

RESEARCH DEVELOPMENT CELL

ST. JOSEPH'S COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

CUDDALORE – 607001

Progress Report of the

Intramural Research Projects 2023-2024

Sanction Order No.

SJC/IP/2023-24/06

Project Title

Basics Of English Speaking Through Mobile App

Department

PG & Research Department of English

Principal Investigator

Dr. P. Indhu Sakthi

Assistant Professor

Department of English.

Dr. M. ARUMAI SELVAM, M.Sc., M.Phil., P.N.D.,
PRINCIPAL

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Basics of English Speaking through Mobile App

MasterSpeak: Mobile App for Enhancing English Speaking


MasterSpeak is a mobile application designed to help users improve their English speaking skills across all proficiency levels: Beginner, Intermediate, and Advanced. It offers interactive lessons, real-time feedback, and tailored learning paths, making language learning engaging and effective.

Key Features:

- **Level-Based Learning:** Users progress through content designed for their skill level—Beginner, Intermediate, or Advanced.
- **Instant Assessment:** Real-time feedback on pronunciation, grammar, vocabulary, and fluency, enabling immediate improvement.
- **Interactive Speaking & Listening:** Role-play conversations and real-life audio scenarios boost conversational confidence.
- **AI-Powered Feedback:** Personalized recommendations based on speech and writing analysis.

Activities by Level:

1. **Beginner (Band 1-3):**
 - **Vocabulary Flashcards:** Words paired with images and audio to build basic vocabulary.
 - **Pronunciation Practice:** AI-based voice recognition for real-time feedback.
 - **Basic Grammar Quizzes:** Simple exercises covering grammar basics.
2. **Intermediate (Band 4-6):**
 - **Conversation Simulation:** Real-life conversation practice with AI responses.
 - **Grammar Challenges:** Exercises covering tenses, conditionals, and sentence structure.
 - **Story Completion:** Users complete partial stories using proper grammar and vocabulary.
 - **Group Discussions:** AI-driven discussions to develop fluency and argumentative skills.
3. **Advanced (Band 7-9):**
 - **Debating & Public Speaking:** Complex topics with AI feedback on coherence and structure.
 - **Fluency Tests:** Timed responses to encourage fluid, coherent speech.
 - **Advanced Grammar & Writing:** Practice complex structures like passive voice and idiomatic expressions.


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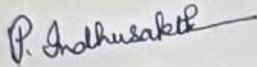
Instant Assessment Features:

- **Quizzes & Grammar Exercises:** Auto-graded with explanations for wrong answers.
- **Pronunciation Practice:** AI feedback on accuracy, highlighting problem areas.
- **Listening Exercises:** Immediate responses with audio replay for reinforcement.

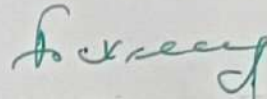
Progress Tracking:

- **Real-Time Dashboard:** Shows daily/weekly progress, scores, and areas for improvement.
- **Gamification:** Badges and rewards for motivation.
- **Adaptive Learning:** Tailored exercises based on user performance, focusing on weaker areas.

MasterSpeak is the ultimate tool for users looking to refine their English skills for exams, job interviews, or everyday communication.

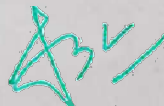


Signature of the Principal Investigator



Signature of the Coordinator

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CUDDALORE – 607001**

Progress Report of the Intramural Research Project 2023-2024

Sanction Order No: **SJC/IP/2023-2024/01**

1. Title of the Project:

Synthesis of Eco-Friendly Positive Electrode with Improved Stability for Lithium-Ion Batteries

2. Name of the Principal Investigator:

Dr. V. Sathana

Designation and Department: Assistant Professor, PG & Research Department of Physics

E-mail ID and Contact Number: sathana@sjctnc.edu.in | 9976723490

3. Objective of the Study (as mentioned in the proposal):

- To synthesize an eco-friendly cathode, aimed at replacing the toxic cobalt, which is currently a critical component of rechargeable batteries.
 - To enhance the stability of the electrode material through the incorporation of selected dopants.
 - To achieve faster charging, improved cycle life, and superior electrochemical performance at the nanoscale.
-

4. Materials and Methods:

The synthesis route plays a vital role in determining the capacity and purity of the compound. The efficiency of compounds prepared from the same precursor can vary significantly due to differences in preparation methods, making the selection of an appropriate method crucial. In this study, the following novel cathode compounds have been synthesized using the **sol-gel** technique, known for its phase purity and ease of use:

- $\text{Li}_2\text{NiMnCo}_{1.3}\text{O}_6$
- $\text{Li}_2\text{NiMnCo}_{0.75}\text{Fe}_{1.5}\text{O}_6$


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- $\text{Li}_2\text{NiMnCo}_{0.5}\text{Fe}_{1.6}\text{O}_6$
- $\text{Li}_2\text{NiMnCo}_{0.25}\text{Fe}_{1.8}\text{O}_6$
- $\text{Li}_2\text{NiMnFe}_2\text{O}_6$

The sol-gel method is favoured due to its ability to control particle size, which plays a key role in the material's electrochemical performance.

5. Major Findings:

In this study, efforts have been made to select a suitable cathode material that is completely free of cobalt (Co), which is known to be highly toxic to humans and the environment. Since cobalt contributes significantly to the structural stability of battery materials, a substitute material must compensate for its role. Following an extensive literature survey, a suitable eco-friendly transition metal was chosen. This metal not only provides structural stability but also enhances electrochemical performance, such as faster charging rates and improved cycle life.

In the sol-gel process used for this research, active materials in the correct stoichiometric ratios are mixed into a homogeneous solution using appropriate solvents and a chelating agent. To maintain a pH of around 10, ammonium hydroxide is added. The homogeneous solution is stirred and heated until gel formation occurs. The gel is dried and annealed at high temperatures to obtain the final powder sample, which is then analysed.

Basic characterization techniques, such as **X-Ray Diffraction (XRD)**, **Field Emission Scanning Electron Microscopy (FE-SEM)**, and **X-Ray Photoelectron Spectroscopy (XPS)**, were employed to understand the structure, morphology, and electrochemical performance of the prepared cathode materials.

The incorporation of a transition metal dopant into the structure of the layered cathode material positively impacts the structural integrity and thermal stability of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ (NCM811). Lithium-rich transition metal oxide cathodes such as $\text{Li}_2\text{NiMnCo}_{1.3}\text{O}_6$, $\text{Li}_2\text{NiMnCo}_{0.75}\text{Fe}_{1.5}\text{O}_6$, $\text{Li}_2\text{NiMnCo}_{0.5}\text{Fe}_{1.6}\text{O}_6$, $\text{Li}_2\text{NiMnCo}_{0.25}\text{Fe}_{1.8}\text{O}_6$, and $\text{Li}_2\text{NiMnFe}_2\text{O}_6$ synthesized through sol-gel have shown promising potential. Among these, $\text{Li}_2\text{NiMnFe}_2\text{O}_6$ is considered one of the most promising intercalation cathode materials for lithium-ion batteries (LIBs) due to its high energy density.

Signature

Signature of Principal Investigator

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Signature

Signature of HOD

Dr. S. XAVIER, M.Sc., B.Ed., M.Phil., Ph.D.,
Assistant Professor & Head
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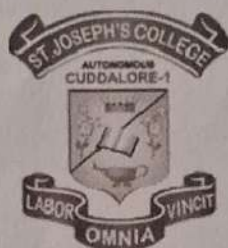
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Progress Report of the
Intramural Research Project 2023-2024

Sanction Order No. SJC/IP/2023-24/02

Project Title

AN EFFICIENT SYNTHESIS OF π -CONJUGATED DIHYDROPYRIMIDINE CORE IN
WATER MEDIUM AND IT'S SIGNIFICANCE



PG & RESEARCH DEPARTMENT OF CHEMISTRY

Principal Investigator

Dr. C. ADAIKALARAJ

Assistant Professor


PG & Research Department of Chemistry

St. Joseph's College of Arts and Science (Autonomous)

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Date of Submission

10/09/2024


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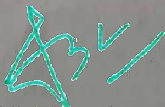
Introduction

The aim of this present research is to synthesis Novel π - conjugated dihydropyrimidinone derivatives and to evaluate their structure using FT-IR, UV-Vis and $^1\text{H-NMR}$ and $^{13}\text{C-NMR}$ spectral studies. Detailed knowledge on the structure and spectra of the title compound is a necessary prerequisite for understanding their chemical and biological properties. Dihydropyrimidinone, which is a highly deficient aromatic heterocycles, can therefore be used as electron withdrawing molecules. This electron withdrawing core linked with the aromatic substituted aldehydes by π -bond. Recent reports exhibits dihydropyrimidinone derivatives is a good non linear material.

All the synthesized compounds are analyzed theoretically using gaussian03 software and their optical properties are identified using B3LYP/6-31G(d,p) basis set. Dihydropyrimidinone and their derivatives play an essential role in several biological processes and have considerable chemical and pharmacological importance. In particular, pyrimidinone nucleus can be found in a broad variety of antibacterial and antitumor agents, well as in agrochemical and veterinary products.

Objectives of the study :

- (i) To synthesis novel target π - conjugated dihydropyrimidine molecule by using green solvent.
- (ii) To characterize the intermediate products using various analytical and spectral studies viz, melting points, Uv-Visible, FT-IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$
- (iii) To synthesis of a novel target molecule and characterized various analytical and spectral studies viz, melting points, Uv-Visible, FT-IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$
- (iv) To study the in-vitro antimicrobial activities


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Stage 1: Synthesis of ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-aminophenyl)-2-oxopyrimidine-5-carboxylate

The compound ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-nitrophenyl)-2-oxopyrimidine-5-carboxylate is stirred with 10% Palladium on charcoal in equimolar quantity of ethanol and ethyl acetate (50%). The reaction mixture was stirred for 12 hours. After the completion of reaction TLC monitoring, the reaction mixture was filtered. The filtrate was concentrated under reduced pressure resulting in a solid compound which was further purified by recrystallization. Yield: 73% melting point = 201°C.

Stage 2: Synthesis of ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-aminophenyl)-2-oxopyrimidine-5-carboxylate derivatives.

A mixture of ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-nitrophenyl)-2-oxopyrimidine-5-carboxylate (0.003M) and different substituted aromatic aldehydes (0.003M) were taken in round bottom flask, added to glacial acetic acid. The reaction mixture was stirred for 12 hours. After the completion of reaction TLC monitoring, the reaction mixture was filtered. The filtrate was concentrated under reduced pressure resulting in a solid compound which was further purified by recrystallization.

In this work reports the efficiently synthesis of ethyl-1,2,3,4-tetrahydro-6-methyl-4-(4-aminophenyl)-2-oxopyrimidine-5-carboxylate structure were determined and characterized by UV-visible, FT-IR, ¹H-NMR and ¹³C-NMR spectral studies.

To analysis of microbial activities will be done in the forthcoming days.

(Handwritten signature)
(Dr. T. Antony Sandesh)
HoD, Chemistry

(Handwritten signature)
Principal Investigator

(Dr. C. ADAIKALARAJ)

(Handwritten signature)



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**Final Report of the
Intramural Research Projects 2023-2024**

Sanction Order No.

SJC/IP/2023-24/04

Project Title

**Antioxidant, antimicrobial. phytochemical and GC-MS
profiling of cashew testa**

Department

Biochemistry

Principal Investigator

Dr.P.Marie Arockianathan

Dr.N.Priya


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Final Report of the Intramural Research Projects 2023-2024

Sanction Order No:SJC/IP/2023-24/04

1. Title of the Project: Antioxidant, antimicrobial, Phytochemical and GC-MS profiling of cashew testa.

2(a). Name of the Principal Investigator: Dr. P. Marie Arockianathan

Designation and Department: Associate Professor & Head (Biochemistry)

E-mail ID and contact Number: marie@sjctnc.edu.in, 8608340307

2(b). Name of the Co-Investigator I (If applicable): Dr. N. Priya

Designation and Department: Assistant Professor (Biochemistry)

E-mail ID and contact Number: priyan7shrine@gmail.com, 8056610585

3. Objective of the Study (as mentioned in the proposal):

- ❖ To study the preliminary phytochemical screening
- ❖ To analyse the antioxidant activity of the cashew testa
- ❖ To study the antimicrobial activities of cashew kernel peel.
- ❖ GCMS Profiling of various extracts of cashew testa

4. Materials and Methods:

- ✚ Phytochemical studies was carried out as per the standard protocol
- ✚ The total phenolic content of the extract was determined by FolinCiocalteu method
- ✚ The total flavonoid content of the extract was determined by Zhishen et al 1999. method.
- ✚ DPPH assay was carried out as per Ohnishi *et al* (1994).
- ✚ Hydrogen peroxide by Ruch *et al* 1989
- ✚ Antimicrobial studies has been done by disc diffusion method

5. Results and Discussion: Enclosed

6. Major finding(s) of the project / Conclusion (Not exceeding 250 words):

Cashew Testa showed appreciable amount of phytoconstituents like alkaloids, terpenoids, phenols and tannins. Among the phytochemicals, the presences of phenolic and alkaloids are prominent. Phenolic compounds have the therapeutic property on different diseases like diabetes, asthma, allergy, cancer, bacterial, viral infections etc. The hydroxyl groups present in phenolics facilitate the free radical scavenging ability of the compounds. So the determination of total phenolic concentration in samples form the basis for quick screening of antioxidant potential of plants. The proximate composition of Cashew Testa studied were the moisture content, protein, ash etc. The moisture content of the cashew testa was found to be $92 \pm 2.2\%$. As moisture content is low, this sample is stable and can be stored. The total protein of the cashew testa were found to be $91.9 \pm 3.2\%$ and ash $348 \pm 6.2\%$.

DPPH is a stable free radical which is used to determine the free radical scavenging abilities of antioxidants present in plant extracts. The antioxidant activity is then measured by the decrease in absorption at 515 nm by proton scavengers. IC_{50} value of DPPH in ethanolic extract was found to be $352.23 \mu\text{g/ml}$ and IC_{50} value of BHT (standard) was $281.74 \mu\text{g/ml}$. The IC_{50} value of H_2O_2 scavenging activity of ethanolic extracts were found to be $301.61 \mu\text{g/ml}$ and value of BHT (standard) : $277.03 \mu\text{g/ml}$ respectively.

IC_{50} value of DPPH in aqueous extract was found to be **$426 \mu\text{g/ml}$** and IC_{50} value of BHT (standard): **$230 \mu\text{g/ml}$** . The H_2O_2 scavenging activity of aqueous extracts were found to be IC_{50} **$272 \mu\text{g/ml}$** and IC_{50} value of BHT (standard): **$180 \mu\text{g/ml}$** . Scavenging activity for acetone extract was found to be very low when compared to other two extracts.

The acetone, ethanolic and aqueous extracts of cashew testa showed various peaks in the GCMS spectra which corresponds to bioactive compounds which are recognized by their retention time, peak area and fragmentation patterns compared with NIST library.

There is no significant zone of inhibition seen for the various extracts of cashew testa.

In our study, the agro waste Cashew testa was used widely as paint additives and thrown as waste or used as animal feed. This cashew testa are found to be rich in alkaloids, terpenoids, carbohydrate that are apparently responsible for free radicals scavenging effects. They are rich in fibre and protein. So the testa not only exhibit good antioxidant properties

but also rich in phytochemicals, protein and fibre. Thus, the economic importance of cashew testa serve as an agro industrial by-product, and can be explored for future use in food supplements and also for other health benefits.

7. Papers presented / published out of the project (Enclose copies): -

8 (a). Amount allotted: 13000/-

8 (b). Amount received: 10000/-

8 (c). Details of expenses (Enclose copy of bills):

Sl. No.	Details	Amount (in RS.)
1.	GC-MS	3300/-
2.	Antimicrobial studies	5000/-
3.	Antioxidant studies	4000/-
4.	Chemicals	7785/-
	Total	20,085

Name and Signature of the Investigator(s)

(i) Dr.P.Marie Arockianathan



(ii) Dr. N.Priya



Place: Cuddalore

Date: 23.09.2024



Research and Development Cell, St. Joseph's College, Cuddalore


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**ST.JOSEPH'S COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS),
CUDDALORE**

PG & RESEARCH DEPARTMENT OF MICROBIOLOGY

**REPORT ON INTRAMURAL PROJECT FUNDED BY ST.JOSEPH'S COLLEGE OF
ARTS AND SCIENCE-2023-2024**

Project Title: Microbial synthesis of selenium nanoparticles (Se NPs) and evaluation of its biological activity

Fund received: 13,000/-

Sanction order No: SJC/IP/2023-24/03

Work completed :

- Isolation of bacteria from marine sample (A total 12 bacteria were isolated by using specific media Zobell Marine agar)
- Selected bacterium has been sent to 16s rRNA sequence for its identification at species level (the result yet to be received)
- Synthesis of selenium nanoparticles by selected marine bacterium
- Physical characterization of biosynthesized nanoparticles by UV-Vis spectroscopy, XRD, FE-SEM with EDS, XPS and FTIR (Completed and results were received)
- Study of biological characterization of SeNPs *viz.* antibacterial activity, antibiofilm activity (Completed and results were received)

Works to be completed:

- The results of bacterial 16S rRNA sequencing to be received
- Writing paper for journal publication is in progress

RDC Coordinator



Investigator

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**RESEARCH & DEVELOPMENT CELL
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**PROGRESS REPORT FOR THE
INTRAMURAL RESEARCH PROJECT
2023-2024**


PROJECT TITLE

**A COMPARATIVE STUDY ON THE EFFECT OF DIFFERENT FEED
ON
GROWTH AND SURVIVAL OF FRESH WATER FISHES**

**Department
ZOOLOGY**

**Principal Investigator
DR. P. THENMOZHI
Asst. Prof. & Head
Department of Zoology**

**Co-Investigators
Dr. N. Jayaprabha, Asst. Professor
Ms. V. PushpaAruvi, Guest Lecturer**


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PROGRESS REPORT

Introduction

In our present study we planned to use the most readily available as well as cost effective ingredients for making different feed for the fresh water fish culture, to check the growth, feed conversion ratio and survival rate of fishes in a controlled environment.

OBJECTIVES OF THE STUDY

- ❖ To evaluate the Growth rate of fishes fed with different feed
- ❖ To examine the Feed conversion ratio of fishes fed with different feed
- ❖ To estimate the Survival rate of fishes fed with different feed
- ❖ To evaluate the nutritional value of the fish feed used.

The project work was carried out in the following steps.

Works done So far

1. Stocking of fingerlings

The fingerlings of *Labeorohita* was procured from Guru Fish Farm and Hatchery, Thukanampakam, Cuddalore District. The fingerlings were randomly stocked in the tank. The initial length (cm) and weight (g) of the fishes were taken and data were recorded for final comparison purposes.

2. Feed ingredients and preparation of feed

Three different types of feed were prepared with different combination of ingredients such as Wheat flour, Groundnut cake, Rice bran, Wheat bran, Tapioca powder, Fish meal, Prawn meal and Vegetable waste.

3. The fishes were observed for the **preference of feed and recorded.**
4. The fishes were sampled for every fortnight schedule for length and weight assessment.
5. The environmental parameters like temperature, dissolved oxygen and pH of the water sample will also be recorded fortnightly for analysing the environmental condition of the water.
6. **Growth Parameters and Digestibility Assessment** was done by comparing the three different feeds used.
7. Survival rate of Fishes in three different feeds were measured and tabulated.
8. The Feed Conversion Rate (FCR) in three different feeds were measured.

The Nutritional Value of Fish Feeds will be done in the forthcoming days.

Arumai Selvam
18/9/24

COORDINATOR



Arumai Selvam
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Thenmozhi

PRINCIPAL INVESTIGATOR

(Dr. P. THENMOZHI)

Dr. P. THENMOZHI
Assistant Professor & Head
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Final Report of the
Intramural Research Projects 2021-2022
Sanction order No. SJC/IP/2021-22/01

Project Title

A systematic study of Plant extracts derived from medicinal plants for
antimicrobial and antioxidant activities

Departments

Microbiology

Chemistry

Principal Investigator

DR. S. JOSEPH CHRISTIAN DANIEL

Asst. Professor & Head, Department of Microbiology

Date of Submission

18.5.2022


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Intramural Research Projects 2021-2022

UTILISATION CERTIFICATE

1. Sanction order number & Date: SJC/IP/2021-22/01, 17.12.2021
2. Title of the Project: "A systematic study of Plant extracts derived from medicinal plants for antimicrobial and antioxidant activities"
3. Department: Microbiology & Chemistry
4. Name of the Principal Investigator: Dr. S. Joseph Christian Daniel


Certified that Rs. Thirteen thousand Rupees (Rs.13000/-) of financial assistance for Intramural Research Projects 2021-2022 sanctioned has been utilized for the purpose of carrying out the project titled "A systematic study of Plant extracts derived from medicinal plants for antimicrobial and antioxidant activities" for which it was sanctioned and the conditions of the grant are fulfilled.



Signature of the Principal Investigator



Signature of Head of the Department



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