional theory (DFT/B3LYP) method with 6–311G (d,p) basis set in the ground state and compared with the experimental data. The entire vibrational assignments of wave numbers were made on the basis of potential energy distribution (PED) by VEDA 4 programme. Stability of the molecule arising from hyper conjugative interactions, charge delocalization has been analysed using the Natural Bond Orbital (NBO) analysis. It was also confirmed by the assignments of UV-Vis spectrum. The fluorescence spectrum confirms that the title compound is a red-light emitting material. In addition, NLO, MEP, Mulliken atomic charges, thermodynamic properties, HOMO and LUMO energy gap were theoretically predicted. The global chemical reactivity descriptors were calculated for BTNANP and used to predict their relative stability and reactivity. The antimicrobial activity of the compound was also tested against the selected bacterial and fungal pathogens. The molecular docking studies concede that the title compound may exhibit inhibition activity against topoisomerase II and lanosterol 14 α-demethylase.

Introduction

Despite the enormous progress in medicinal chemistry, infectious diseases remain the biggest threat to society and have provided new challenges to researcher's worldwide.[1] The new molecular manipulation shows the better way to approach the development of new drugs.[2,3] Among various diseases, malaria and microbial infections are the widest spreading in nature.[4–6] As a result, the antimicrobial studies are the optimum approach to overcome microbial resistance and to develop effective therapies.[7] The spiro compounds exhibit important highly pronounced biological properties.[8,9] The spiro[acenaphthylene-1,2'-pyrrolidine] derivatives exhibit antibacterial activity against Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, and Streptococcus pyogenus strains and antifungal activity versus Candida albicans, Aspergillus niger and Aspergillus clavatus strains.[10] Acenaphthylene exhibits antimicrobial activity against some selected microbes such as S. aureus, B. subtills, E. coli and P. aeruginosa.[11] The 1, 2, 3-triazoles possess wide applications in the pharmaceutical, polymer and material fields and have shown various biological property such as antibacterial, anti-allergic, anti-HIV activity and also functioning as chemotherapeutic agents for numerous diseases.[12,13] Knowing the biological importance of these discrete moieties, in the present work, we have reported the synthesis, structure analysis of 3'-(1-benzyl-5-methyl-1H-1,2,3-triazole-4-carbonyl)-1'-methyl-4'-(3-nitrophenyl)-2H-spiro [acenaphthylene-1,2'-pyrrolidine]-2-one (BTNANP) using FT-IR, FT-Raman, ^{1}HNMR, ^{13}CNMR, UV-Vis, XRD, fluorescence, Second Harmonic Generation (SHG) study, theoretically computed electronic (Mulliken atomic charges, HOMO-LUMO analysis, NLO and NBO) and thermodynamic properties using Density Functional Theory (DFT) correlated with wavefunction based methods which encompass the electron correlation technique.[14,15]

Molecular docking is used to study the possible interaction between ligand and protein and also describe the activities of ligand in the effective site of the target proteins.[16,17] The target protein selection is based on the biotic identities such as synthesis of a cell wall, protein, nucleic acid, and cell metabolism. The biological consequence of the synthesized compound has given a thrust to carry out the molecular docking study with human pathogenic bacterial topoisomerase II and fungal lanosterol 14 α-demethylase (CYP51) enzymes.

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Article

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Development of Biomimetic Hybrid Porous Scaffold of Chitosan/Polyvinyl Alcohol/Carboxymethyl Cellulose by Freeze-Dried and Salt Leached Technique

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Freeze drying and salt leaching methods were applied to fabricate Chitosan/Poly(vinyl alcohol)/Carboxymethyl cellulose (CPCMC) biomimetic porous scaffolds for soft tissue engineering. The properties of these scaffolds were investigated and compared to those by freeze drying and salt leaching methods respectively. The salt-leached CS/PVA/CMC scaffolds were easily formed into desired shapes with a uniformly distributed and interconnected pore structure with an average pore size. The mechanical strength of the scaffolds increased with the porosity, and were easily modulated by the addition of carboxymethyl cellulose. The morphology of the porous scaffolds observed using a SEM exhibited good porosity and interconnectivity of pores. MTT assay using L929 fibroblast cells demonstrated that the cell viability of the porous scaffold was good. Scaffolds prepared by salt leached method show larger swelling capacity, and mechanical strength, potent antibacterial activity and more cell viability than freeze dried method. It is found that salt leaching method has distinguished characteristics of simple, efficient, feasible and less economic than freeze dried scaffolds.

Keywords: Salt-Leaching, Freeze-Dried, Scaffolds, Chitosan, PVA, Carboxymethyl Cellulose.

1. INTRODUCTION

Tissue engineering (TE) approaches have been used to develop engineered scaffolds, which could provide solitary environments to all specific cell types and provides prospective strategies for developing biological substitutes to restore and maintain normal functional organs.[1–3, 14–17] In TE, biomaterials should mimic the native architecture of extracellular matrix (ECM) in the replaced empty organ tissue.[4, 18–24] Scaffold should satisfy several conditions to be used *in vitro* the scaffold should be biocompatible and biodegradable scaffold should have adequate mechanical characteristics that are like that of regenerating tissue adequate quantity of pores and a good interconnection of pores.[25–28] Scaffolds support cell differentiation and extension protect cells injected into the restoration of the injured tissue.[29–33] However, most of the scaffold approaches require continual surgeries for implantation. Scaffolds should offer the space for cell growth, induce transportation of nutrients and discharge wastes.[5, 6] Developing scaffolds that try to be like the construction of tissues one of the major challenges in the field of tissue engineering.[7] Natural and synthetic polymers, metals and metallic alloys, inorganic ceramics, glass and glass ceramics offer several explicit properties that make them smart for biomedical applications.[8] Chitosan (CS) as a natural biomaterial partially deacetylated derivative of chitin and a component of native extracellular matrix (ECM) is one of the most abundant biopolymer. Chitosan is known to have various biological activities and shown many biological applications in medicine,

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Full Length Article

In vitro cytocompatibility of chitosan/PVA/methylcellulose – Nanocellulose nanocomposites scaffolds using L929 fibroblast cells

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ABSTRACT

The present work reports low cost, green synthesis of Nanocellulose (NC) nanoparticles. The biosynthesized nanoparticles were characterized by transmission electron microscopy (TEM), X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (ATR-FTIR). The synthesized NC nanoparticles were pure, predominantly spherical in shape with size ranging from 25 nm. The biosynthesized NC nanoparticles have been used for antibacterial and *in vitro* applications. The antibacterial activity of the prepared CS/PVA/MC-NC1, CS/PVA/MC-NC2, and CS/PVA/MC-NC3 nanocomposites samples was tested against *Staphylococcus aureus* (*S. aureus*) and *Escherichia coli* (*E. coli*) due to disk diffusion method. When adding the NC nanoparticles both bacteria were very good inhibition zone was obtained. The transmission NC micrographs depicts spherical with uniform shape and good crystallinity and are composed of nanoparticles with a diameter less than 25 nm the average cube size was 100 nm. The AFM thickness of the CS/PVA/MC-NC1 scaffold was, estimated from the AFM image, was about 10–20 nm and a roughness-like structure was observed. The FESEM film exhibits a scaffold exhibited porous structures. The excellent cell viability of the composite scaffolds was attributed to the good biocompatibility of the CS/PVA/MC-NC3 as well as green fabrication process of the scaffolds. MTT analysis exposed that the samples did not have any toxicity. Since these positive points, these two kinds of scaffolds show appropriate properties for attachment, proliferation, and tendency to form group from L929 cells. In this work, we have prepared nanocellulose by high pressure homogenization process and the resultant nanocellulose was evaluated as fibers in CS/PVA/MC films.

1. Introduction

In recent years, more attention has been paid to natural polymers for sustainable development and environmental preservation [1]. Tissue engineering represents an emerging multidisciplinary field which involves the "application of the principles and methods of engineering and life sciences towards the fundamental understanding of structure-function relationships in normal and pathological mammalian tissues and the development of biological substitutes that restore, maintain or improve tissue function" [2]. Scaffolds for tissue engineering can also present chemical cues to cells such as ECM components or recognitions sequences that can serve as cellular binding sites for cell surface receptors to affect cell adhesion, migration, growth and differentiation [3]. A variety of biopolymers such as collagen, starch sodium alginate, agar, and gelatin have been used for this tissue engineering. Generally, natural polymers are used to blend with other synthetic polymers or nanomaterials with the aim to extend their applications [4]. There has been spectacular development and rapidly growing interest in renewable biopolymers derived, especially from natural resources for a wide range of applications like biodegradable packaging materials, automotive industries, agriculture, pharmaceuticals [5]. Nanocellulose is a highly strong natural polymer and nanocellulose nanofibers are an attractive class of nanomaterials for elaboration of low cost, lightweight, and high-strength nanocomposites [6,7]. In plants or animals, the cellulose chains are synthesized to

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Novel asymmetric chitosan/PVP/nanocellulose wound dressing: *In vitro* and *in vivo* evaluation

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ABSTRACT

The present study was to develop a novel chitosan based symmetric and asymmetric bionanocomposite for potential wound dressing application. Chitosan (C)/Poly (vinyl pyrrolidone) (P)/nanocellulose (NC) membrane were fabricated by salt leaching method with the addition of 3% and 5% wt of nanocellulose. To obtain asymmetric material one side of the membrane was coated by stearic acid (S) which could form hydrophobic surface and another side acts as a hydrophilic surface. Nanocellulose of size 2–10 nm was synthesized and charactenzed by TEM analysis. SEM showed the hydrophilic surface of asymmetric bionanocomposite consists of porous structure and hydrophobic surface is smooth and homogeneous. The results revealed that the Chitosan/PVP/Nanocellulose 3%-Stearic acid (CPNC3%-S) had a moderate swelling ratio, porosity, barrier and mechanical properties. Incorporation of nanocellulose into chitosan/PVP matrix could enhance the antibacterial activity. The hydrophobic surface of the CPNC3%-S bionanocomposite shows water repellent and antiadhesion properties towards *E. coli* bacteria and also the hydrophilic surface exhibit excellent antibacterial property and cytotoxicity towards bacterial pathogens. *In vivo* wound healing test shows better re-epithelialization and wound contraction compared with control and Chitosan/PVP-stearic acid (CP-S) bionanocomposite. Asymmetric bionanocomposite Chitosan/PVP/Nanocellulose coated with 3%-Stearic acid (CPNC3%-S) exhibited very good *invitro* cytocompatibility and enabled a faster wound healing than symmetric dressing, hence showing great potential to be applied as wound dressings.

1. Introduction

Wound can be defined as a sharp injury, which damages the dermis of the skin and disruption of the normal anatomical relationship of tissues due to accident or suture. Wound healing is a multifactorial, physiological and complicated process and generally needs to be covered with a dressing immediately after it was damaged, because complications associated with wounds are infection, deformity, overgrowth of scar tissue and bleeding [1]. Several wound dressing products are available commercially in the form of non-adherent dressings, emollient dressings, film dressings, hydrocolloids, hydrogels, hydro fibers, foam dressings, antimicrobial dressings, charcoal dressings and composite dressings [2]. In recent years, biopolymers based wound dressings have been widely used, such as natural abundant Chitosan, because of its nontoxic, biocompatible, biodegradable, moisture retentive and readily available properties [3–5].

Chitosan has all ideal property to accelerate the wound healing process. Chitosan is a β-1,4-linked polymer of glucosamine (2-amino-2-deoxy-β-D-glucose) and lesser amounts of *N*-acetyl glucosamine. It is a derivative of chitin (poly-*N* acetyl glucosamine), which is the second most abundant biopolymer after cellulose. Chitosan is a unique natural polymer which possesses properties like biocompatibility and biodegradability that all are coming from the presence of the primary amine group on its backbone of its structure. It can be used in the treatment of wound and burn infections because of its intrinsic antimicrobial property and hemostatic potential. Many researches in this area conclude that chitosan would be continuing to the treatment of wounds and burns [6,7].

However the application of chitosan may be limited by its poor mechanical properties and the loss of structural integrity. In an effort to overcome these advantages is the use of mixtures of chitosan with synthetic polymers to expand its range of applications. Biopolymer blending is one of the most effective methods to create new biomaterials with desired properties. Blends of chitosan/PVP have been of interest for a decade as their properties can be tailored for targeted applications.

Poly (vinyl pyrrolidone) is a water soluble synthetic biocompatible polymer and it is used for many biomedical applications including

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Development and Characterization of Sodium Alginate/Poly(vinyl alcohol) Blend Scaffold with Ciprofloxacin Loaded in Controlled Drug Delivery System

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Sodium Alginate/Poly(vinyl alcohol) (SA/PVA) blend scaffolds were successfully prepared via solution casting method for controlled release of ciprofloxacin (CPF). The structures of the films were evaluated by ATR-FTIR, XRD and SEM. A wide variety of material characteristics for the SA/PVA blend scaffolds were investigated, including the swelling behaviour, liquid displacement method, mechanical property and antibacterial activity. ATR-FTIR studies evaluated the chemical interaction between the biopolymeric scaffolds and the drug. XRD studies proved the amorphous behaviour of the prepared scaffolds. SEM images revealed good cohesivity and compatibility between the biopolymers and the cargos. SA/PVA loaded with ciprofloxacin showed maximum swelling percentage, porosity and tensile strength. The formulated ciprofloxacin loaded SA/PVA scaffold showed strong antibacterial activity. The results of CPF release from biopolymeric scaffolds at pH 1.2, 5.3 and 7.4 indicated strong pH dependence. *In vitro* drug-controlled release studies showed a slower and more continuous release for the SA/PVA in comparison with plain SA and PVA and the drug-delivery cumulative release was proportional to the amount and the interlayer distance of SA/PVA blend scaffolds. A sustained drug release pattern was observed with a non fickian diffusion mechanism.

Keywords:

1. INTRODUCTION

Biodegradable polymeric blend scaffolds have emerged as a promising material for the formulation of drug delivery system. The rapid increase of hydrophilic polymer blends is sensitive to the condition of the surrounding environment, and these are remarkable in the medical field owing to their excellent properties, such as non-toxicity, biocompatibility, biodegradability and environmental sensitivity.[1] The use of these polymers in controlled release drug delivery systems is desirable since the dosage forms will be degraded and eliminated from the body.[2] Drug efficiency and protection can be improved by delivering the drug locally to a goal site at a controlled rate.[3] A smart drug delivery system can release drug in response to changes in environmental conditions, and originations of the drug are important in the drug administration by the selected paths. In addition, of the therapeutic ingredients and non-therapeutic agents such as stabilizing agents, antimicrobial preservatives and drug delivery carriers.[4] The incorporation of drugs in the blended scaffold can provide a quite efficient drug delivery system with a high surface area for a controlled release, depending on the pores size and density, as well as the degradation rate of the biopolymer. This drug delivery has been achieved by various methods, such as the three-dimensional printing,[5] gas forming,[6] phase separation[7] freeze drying,[8] solvent casting

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Fabrication of asymmetric nanostarch reinforced Chitosan/PVP membrane and its evaluation as an antibacterial patch for *in vivo* wound healing application

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ABSTRACT

Starch is an abundant, relatively inexpensive and ecofriendly materials which can be easily convert into nanoparticle and also as filler for the preparation of bionanocomposite for wound dressing application. Symmetric and asymmetric Chitosan(C)/PVP(P) films containing porous structure supported with nanostarch (NS) were prepared by salt leaching method for wound dressing application. Symmetric Chitosan/PVP/Nanostarch (CPNS) film with 1% and 3% wt nanostarch was prepared without coating of stearic acid whereas asymmetric Chitosan/PVP/Nanostarch-Stearic acid (CPNS-S) film was prepared by coating of stearic acid. The stearic acid coated surface possesses hydrophobic water repellent, microporous, bacterial anti adhesion property and the stearic acid uncoated hydrophilic surface shows superior antibacterial and noncytotoxicity property with highly porous character. All the symmetric and asymmetric films exhibit almost same mechanical, barrier, swelling and hemolytic property reveals that the stearic acid does not affect the physical and hemolytic property whereas the concentration of nanostarch greatly influence the above property. The reinforcement of nanostarch with chitosan and PVP was proved by TEM and SEM analysis. The CPNS1%-S film shows excellent *S. aureus* anti adhesion property. Furthermore, the *in vivo* excision-type wound healing proved that the CPNS1%-S film enhanced the healing effect and increased re-epithelialization and collagen formation.

1. Introduction

A wound could be defined as a fault or a break in the skin caused by physical or thermal damage due to some underlying medical condition [1]. Both acute and chronic wound continues to be a major clinical concern. Therefore, it is necessary to develop a wound dressing material that not only protects the wound from infection and is non-toxic but also accelerates the healing process. The principle objective in wound management is to heal the wound in the shortest possible time, with minimal pain, discomfort, and scarring to the patient, and must occur in a physiological environment conducive to tissue repair and regeneration [2]. Delayed healing often results bacterial infections, stress and nutritional deficiencies [3].

More recently, efforts have been made to develop asymmetric membranes trying to mimic full-thickness skin wounds since those types of dressing present morphology similar to the native skin and suitable properties for a better wound healing process [4]. The first asymmetric membrane was made of Polyurethane, which is a fully synthetic biodegradable material with uniform hard segments composed of butanediol and 1, 4-butanediisocyanate and soft segments of DL-lactide, ε-caprolactone and polyethylene glycol (PEG) [5].

Till now various types of polymeric wound dressing materials have been reported but they have some serious flaws such as low water vapor/gas transmission rate, poor fluid absorption capability and low tensile strength. So, we selected chitosan as a dressing material due to its biocompatibility [6], biodegradability [7], haemostatic activity [8], anti-microbial activity [9] and property to accelerate wound healing [10,11]. The *N*-acetyl glucosamine (NAG) present in chitin and chitosan is a major component of dermal tissue which is essential for repair of scar tissue [12]. In addition, asymmetrical membranes made of chitosan have also been produced [13,14].

PVP is a synthetic polymer, has good biocompatibility and for many years has been applied as a biomaterial or additive to drug compositions, *e.g.* as a blood plasma expander [15] and as vitreous humor substitute [16]. It has been used as a main component of temporary skin covers or wound dressing [17]. Natural and synthetic polymers blending results a new desirable material with improved mechanical property and reduced cost. The blends of chitosan and PVP have already studied for antibacterial activity [18], biocompatibility [19] and biomedical applications [20]. The miscibility of chitosan and PVP in the films has

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Facile Synthesis of Graphene Via Chemical and Biological Methods- A Review

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Abstract

Graphene, a single atom thick planar layer of sp^2 hybridized carbon atoms densely packed in a honey comb crystal lattice, has fascinated much attention in recent years owing to its exceptional electronic, optical, magnetic, thermal, mechanical properties and high specific surface area. The reported properties and applications of this two-dimensional form of carbon structure have opened up new opportunities for the future devices and systems. Although graphene is known to possess excellent properties, synthesizing single sheet of graphene has been less explored. Generally large-scale graphene nanosheets are reliably synthesized utilizing other forms of graphene-based novel materials including graphene oxide (GO), exfoliated graphite oxide and reduced graphene oxide (RGO). In this review article some selected synthesis of graphene such as mechanical exfoliation, chemical exfoliation, oxidation of graphite, chemical vapour deposition, flame synthesis and epitaxial growth on SiC and methods of reduction of graphene oxide are also presented which includes chemical reduction methods, bio-molecules employed graphene oxide reduction, microbial reduction of graphene oxide, phytoextracts mediated graphene oxide reduction, solvothermal/hydrothermal reduction, photoreduction, microwave assisted technique and thermal reduction. This review also covers the advantages and disadvantages of various methods of synthesis.

Keywords
Graphite, graphene nanosheets, graphene oxide and reduced graphene oxide.

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FUZZY TOPSIS METHOD FOR SOLVING MCDM PROBLEMS USING METRIC DISTANCE AND SIMILARITY MEASURE

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Abstract: Problem solving and decision making are important business skills. Multi Criteria Decision Making (MCDM) is a valuable tool that can be applied to many complex decisions. MCDM method is applicable for solving problems that are characterized as a choice among alternatives. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is a popular method for solving MCDM problems. If the data are imprecise in nature, fuzzy version of MCDM is the most preferable one, where fuzzy TOPSIS method plays a vital role. In this paper Fuzzy TOPSIS procedure is proposed to solve the MCDM problem using Metric distance and Similarity measure based on Metric distance where the data are in the form of fuzzy numbers. The method developed is useful to rank the alternatives and to choose the best among all the available alternatives. Comparison is also made with the Hamming distance and Similarity measure based on Hamming distance to point out the conclusion. Numerical example is illustrated for the demonstrated approach.

IndexTerms **- MCDM, TOPSIS, Fuzzy Numbers, Weightage Criteria, Metric Distance, Hamming Distance, Similarity Measures.**

I. INTRODUCTION

Decision making is the process of obtaining the best alternative among available alternatives. In MCDM problems various criteria and alternatives with different ratings and weights exists from which the best alternative is chosen. TOPSIS was introduced by Hwang and Yoon [3]. It is a popular technique for solving MCDM problems. If the data are ill-defined, fuzzy TOPSIS method is applied to solve MCDM problems. Numerous papers have been published in fuzzy TOPSIS. Few among them are [1, 2, 4, 5, 6, 7]. The paper is structured as follows: In section 2, the basic definitions are reviewed. The definition for metric distance is proposed for triangular and trapezoidal fuzzy numbers which is utilized to determine the distance between the ideal solutions in TOPSIS where the data are in the form of fuzzy numbers. A similarity measure based on metric distance is proposed which is utilized to identify the best among all the available alternatives. In section 3, a procedure for fuzzy TOPSIS is proposed to handle MCDM problems. Suitable numerical example is illustrated for the proposed approach. Comparative study is done under results and discussions. Section 5 concludes the paper. It is followed by the list of references.

II. PRELIMINARIES

2.1 Triangular fuzzy number: Let $\tilde{A} = (a_1, a_2, a_3)$ be a triangular fuzzy number. $a_1 < a_2 < a_3$; $a_1, a_2, a_3 \in R$. The membership function of $\tilde{A}$ is given by

$$\mu_{\tilde{A}}(x) = \begin{cases} 0, x < a_1; \\ \dfrac{x - a_1}{a_2 - a_1}, a_1 \le x \le a_2; \\ \dfrac{a_3 - x}{a_3 - a_2}, a_2 \le x \le a_3; \\ 0, x > a_3 \end{cases}$$

2.2 α-cut of triangular fuzzy number: Let $\tilde{A} = (a_1, a_2, a_3)$ be a triangular fuzzy number. α-cut of $\tilde{A}$ is given by $\tilde{A}(\alpha) = [A_L(\alpha), A_R(\alpha)] = [a_1 + \alpha(a_2 - a_1), a_3 - (a_3 - a_2)\alpha]$.

2.3 Hamming distance: Let $\tilde{A} = (a_1, a_2, a_3)$ and $\tilde{B} = (b_1, b_2, b_3)$ be two triangular fuzzy numbers. The Hamming distance between $\tilde{A}$ and $\tilde{B}$ is given by

$$HD(\tilde{A}, \tilde{B}) = \sum_{i=1}^{3} |a_i - b_i|$$

The proposed Metric distance and Similarity measure are as follows:

2.4 Metric distance for triangular and trapezoidal fuzzy numbers:
Let $\tilde{A} = (a_1, a_2, a_3)$ and $\tilde{B} = (b_1, b_2, b_3)$ be two triangular fuzzy numbers. The Metric distance between $\tilde{A}$ and $\tilde{B}$ is given by

$$MD(\tilde{A}, \tilde{B}) = \left\{(a_1 - b_1)^2 + (a_3 - b_3)^2 + \frac{1}{3}[(a_2 - a_1 + b_1 - b_2)^2 + (a_2 - a_3 + b_3 - b_2)^2] + (a_1 - b_1)(a_2 - a_1 + b_1 - b_2) + (a_3 - b_3)(a_2 - a_3 + b_3 - b_2)\right\}^{\frac{1}{2}}$$

Let $\tilde{A} = (a_1, a_2, a_3, a_4)$ and $\tilde{B} = (b_1, b_2, b_3, b_4)$ be two trapezoidal fuzzy numbers. The Metric distance between $\tilde{A}$ and $\tilde{B}$ is

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Solving Transshipment Problem Using Zero Point and ICMM Method

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ABSTRACT: *Transshipment problem is a special case of transportation problem where the shipment takes place through transient nodes before reaching the final destination. In this paper, the transshipment problem is converted to a transportation problem and the converted transportation problem is solved using the proposed procedure namely Zero point method. The result obtain through zero point method is compared with the ICMM and VAM methods to point out the conclusion.*

Keywords: *ICMM method, VAM method, Initial basic feasible solution, Zero point method, Optimal solution.*

1. Introduction

The transportation problem is one of the subclasses of Linear programming problems. In a transportation problem shipments are allowed only between source-sink pairs. There is a possibility of existing points via which units of goods may be transshiped from a source to a sink. It is a strong assumption that shipments may be allowed between sources and between sinks and also inter-linking source-sink. Transportation models which have these additional features are called as transshipment problem.

The paper is structured as follows: Basic definitions and the Mathematical formulations of transportation problem and transshipment problem are reviewed in section 2. In section 3, the procedure is proposed for the converted transportation problem using zero point method. The section also includes the procedure for the transshipment problem. In section 4, suitable numerical examples are presented for the two types of transshipment models. Comparative study is made under results and discussions in section 5. Section 6 concludes the paper. It is followed by the list of references.

2. Preliminaries

2.1 Mathematical Formulation of Transportation Problem

Minimize $Z = \sum\sum c_{ij}\, x_{ij}$, i = 1,2,3,.....,m and j = 1,2,3,.....,n

subject to $\sum_{j=1}^{n} x_{ij} = a_i$, i = 1,2,3,.....,m

$\sum_{i=1}^{m} x_{ij} = b_j$, j = 1,2,3,.....,n

$x_{ij} \geq 0$ for all i,j.

2.2 Mathematical Formulation of Transshipment Problem

Min $Z = \sum\sum c_{ij}\, x_{ij}$, i=1,2,....m+n and j=1,2,.....m+n, j≠i.

subject to $\sum_{i=1, i\neq j}^{m+n} x_{ij} - \sum_{j=1, j\neq i}^{m+n} x_{ji} = a_i$, for all i = 1,2,.....m

$\sum_{i=1, i\neq j}^{m+n} x_{ij} - \sum_{j=1, j\neq i}^{m+n} x_{ji} = b_i$, for all j = m+1,m+2,.....m+n

$x_{ij} \geq 0$, i,j = 1,2,.....m+n, j ≠ i

Transient nodes: It is the node through which the shipment takes place when the goods are transshipped on their journey from the sources to the destinations.

Buffer Amount: It is the Maximum (sum of the supplies, sum of the demands)

3. Procedure for Transportation problem and Transshipment problem

Procedure for ICMM method for transportation problem is developed by Priya et al.[3]. Pandian and Natarajan [2] proposed a new algorithm for finding a fuzzy optimal solution for fuzzy transportation problems. Elizabeth and Sujatha [1] proposed the procedure for transportation problem using Zero point method under fuzzy environment in k stages. In this paper, we have applied the Zero point method for crisp case.

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Characterization of Biopolymer Produced by *Streptomyces* Sp. RDD

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Abstract
The present investigation was designed to evaluate the biopolymer production by filamentous bacteria isolated from the soil in Naganathi of India, identified as *Streptomyces* sp., and designated as strain RDD. The organism accumulates poly-β-hydroxybutyrate (PHB) granules in their cells when it was cultivated under limited nutrients with excess carbon rich medium. Purified polymers from cells were determined as PHB by thin layer chromatography, Fourier transform infrared and Nuclear magnetic resonance spectroscopy. While using galactose as carbon source, PHB content was up to 62.74% and the productivity was 1.91 g/L. One of the limiting factors in the commercialization of biopolymer production is the cost of substrate used and its downstream processing. To increase the cell density and production of homopolymer PHB by filamentous bacteria, less expensive agro waste as alternative carbon and nitrogen source were used.

Keywords
Biopolymer; Poly-β- hydroxybutyrate; *Streptomyces* sp. RDD; Nuclear magnetic resonance; Agro waste

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INTRODUCTION
The production of polyhydroxyalkanoates (PHA) has been investigated for more than 80 years but recently the increase in the price of crude oil and public awareness of the environmental issues have forced for extended research on biopolymers (TajalliKeshavarz and Ipsita Roy, 2010). Polyhydtoxybutyrate belonging to the family of PHAs was first discovered by Maurice Lemoigne in 1926 in *Bacillus megaterium*. This polymer is formed as intracellular inclusions under unbalanced growth conditions, i.e. in the presence of excess carbon or energy source and a limiting nutrient (N, P, O, S) or trace elements (Mg, Ca, Fe) (Lee, 1996; Khanna and Srivastava, 2005).

The limiting factors in the commercialization of biopolymer production are the cost of substrate used and its downstream processing. The occurrence and formation of PHB by actinobacteria have not been investigated to a significant extent. In this study, the production of homopolymer PHB by filamentous bacteria, less expensive agro waste used as alternative carbon and nitrogen source. Therefore, use of agro waste could be a good approach for cost effective production of PHB. The natural biopolymer possesses three excellent features: biodegradability, biocompatibility and thermoplastic properties. In addition, PHB shows material properties similar to that of petrochemical derived plastics. It exhibits good

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Larvicidal and acaricidal efficacy of different solvent extracts of *Andrographis echioides* against blood-sucking parasites ☆

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Original research article

In vitro antimalarial activity of synthesized TiO_2 nanoparticles using *Momordica charantia* leaf extract against *Plasmodium falciparum*

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ABSTRACT

Malaria is a serious global health challenge, and it has infected millions of people worldwide. There is an urgent need for new antimalarial drugs and drug targets for both prophylaxis and chemotherapy. In the present study, we biosynthesized TiO_2 nanoparticles (NPs) using the *Momordica charantia* leaf aqueous extract as a reducing and stabilizing agent. TiO_2 NPs were characterized by UV, XRD, FTIR, HRTEM, EDX, DLS and Zeta-potential. The maximum activity of mosquitocidal was observed in the synthesized TiO_2 NPs against *Anopheles stephensi* Liston (Diptera: *Culicidae*) larvae and pupae, LC_{50} were 2.50 mg/l (I instar), 2.86 mg/l (II), 3.29 mg/l (III), 3.43 mg/l (IV), and 5.04 mg/l (pupa). The antimalarial activity of *M. charantia* leaf aqueous extract and TiO_2 NPs were evaluated against CQ-resistant (CQ-r) and CQ sensitive (CQ-s) strains of *Plasmodium falciparum*. IC_{50} of *M. charantia* leaf aqueous extract were 83.64 µg/ml (CQ-s) and 88.14 µg/ml (CQ-r). Synthesized TiO_2 NPs achieved IC_{50} of 53.42 µg/ml (CQ-s) and 59.71 µg/ml (CQ-r). The TiO_2 NPs did not exhibit any noticeable toxicity on *Poecilia reticulata* after 24 h of exposure. Overall, our results suggest that the synthesized TiO_2 NPs may be employed to develop newer and safer agents for malaria control.

Introduction

The World Health Organization estimates that each year at least one million children are affected by mosquito-borne diseases and die (Murugan et al., 2016). Worldwide, more than 2100 million people are at risk of malaria, filariasis, Japanese encephalitis, dengue fever, chikungunya and yellow fever (Benelli and Mehlhorn, 2016). Malaria is caused by *Plasmodium* parasites, vectored to people through the bites of infected *Anopheles* mosquitoes, which bite mainly between dusk and dawn (Jensen and Mehlhorn, 2009; WHO, 2014). *Anopheles stephensi* is a major malaria vector in India. With an annual incidence of 300–500 million clinically manifested cases and a death toll of 1.1–2.7 million, malaria is still one of the most important communicable diseases. Currently, about 40% of the world's population live in areas where malaria is endemic (Wernsdorfer and Wernsdorfer, 2003). Currently, malaria control is challenging, due to insecticide resistance in vector populations, as well as due to the spreading of *Plasmodium* strains resistant to a growing number of antimalarial drugs. In this scenario, novel eco-friendly control tools are urgently needed (Benelli, 2015a,b).

Nowadays synthetic insecticides are mostly used because of their quick response against parasites. The main drawbacks of those chemical agents are undesirable toxic effects to non-targeted organisms. Hence we focus to overcome that problem by plant synthesized nanoparticles used as insecticidal agents instead of chemical agents.

In the past few years, nanotechnology has grown by leaps and bounds, and this multidisciplinary scientific study is undergoing explosive development (Chan, 2006; Gandhi et al., 2016). Titanium dioxide has a more helpful role in our environmental purification due to its non-toxicity, photo catalytic activity, photo

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BIODIVERSITY OF GRASSHOPPERS AT AMIRDHI FOREST AND ADJOINING AREAS OF VELLORE, TAMIL NADU

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ABSTRACT

As there is no systematic survey of grasshoppers and their fannistics are available, present study was conducted in Vellore. The grasshopper fauna and identification of grasshopper species found in the Amirdhi forest and the adjoining places was undertaken. The results revealed >15 species identified based on their external morphology.

Key words: Biodiversity, grasshoppers, Amirdhi forest, Vellore, agricultural lands, *Cyrtacanthris, Atractomorpha, Acrida, Heteracris, Trilophidia, Gastrimargus, Diabolo, Morphacris, Orthacris, Phlaeoba, Oedaleus, Spathosternum, Truxalis*

The superfamily Acridoidea of Phylum Arthropoda is one of the largest assemblages of phytophagus insects belonging to the order This superfamily comprises short horned non migratory grasshoppers and highly destructive migratory locusts (Davies, 1988). Acridordea has 14 families of which Acrididae and Pyrgomorphidae are represented in Tamil Nadu.

The population density, species diversity and distribution patterns of various grasshopper species in different parts of peninsular India had been well documented (Muralirangan *et al.*, 1993). Their extensive studies had included the forest ecosystems found in Guindy shrub jungle, Yercaud hills, Ooty hills, Topslip, Valparai. However, no systematic study has been made in Amirdhi forest, Vellore District Eastern Ghats, and hence the present study was conducted.

MATERIALS AND METHODS

Amirdhi forest is a dry mixed deciduous forest situated at a distance of 20 km from Vellore towards south west direction. It is classified as low land forest category of the Eastern ghats. It contains lot of vegetations like sandalwood, tamarind, kadukkai, bamboo, avaram bark, konnai bark, wood apple, pungan, soapnut and grasses. Three different stations were selected for sample collection: Station 1 is a typical forest area; station 2 is the area converted in to agricultural land; and station 3 near the bank of Amirdhi river (naga nathi) three stations represented diversity and distribution pattern of various grasshopper species.

The grasshoppers were collected using sweep net, choosing nearly 6 to 8 random sites of 10 m^2 within the selected regions (100 m^2). Insects were killed using other and chloroform and preserved. Confirmation of identification of species was obtained from Dr. Muralirangan, Director, Gill Research Centre, Chennai. The seicesens were preserved in insect boxes with suitable preservatives.

RESULTS AND DISCUSSION

The collections of 20 species of which fifteen were led to identified and confirmed faunal load (Lockwood et al. 1988). Further density in forest ecosystem was based on visual estimation of acridid number (Pfadt, 1994). The survey resulted in the collections of nearly 20 species of which 15 have been identified and confirmed (Table 1). Figure 1-15 depicts these

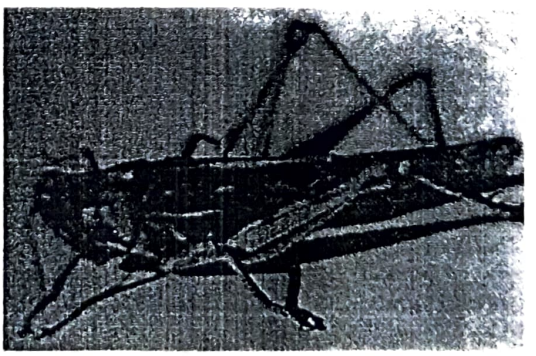

Fig. 1. *Cyrtacanthris tetarica*

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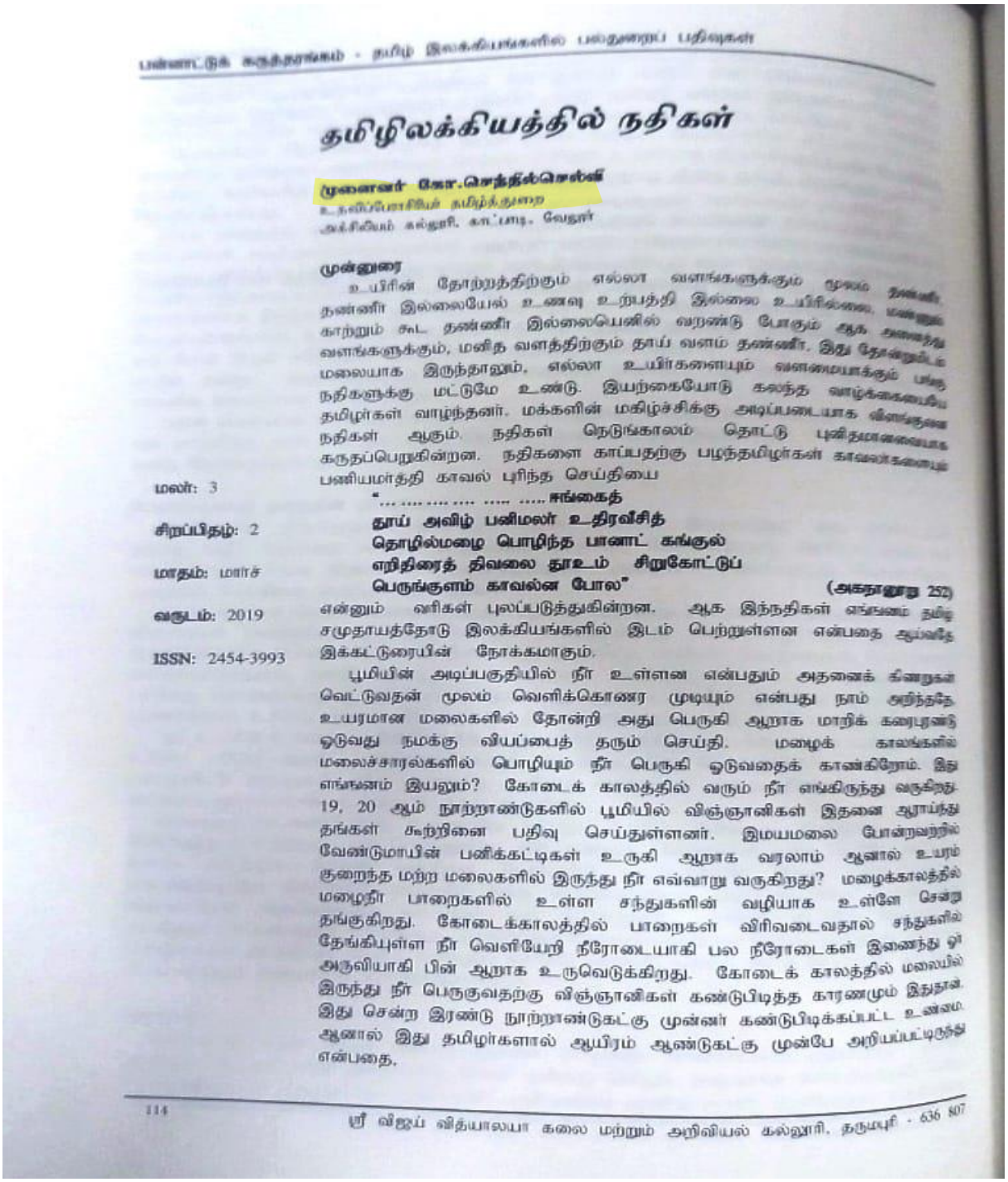

தமிழிலக்கியத்தில் நதிகள்

முனைவர் கோ.செந்தில்செல்வி
உதவிப்பேராசிரியர் தமிழ்த்துறை
அரசினர் கல்லூரி, காட்பாடி, வேலூர்

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முன்னுரை

உயிரின் தோற்றத்திற்கும் எல்லா வளங்களுக்கும் மூலம் நீரும் நீர் இல்லையேல் உணவு உற்பத்தி இல்லை உயிரில்லை. மண்ணும் காற்றும் கூட தண்ணீர் இல்லையெனில் வறண்டு போகும் எந்த வளத்திற்கும், மனித வளத்திற்கும் தாய் வளம் தண்ணீர். இது தோன்றிய மலையாக இருந்தாலும், எல்லா உயிர்களையும் வளமையாக்கும் பண்பு நதிகளுக்கு மட்டுமே உண்டு. இயற்கையோடு கலந்த வாழ்க்கையிலே தமிழர்கள் வாழ்ந்தனர். மக்களின் மகிழ்ச்சிக்கு அடிப்படையாக விளங்குவன நதிகள் ஆகும். நதிகள் நெடுங்காலம் தொட்டு புனிதமானவையாக கருதப்பெறுகின்றன. நதிகளை காப்பதற்கு பழந்தமிழர்கள் காவல்களையும் பணியமர்த்தி காவல் புரிந்த செய்தியை

"..... .... ஈங்கைத்
தூய் அவிழ் பனிமலர் உதிரவீசித்
தொழில்மழை பொழிந்த பானாட் கங்குல்
எறிதிரைத் திவலை தூஉம் சிறுகோட்டுப்
பெருங்குளம் காவல்ன போல" (அகநானூறு 252)

என்னும் வரிகள் புலப்படுத்துகின்றன. ஆக இந்நதிகள் எங்ஙனம் தமிழ் சமுதாயத்தோடு இலக்கியங்களில் இடம் பெற்றுள்ளன என்பதை ஆய்வதே இக்கட்டுரையின் நோக்கமாகும்.

பூமியின் அடிப்பகுதியில் நீர் உள்ளன என்பதும் அதனைக் கீணறுகள் வெட்டுவதன் மூலம் வெளிக்கொணர முடியும் என்பது நாம் அறிந்ததே. உயரமான மலைகளில் தோன்றி அது பெருகி ஆறாக மாறிக் கரைபுரண்டு ஓடுவது நமக்கு வியப்பைத் தரும் செய்தி. மழைக் காலங்களில் மலைச்சாரல்களில் பொழியும் நீர் பெருகி ஓடுவதைக் காண்கிறோம். இது எங்ஙனம் இயலும்? கோடைக் காலத்தில் வரும் நீர் எங்கிருந்து வருகிறது. 19, 20 ஆம் நூற்றாண்டுகளில் பூமியில் விஞ்ஞானிகள் இதனை ஆராய்ந்து தங்கள் கூற்றினை பதிவு செய்துள்ளனர். இமயமலை போன்றவற்றில் வேண்டுமாயின் பனிக்கட்டிகள் உருகி ஆறாக வரலாம் ஆனால் உயரம் குறைந்த மற்ற மலைகளில் இருந்து நீர் எவ்வாறு வருகிறது? மழைக்காலத்தில் மழைநீர் பாறைகளில் உள்ள சந்துகளின் வழியாக உள்ளே சென்று தங்குகிறது. கோடைக்காலத்தில் பாறைகள் விரிவடைவதால் சந்துகளில் தேங்கியுள்ள நீர் வெளியேறி நீரோடையாகி பல நீரோடைகள் இணைந்து ஓர் அருவியாகி பின் ஆறாக உருவெடுக்கிறது. கோடைக் காலத்தில் மலையில் இருந்து நீர் பெருகுவதற்கு விஞ்ஞானிகள் கண்டுபிடித்த காரணமும் இதுதான். இது சென்ற இரண்டு நூற்றாண்டுகட்கு முன்னர் கண்டுபிடிக்கப்பட்ட உண்மை. ஆனால் இது தமிழர்களால் ஆயிரம் ஆண்டுகட்கு முன்பே அறியப்பட்டிருந்தது என்பதை,

தமிழிலக்கியத்தில் கொடை

கே.வீ.கவிமொழி
உதவிப்பேராசிரியர், தமிழ்த்துறை, அக்சிலியா கல்லூரி, வேலூர்

தமிழ் இலக்கியங்கள் காலந்தோறும் வெவ்வேறு பாடு பொருள் கொண்டு வடிவம் கொண்டும் வெளிப்பாட்டு உத்திகள் கொண்டும் இலங்குகின்றன. இலக்கியங்களில் காலந்தோறும் சமுதாயத்தில் ஏற்பட்டு வரும் பலவேறு அரசியல், சமுதாய, பண்பாட்டு மாற்றங்கள் காரணங்களாகின்றன. ஆயினும் தமிழர் அகச்சிந்தனையுடன் நிகழ்ந்தமை, அறவுணர்வுடன் செயல்பட்டமை பற்றி எல்லாம் பல செய்திகள் இலக்கியங்களில் காணப்படுகின்றன.

"மெல்லென்று அருளிற் பிறக்கும் அறநெறி" (நான்மணிக்கடிகை.52-3)
"நெகிழ்ந்த அருளினால் ஆகும் அறம்" (சிறுபஞ்சமூலம்.323-4)

என்று இன்னவாறு அறநூல்கள் விளக்குகின்றன. இவ்வாறு அறம் கொள்ளும் பல உருவுகளுள் ஒன்று தான் கொடை. இக்கொடைத்தன்மையின் பரிணாமத்தை இலக்கியங்களின் வழி ஆய்வதே இக்கட்டுரையின் நோக்கமாகும்.

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கொடை

பண்டைக் காலத்தில் புலவர்களை வறுமை வாட்டியதால், பழுத்த மரங்களை நாடிச்செல்லும் பறவைகளைப் போல அவர்கள் செல்வர்களை நாடிச் சென்றார்கள். செல்வர்கள் ஈகையின் சிறப்புணர்ந்தவர்களாய் - தொடைப்பண்புமிக்க குணக்குன்றுகளாய் அக்காலத்தில் திகழ்ந்தார்கள். வீரத்தில் மட்டுமின்றி தம்மை நாடி வந்த வறுமையுற்றவர்களை வளமையுள்ளவர்களாக மாற்றும் வள்ளல்களாக அரசர்களும் திகழ்ந்தனர். இதனால் அரசர்கள் வள்ளல்களாக திகழ்ந்ததோடு, கொடைத்தன்மையும் மலர்ந்தது. புலவர்களும் பரிசில் பல பெற்று வாழ்ந்தனர்.

கொடையைச் சுட்டப் பல சொற்கள் தமிழில் உண்டு. கொடுத்தலே கொடையாகும். ஈகை, விருந்தோம்பல், கையுறை, தானம், தருமம், அன்பளிப்பு, தியாகம் போன்ற பல. அன்பு காரணமாகக் கொடுத்தல் என்ற மனிதநேய வெளிப்பாடு தான கொடைக்கு அடிப்படை எனினும் இக்கொடையிலும் பல்வேறு படிநிலைகள் இருப்பதை இச்சொற்கள் காட்டுகின்றன.

தானம் செய்தல் இரப்பவன், இல்லாதவன் எல்லோருக்கும் கொடுப்பது. அன்பளிப்பு என்பது அன்பின் அடிப்படையில் கொடுப்பது. சிலரைப் பொறுத்தவரை எதிர்பார்ப்பும் இணைந்தது. தியாகம் என்பது முழுமையாகக் கொடுத்தல். உணவாய் இருந்தால் அது விருந்தோம்பல். ஆனால் வள்ளுவர் பெருந்தகை, 'வறியார்க்கு ஒன்று ஈவதே ஈகை' என்றும், 'ஈதல் இசைபட வாழ்தல் வேண்டும்' என்றும் கூறுகின்றார்.

கொடைப்பொருட்கள்

கொடைப்பொருட்கள் பலவாக அமைந்தன என்பதையும் இலக்கியங்கள் காட்டுகின்றன. மன்னர் உணவு, உடை, யானை, நாடு மற்றும் பல பரிசுப் பொருட்களையும் வழங்கியுள்ளனர். மணிமேகலை உணவு, உடை, உறையுள் கொடுத்தலே அறம் என்கிறது. இவ்வாறு பல பொருட்கள் கொடையில் காலந்தோறும் தொடர்ந்து காணப்பட்டாலும் முதன்மையிடம் உணவு அளித்தலுக்கே. எனவே தான் இதனை 'பசிப்பிணி' (மணி.18: 234) என்றனர்.

கொடை நோக்கிய கலைசார் வாழ்வியல்

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உலக மொழிகளினிடையே செம்மொழியாக செம்மார்ந்து நிற்கும் தமிழ்மொழி பல ஆயிரம் ஆண்டுகால பழமை வாய்ந்த இலக்கியங்களைத் தன்னகத்தே கொண்டது. உலகின் முத்தமிழாகக் கருதப்படும் தமிழ்க்குடியின் பெருமைமிக்க வாழ்வியல் கூறுகளை பதிவுசெய்து காலம் பலகடந்தும் உலகிற்கு பறை சாற்றும் விதமாக எடுத்தியம் ஆற்றல் பெற்றதாக சங்கப்பாடல்கள் அமைந்துள்ளன. அவை பதிவுசெய்துள்ள தமிழர் வாழ்வியலின் முதன்மைக் கூறாக இன்ப வாழ்வை குறிப்பிடுகின்றன. அவ்வின்பத்தை அக இன்பம் புற இன்பம் என்றவாறு பகுத்து புற இன்பத்தை வழங்கக்கூடியவையாக வீரத்தையும் புகழையும் நிலைநிறுத்துகின்றன. அவற்றுள் புகழைத் தரும் காரணிகளுள் ஒன்றாக கொடை திகழ்கின்றது. அக்கொடையை வழங்குவோர் குறித்து பல ஆய்வுகள் வெளிவந்துள்ள நிலையில் பெறுவோர் குறித்து ஆய்வதே இக்கட்டுரையின் நோக்கமாகும்.

பரிசில் நாடுநரின் பாகுபாடு

சங்க காலத்தில் வாழ்ந்த பரிசிலர்கள் தமக்குற்ற வறுமையை நீக்கும் ஒரே வழி, அரசர்கள் மற்றும் வள்ளல்களின் கொடை எனக் கருதினர். அரசர்களும் தாம் கொடுக்கும் பரிசின் வாயிலாக அவர்களின் துயரைத் துடைத்தனர். பரிசுப் பொருள்களை பெற்றுக்கொள்ளும் இரவலர்கள், தாம் அறிந்த கலைகளின் வாயிலாக கொடுத்தோரின் புகழ்தோன்றுமாறு நிகழ்ச்சிகளை நடத்தி மகிழ்வித்தனர். அவ்வளவில் இன்றி, ஏட்டில் எழுதிவைத்தும் அவர்களை நிலையான புகழுக்குரியோராகவும் ஆக்கினர். பரிசிலர் என்ற பொதுவான சொல்லால் வழங்கப்பட்டோர் குறித்து ஆய்ந்தால். இரவலர், விறலியர், பாணர், கூத்தர், புலவர் என்றவாறு அவர்களை வகைப்படுத்த வாய்ப்புள்ளது.

1. வாயால் மட்டும் பேசக்கூடியவன் இரவலன், ஆடல் பாடலில் சிறந்தவள் விறலி
2. பண் இசைத்து வாய்மொழியால் பாடக்கூடியவன் பாணன், மற்றவரைப் போல் ஒப்பனை செய்து கொண்டு நடிப்பவன் பொருநன்
3. கூத்தாடி மகிழ்விப்பவன் கூத்தன்
4. தாம் பாடியதை ஏட்டில் எழுதிவைத்து நிலையான புகழைத் தேடித் தருபவன் புலவன் என்றவாறு பாகுபடுத்தலாம்.

பாணர்

தொடக்க காலக் கலைஞர்களாக போற்றப்பட்ட பாணன் பாடினி ஆகியோர் மரபுவழிக் கலைஞர்கள் ஆவர். எனவேதான் இவர்களை கல்லாவாய் பாணர்கள் என்பர். இவர்கள் வாய்மொழியாகப் பாடி மக்களை மகிழ்வித்தனர். பாணர்களுள் ஆடவரைச் 'சென்னியர்', 'வயிரியர்', 'செயிரியர்', மதங்கன், 'இன்னிசைக்காரர், பாணரென்ப' (பிங்கலம். 815) என்று பிங்கல நிகண்டு கூறுகிறது. பெண்டிரைப், 'பாடினி, விறலி, பாட்டி, மதங்கி, பாடல் மகடூஉ,

ஆசாரக்கோவைச் சுட்டும் உளவியல்

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அட்சயா கல்லூரி, காட்பாடி, வேலூர்

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முன்னுரை

சங்கம் மருவிய கால இலக்கியங்களான பதினெண்கீழ்க்கணக்கு நூல்களுள் ஒன்று ஆசாரக்கோவையாகும். ஆசாரம், கோவை என்னும் இரண்டு சொற்கள் சேர்ந்து ஆசாரக்கோவை என்றாயிற்று. ஆசாரம் வடமொழி கோவை தமிழ்ச்சொல். ஆசாரம் என்றால் பின்பற்றக்கூடியவை என்பது பொருளாகும். கோவை என்றால் தொகுப்பு என்பது பொருளாகும். இந்நூல் குறள் வெண்பா, சிந்தியல் வெண்பா, இன்னிசை வெண்பா, நேரிசை வெண்பா, பஃறொடை வெண்பா என வெண்பாவின் அனைத்து வகைகளையும் ஒருங்கே பெற்றுள்ளது. இந்நூலாசிரியர் பெருவாயின் முள்ளியார் ஆவார். இவர் தனிமனித கடைப்பிடிக்க வேண்டிய ஒழுக்கங்களை உளவியல் நீதியாக எடுத்துரைத்துள்ளார். இந்நூலாசிரியரின் உளவியல் சிந்தனைகளை ஆராய்வதாக இக்கட்டுரை அமைந்துள்ளது.

ஆசாரக்கோவை

ஆசாரக்கோவையில் இன்ன காரியங்களைச் செய், இன்ன காரியங்களைச் செய்யாதே என்ற கண்டிப்பாக உத்தரவைப் போடுவது போல பல பாடல்கள் இயற்றப்பட்டுள்ளன. இது போன்ற கட்டளையிடும் நூல்களுக்கு வடமொழியில் ஸ்மிருதிகள் என்ற பெயர். ஆசாரக்கோவையும் ஒரு ஸ்மிருதி போலவே காணப்படுகிறது. வடமொழி ஸ்மிருதியிலுள்ள பழைய உளவளம் சார்ந்த உத்வேகக் கருத்துக்கள் இந்நூலில் காணப்படுகிறது. இதில் கூறப்பட்டுள்ள ஒழுக்கங்களில் சிலவற்றை இக்காலத்தார் பின்பற்ற முடியாமலிருக்கலாம். வடமொழியிலுள்ள ஸ்மிருதிகளில் இன்னின்ன வருணத்தார் இன்னின்ன ஆசாரங்களைப் பின்பற்ற வேண்டும் என்று சொல்லப்பட்டிருக்கின்றன.

ஆசாரக்கோவை சாதிக்கொரு நீதியென்று பிரித்துக் காட்டவில்லை. மக்கள் அனைவரும் ஆசாரத்தைப் பின்பற்ற வேண்டும் என்ற உளவியல் தொடர்களையே பொதுவாகச் செய்திகள் அடிப்படையாக வலியுறுத்தப்பட்டுள்ளன. இந்த முறை தமிழகத்துள்ள ஒரு தனிச்சிறப்பாகும். நோயணுகாமல் சாதிப்பிரிவினைக்கு முக்கியத்துவம் தராத பெருந்தன்மையுடைய உயரிய சமூகம் தமிழ்ச் சமூகமாகும். சாதிக்கொரு நீதி கூறும் முறையைத் தமிழ்நாட்டார் பின்பற்றவில்லை என்பதே தமிழகத்தின் தனிச்சால் புலவர்களின் மனிதநேயவுணர்வையும், உள்ளார்ந்த உளவியல் அணுகலங்களையும் பறைசாற்றி நிற்கின்றன.

இறைவழிபாட்டால் உண்டாகும் உளவியல் வளம்

இறைவனை வணங்குவதால் உள்ளம் தெளிவடைதல், பிறரை நல்லுணர்வுடன் அணுக முடிதல் என்ற உளவியல் சிந்தனைகளை ஆசாரக்கோவை வற்புறுத்தியுள்ளது. மேலும் கடவுளை வணங்குதலுக்கு ஒரு சீரிய நெறிமுறை இந்நூலில் காணப்படுகிறது. காலையில் எழுந்ததும் பல்விளக்கி, முகம் கழுவித் தூய்மை செய்து கொண்டு நல்முறையாக நின்று

நற்றிணைக் காட்டும் சமயநெறிகள்

[illegible]
[illegible]
[illegible]

[illegible] இக்கட்டுரையில் நற்றிணையில் காணப்படும் பழந்தமிழர்களின் சமயநெறிகளை பற்றி ஆய்வுச் செய்யப்பட்டிருக்கிறது.

மலர்: [illegible]
இதழ்: [illegible]
மாதம்: [illegible]
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நிலங்களும் தெய்வங்களும்

தற்கால மக்கள் பல்வேறான பழக்க வழக்கங்களைக் கொண்டுள்ளதைப் போன்று சங்ககால மக்களும் தங்கள் வாழ்வியல் நிலைப்பாடுகளின் [illegible] மரபுகளுக்கு ஏற்றவாறு பல்வேறு வகையான பழக்க வழக்கங்களைக் கொண்டுள்ளதை அக்கால இலக்கியங்களின் வழி உணரலாம். குறிப்பாக இன்றைய சமுதாயக் கூறுகளில் காணப்படும் சமயநெறிகள் சங்ககால மக்களிடம் காணப்பட்டுள்ளது.

சமயநெறிகள் யாவும் 'அச்சம்' என்ற உணர்வின் அடிப்படையில் தோன்றியதேயாகும். 'அச்சமே கடவுளைத் தோற்றுவிக்கிறது' என்கிறார் ரோமானிய எழுத்தாளர் பெட்ரோனியஸ். ஆதி மனிதர்கள் இயற்கையோடு இயைந்த வாழ்க்கையினை மேற்கொண்டார்கள். அவர்கள் இயற்கை நிகழ்வினை கண்டு அச்சப்பட்டதோடு அதனை பணிந்து வணங்கவும் செய்தார்கள். துன்ப உணர்வு மனிதனுக்கு மேலோங்கும் போது அவனை அறியாமலேயே அச்சம் தோன்றுவது இயல்பு. துன்பத்தினை எதிர்த்து போராட முடியாத நிலையில் அத்துன்பத்தினை ஏற்றுக்கொள்ளும் மனநிலைக்குத் தள்ளப்படுகின்றான். அவனுக்குள் தோன்றும் 'பணிவு' என்ற உணர்வோடு அச்சமும் கலந்து 'பக்தி' என்ற நிலையினைத் தோற்றுவிக்கிறது. இதுவே இயற்கை வழிபாட்டின் முதல் நிலையாக விளங்குகிறது.

தொல்காப்பியர் காலத்திற்கு முன்பே தமிழர்களின் வாழ்வியலோடு நிலைபெற்றது சமயநெறியாகும். 'தெய்வம்' பற்றிய தொல்காப்பியரின் வகைப்பாடு நிலத்திற்கு நிலம் மாறுபடுகின்றது. அகத்திணைக் கூறும் முப்பொருள்களில் ஒன்றான கருப்பொருளின் முதல் நிலையாக விளங்குவது 'தெய்வம்' என்பதாகும். இத்தெய்வங்கள் நிலத்திற்கு நிலம் வேறுபடுகின்றன.

"மாயோன் மேய காடுறை உலகமும்
சேயோன் மேய மைவரை உலகமும்
வேந்தன் மேய தீம்புனல் உலகமும்

கிறித்தவர்களின் வாழ்வியலில் நம்பிக்கைகள்

அ.அக்ஸில்லியா மேரி
உதவிப் பேராசிரியர், தமிழ்த்துறை, அக்சிலியம் கல்லூரி (தன்னாட்சி)
காட்பாடி, வேலூர்

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மாதம்: மார்ச
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மனிதன் பிறப்பு முதல் இறப்பு வரையில் பல்வேறு நம்பிக்கைகளைக் கொண்டிருக்கின்றான். நம்பிக்கைகள் மக்களால் உருவாக்கப்பட்டு பாதுகாக்கப்படுகின்றன. மனித வாழ்வில் ஏற்படும் செயல்களுக்குக் காரணம் கற்பிக்க இயலாத போதும் மனித இனம் சிலவற்றைக் காரணம் கற்பிக்கின்றது. நம்பிக்கைகளின் அடிப்படை மனிதனின் அகமனம் (sub conscious) என்பர். மூளைக்கு அகமானது எண்ணங்களை உண்ர்த்தும் போது மூளையில் பதியும் அவ்வெண்ணங்கள் உண்மையாக்கி உறுதிப்படும் போது நம்பிக்கையாகிறது. இதனடிப்படையில் கிறித்துவர்களின் வாழ்வியலில் நம்பிக்கை மீனாத ஓர் இடத்தை பிடித்து உள்ளது என்பதை இக்கட்டுரை ஆராய முற்படுகிறது.

நம்பிக்கை

நம்பு என்னும் சொல்லில் இருந்து நம்பிக்கைகள் என்ற சொல் உருவாக்கப்பட்டு இருக்கிறது. தனிமனிதனின் சுயமான ஆக்கமாகவோ, பண்பாட்டின் ஏனைய அம்சங்கள் இன்றிச் சடங்குகளிலேயே வெவ்வேறு நாகரிகங்களின் நம்பிக்கைகளும் இலட்சியங்களும் மிகத் தெளிவாக வெளிப்படுத்தப்படுகின்றன என்கிறார் ரூத் பெனிடிக்ட். மனித வாழ்வின் உறுதிப்பாட்டிற்கு ஆதரவு தரும் இந்நம்பிக்கைகள் மனித வாழ்வில் மிக இன்றியமையாதவை என்கிறார் ஜேம்ஸ் வின்செஸ்டர்.

கடவுள் பற்றிய நம்பிக்கைகள்

கிறித்துவ மக்கள் இறைவனின் அருளால் தான் எல்லாப் பொருட்களையும் பெற முடியும் என்று நம்புகின்றனர். வாழ்வில் துன்பம் நேரும் போது இறைவனிடம் முறையிட்டு நேர்த்தி கடன்கள் செய்கின்றனர். இந்த நேர்த்தி கடனின்பொழுது கை நிறைய மெழுகு வர்த்தியை வைத்தால் அவ்வொளி போன்று தமக்கும் வாழ்வில் இன்பமாகிய ஒளி கிடைக்கும் என்று நம்புகின்றனர். இதனை திருவிவிலியத்தில்,

> **"உலகின் ஒளிநானே என்னைப் பின்தொடர்பவர் இருளில் நடக்கமாட்டார், வாழ்வுக்கு வழி காட்டும் ஒளியைக் கொண்டிருப்பார்"**
>
> **(யோவான் 8:12)**

என்று இயேசு தம் மக்களைப் பார்த்துக் கூறுகிறார். மக்கள் அனைவரும் இயேசுவை ஒளியாக ஏற்று வழிபாடு செய்கின்றனர்.

மேலும் சூரிய வழிபாடு, பிறை வழிபாடுகள் கிறித்துவ மக்களிடையே காணப்பட்டன. சூரியன் உதிக்கும் திசை பார்த்து கோவில்களில் பலி பீடங்கள் அமைந்திருக்கும் இத்தகைய செய்தியானது திருவிவிலியத்தில் காணமுடிகிறது. இஸ்ரேயலின் கடவுளாகிய யாவே எப்போதெல்லாம் மக்களுக்கு

சிறார் நாடக நிலை

அ. இந்துமதி
முகவரி: எண் 7/139 6வது கிழக்கு குறுக்குச்சாலை
'பி' செக்டார் வி. ஜி. ராவ் நகர், காட்பாடி

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மாதம்: மார்ச்
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> **'கண்ணைச் செவியைக் கருத்தைக் கவர்ந்து நமக்(கு)**
> **எண்ணரிய போதனைகள் ஈவதற்கு – நண்ணுமிந்த**
> **நாடகசாலை பொத்த நற்கலாசாலை யொன்று**
> **நீடுலகில் உண்டோ நிகழ்த்து.' 1**

என்னும் கவிமணியின் பாடல் வரிகள் நமக்கு நாடகத்தின் சிறப்பை எளிதாக விளக்கும். 'மனக்கருத்தின் அமைதியே இயற்றமிழ். வாய் ஒலியின் அமைதியே இசைத்தமிழ். மெய்யின் விளக்கமே கூத்துத் தமிழ்'2

இயற்றமிழ், இசைத்தமிழ் நாடகத்தமிழ் என முத்தமிழாய் விளங்கும் தமிழில் நாடகத்தமிழ் என்பதே இயலையும் இசையையும் தன்னுள் அடக்கிக் கொண்டது. இதுவே சிறார்களின் மிகச் சிறந்த ஆளுமை பண்புகளை வெளிப்படுத்தவும், வளர்க்கவும் உதவும். நாடகத்தின் தோற்றத்தையும் வளர்ச்சியையும் ஆராய்ந்து பார்க்கும் பொழுது தமிழில் நாடகங்கள் இருந்தன என்பதற்கான சான்று தொல்காப்பியம் "நாடக வழக்கினும் உலகியல் வழக்கினும்..."3 தொட்டு இன்று வரை காணப்படுகின்றன. ஆனால் தனியாக குழந்தைகளுக்கான நாடகம் இருந்ததற்கான சுவடுகள் எதுவும் தென்படவில்லை. உயர் திரு ஆறு. அழகப்பரோ இருபதாம் நூற்றாண்டின் பிற்பகுதியில் தமிழ் நாடக இலக்கியத்தில் புதிதாக தோன்றிய வகையே குழந்தை நாடகம் என தெளிவுபடுத்துகிறார்

நாடகம் -பொருள் விளக்கம்

"நாடகம் கலைக்கரசு; நாட்டின் நாகரிகக் கண்ணாடி; பாமரர்களின் பல்கலைக்கழகம். உணர்ச்சியைத் தூண்டிவிட்டு, உள்ளத்தில் புதைந்து கிடக்கும் அன்பையும் அறிவையும் தூய்மையையும் வெளிப்படுத்தி, மக்களை பண்படுத்தும் மகத்தான கலை."4 இவ் வரையறையானது சிறார் நாடகத்திற்கும் செவ்வனே பொருந்தும்.

"நாடகம் என்னும் சொல் நாடு + அகம் எனப் பிரியும். நாட்டை அகத்தில் கொண்டது நாடகம். நாட்டின் கடந்த காலத்தையும் நிகழ்காலத்தையும் வருங்காலத்தையும் தன் அகத்தே காட்டுவதனால், நாடகம் என பெயர் பெற்றது என்பர் அகம் - நா : உள்ளுள் நோக்கு: உள்ளை உணர் அகத்தை நாடு என்றெல்லாம் பலவாறு அறிஞர் பொருள் கூறுகின்றனர். எனினும், நாடகம் என்பது உலக நிகழ்ச்சிகளைக் காட்டும் கண்ணாடி என்பது முற்றிலும் பொருந்தும். கதையை, நிகழ்ச்சியை, உணர்வை நடித்துக் காட்டுவதும் கூத்தாக ஆடிக்காட்டுவதும் நாடகம் என்பர். இதற்குக் கூத்துக்கலை என்னும் பெயரும் உண்டு"5

> **"நாட்டினிற் கனிகலம் நாடகக் கலையே**
> **பாட்டும் இயலும் எழில் காட்டும் - நவ நிலையே"6**

"தமிழின் தொன்மையான கலை வடிவம் நாடகம் ஆகும். நாடகம் தோற்றம் பெற்றதன் வரலாற்றை அறிய புகும்போது , போலச்செய்தல் என்னும் பண்பு

குளத்தூர்ச் சோமேசர் முதுமொழி வெண்பா

பெ.ரதா
உதவிப் பேராசிரியர், அக்சிலியம் கல்லூரி தன்னாட்சி
வேலூர்

மலர்: 3

சிறப்பிதழ்: 2

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தமிழ்நாட்டில் பழைய காலம் முதல் எழுந்த நூல்களுள் சிறப்பெய்திய நூலாகவும் பல சமயத்தவராலும் போற்றப்படுகின்ற நூலாகவும் விளங்குவது திருக்குறள். இதன் சொல்லழகையும் கருத்தழகையும் கண்டு பிற நூலாசிரியர்கள் நம் நூலில் திருக்குறளை கையாண்டுள்ளனர். அறநெறிக் கருத்துக்களை வலியுறுத்தும் வகையில் தங்கள் காலத்தில் மக்களிடையே பெருமளவு வழக்கில் இருந்த இலக்கியச் செய்திகளையும் புராணக்கருத்துக்களையும் சான்றுகளாகக் கொண்டு சிற்றிலக்கியங்களைப் படைத்தளிக்கலாயினர். அவ்வகையில் எழுந்ததே "சோமேசர் முதுமொழி வெண்பாவாகும்"1. இந்நூல் சிவஞான முனிவரால் இயற்றப்பட்டது. இவரது காலம் கி.பி. பதினெட்டாம் நூற்றாண்டு என்பர்.

நூல் அமைப்பு

ஒரு நூலின் வடிவம் தான் கலைஞனின் உள்ளத்தையும் கற்பவனின் உள்ளத்தையும் தொடர்புபடுத்துவதாகும். இதைப் பற்றி டாக்டர் மு. வ 'ஒருமுகமாக இயையும் முழுமை' என்பர். மேலும் தனிப்பாட்டாக இருப்பினும் ஓர் உணர்ச்சியைப் பற்றிய கற்பனையும் ஒலிநயமுமாக அமைதல் வேண்டும் எனக் கூறுவர். எனவே கற்பனையோடு அமைந்த உணர்வுகள் ஓர் அமைப்பை பெறுகின்றபொழுது அங்கு ஒலிநயம் தானே இயைகின்றது. இந்நெறியில் இவ்வெண்பா இலக்கியம் சிவநெறியைத் தலையாய உணர்வாகக் கொண்டு பல்வேறு வகைப்பட்ட உணர்வுகளோடு கற்பனை வளத்தையும் கொண்டு விளங்குகின்றது.

பாட்டு

பிற்காலத்து எழுந்த பிரபந்த இலக்கிய வகையைச் சார்ந்த வெண்பா சிவ நெறியினை நோக்கமாகக் கொண்டு இசையினால் அமைந்துக் காணப்படுகின்றது.

"ஏனையர் பால் வெற்றி கொண்டா யின்னோ டெதிர்த்திறந்தான்
தூ நறும்பூவாளியான் சோமேசா – மானம்
வலியார்க்கு மாறேற்ற லோம்புக வோம்பா
மெலியார் மேன் மேக பலை"2

இது பற்றி மேல்நாட்டுத் திறனாய்வாளர் ஆர்கிராம்பி என்பார் 'புலவனுடைய உணர்ச்சியும் அனுபவமும் கற்பனையும் ஒலிநயத்தின் துணையின்றி வாழ வழியில்லை'என்பர். ஆதலின் இங்கு ஒலிநயம் காணப்படுகின்றமை நோக்குதற்குரியது.