Number of departments having Research projects funded by government and non government agencies during the year

S.No.	Name of the Department	Name of the Funding Agency Govt	Amount
1	Chemistry	Tamilnadu state council for science and technology	7500

1. Chemistry

Name of the Project/ Endowments, Chairs	Name of the Principal Investigator/Co-investivator	Department of Principal Investigator	Year of Award	Amount Sanctioned	Duration of the project	Name of the Funding Agency	Type (Government/non-Government)
Novel techniques of fabrication of cobalt oxide Nano particles from plant extract to improve the lithium ion battery performance	Dr Dinesh karthik A	Chemistry	2022-2023	7500	1- year	Tamilnadu state council for science and technology	Government

தமிழ்நாடு அறிவியல் தொழில்நுட்ப மாநில மன்றம்
TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Established by Government of Tamilnadu)
Directorate of Technical Education Campus, Chennai – 600 025.
Ph : 044-22301428, www.tanscst.nic.in

Dr.R.SRINIVASAN, M.Sc., Ph.D.,F.I.C.S., M.A.C.S.(USA).,
Member Secretary

Lr.No.TNSCST/SPS/BS/2022-2023

27.02.2023

To
The Principal
Shanmuga Industries Arts and Science College,
Tiruvannamalai-606 603

Sir/Madam,

Sub: TNSCST – Student Project Scheme – 2022-2023 – approval intimation–grant release- reg.

With respect to the above scheme, the list of projects approved by the State Council is enclosed along with terms and conditions. You are requested to adhere to terms and conditions such as submission of UC and Seminar Paper on Time.

1.	Dr. A.Dinesh Karthik, Associate Professor and Head, Department of P.G & Research Department of Chemistry, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603	Novel technique of fabrication of Cobalt Oxide Nanoparticles from plant extract to improve the Lithium Ion Battery Performance.	A.Thahira Jahan, P.Kavipriya, M.Deepak,	PS-403	The Principal	Rs 7500/-
					Total	**Rs 7500/-**

Herewith enclosed the cheque for the approved grant and disburse the grant to the concerned students through the guides at the earliest

Kindly send the utilisation certificate (format enclosed) and seminar paper (Ref.T&C-no.5&6) on completion of the project.

Thanking you,

Yours faithfully,

3/3/23
Member Secretary.

Encl: a) Terms & Conditions (T&C)
b) Format of Utilisation Certificate (UC)
c) Cheque for Rs. 7500/-Cheque No: 575005 dt.03.03.2023

Copy to: Individual Guides

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FOR MEMBER SECRETARY, TAMILNADU STATE COUNCIL SCIENCE & TECHNOLOGY

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

DOTE campus, Chennai-600 025

STUDENT PROJECT SCHEME 2022-2023

Terms and Conditions for the granted SPS projects

1. Every sanctioned project will be given a Project code Number. Please refer to this number while corresponding with TNSCST.

2. The project team **SHOULD NOT** change the topic of the project and should not deviate from the objectives of the sanctioned proposal. In the event of any such changes, sponsoring will be treated as canceled and the college should return the sanctioned amount to TNSCST.

3. The sanctioned projects should be completed and the reports should be submitted before the end of **MAY 2023.**

4. On completion of the project, a soft copy (CD) of the final project report and **TWO** copies of 2-3 page seminar paper (500 words-MS Word format), utilization certificate (**UC**) and statement of expenditure (**SE**) should be sent to **The Member Secretary, Tamilnadu State Council For Science and Technology, DOTE Campus, CHENNAI-600 025.**

5. The seminar paper will be included in the form of PROCEEDINGS which will be brought out during the Seminar cum Exhibition, only for those who submit the **UC & SE.**

6. The Utilization Certificate and Statement of Expenditure should be countersigned by the GUIDE, HOD and Principal/Registrar with an official **seal** as the case may be.

7. The guides are responsible for the timely submission of SEMINAR PAPER, UC and SE.

8. It is mandatory for the project team (**anyone student**) should present and exhibit the findings before the experts in the Seminar cum Exhibition which will be organized during **JULY / AUGUST 2023.**

9. During the Seminar cum Exhibition, "the best project award and certificate" will be presented to the outstanding projects and completion certificates to all.

10. The council reserves the right to terminate the project at any stage if it is convinced that the grant has not been properly utilized or appropriate progress is not made. In addition, the Council may designate an officer/an Expert to review the work done.

11. If the GUIDE wishes to leave the Institution where the project is based, the Institute/GUIDE will inform the same to Council and in consultation with Council, evolve steps to ensure the successful completion of the project, before relieving the GUIDE.

12. The Council reserves the right to order verification/audit of accounts by any authorized officer. The bills and accounts shall be kept safe for a **minimum of 5 years**.

13. Unspent money if any should be refunded in the form of DD drawn in favor of **The Member Secretary, Tamilnadu State Council for Science and Technology, DOTE Campus, CHENNAI-600 025 payable** at **CHENNAI.**

14. Investigators must acknowledge the Council in reports and technical/scientific papers if published based on the research work done under the project. Investigators are requested to publish some of the research papers emerging out of the project work in peer-reviewed journals Journal's.

15. If the results of the research are to be legally protected by way of patents/copyrights etc. the results should not be published without action being taken to secure legal protection for the research results.

16. The knowledge generated from the project will be the property of TNSCST and should be properly acknowledged. Transfer to technology generated shall be done in consultation with the Council.

17. The recipient organization shall comply, with such other conditions as may be suggested in the 'guidelines' issued in this regard from time to time.

18. The sanctioned grant should not be utilized for the expenses like travel, photocopy, purchase of books, internet charges and report preparation.

3/3/23

MEMBER SECRETARY

04175 - 236654 / 235295

SHANMUGA INDUSTRIES
ARTS & SCIENCE COLLEGE (Co-Ed)

Accredited with "B+" GRADE by NAAC in Cycle 1
Certified Under Section 2 (f) & 12 B of UGC Act 1956, An ISO 9001 - 2015 Certified Institution
Permanently Affiliated to Thiruvalluvar University, Vellore and Approved by the Govt. of Tamil nadu & AICTE, New Delhi
Manalurpet Road, Tiruvannamalai - 606 603, shanmugacollege@gmail.com www.shanmugacollege.edu.in

25.05.2023

To

The Member Secretary,
Tamil Nadu State Council For Science and Technology,
DOTE Campus,
Chennai - 600025.

Respected Sir,

Sub: Submitting Project & Utilization Certificate – reg.

*****

We wish to inform you that we have completed the Student Project Scheme [SPS] **2022-2023, PS Code 403**, under the Supervision of **Dr.A.DINESH KARTHIK,** Associate Professor & Head, Department of Chemistry, Shanmuga Industries Arts and Science College, Tiruvannamalai. Herewith we enclosed following documents related to the Student Project Scheme [SPS] project for your consideration.-

Thanking you,

Yours

25/5/23

Principal
PRINCIPAL
Shanmuga Industries Arts and Science College (Co-Education)
Thiruvannamalai - 606 603.

Encl:

1. Utilization Certificate (UC).
2. Seminar Paper.

TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
DOTE Campus, Chennai - 600 025

STUDENT PROJECT SCHEME 2022-2023

UTILISATION CERTIFICATE

1. **Name of the guide and address :** **Dr. A.DINESH KARTHIK,**
Associate Professor and Head,
PG & Research Department of chemistry,
Shanmuga Industries Arts and Science College , Tiruvannamalai-606601.
Email ID: dineshkarthik2008@gmail.com, dineshkarthikche@shanmuga.edu.in.

2. **Name of the student(s) :** **Mr. Ms.A.THAHIRAJAHAN, Ms.P.KAVIPRIYA, Mr.M.DEEPAK.**
II M.Sc.,chemistry,
PG & Research Department of Chemistry,
Shanmuga Industries Arts and Science College,Tiruvannamalai-606601.

3. **Title of the project :** **NOVEL TECHNIQUE OF FABRICATION OF COBALT OXIDE NANOPARTICLES FROM PLANT EXTRACT TO IMPROVE THE LITHIUM ION BATTERY PERFORMANCE**

4. **Project code :** **PS -403**

It is certified that a sum of **Rs 7500/-** (Seven thousand and five hundred only) Sanctioned by the council for carrying out above mentioned student project has been utilized for the purpose for which it was sanctioned and sum of **Rs.NIL** remaining unutilized is refunded.

25/5/23

Signature of the Guide

Dr.A.DINESH KARTHIK, M.Sc.,M.Phil.,Ph.D.,
Research Supervisor & Head,
P.G. and Research Department of Chemistry,
Shanmuga Industries Arts and Science College
Thiruvannamalai - 606 603.

25/5/23

Signature of the HOD

25/5/23

Signature of the PRINCIPAL

PRINCIPAL
Shanmuga Industries Arts and Science College (Co-Education)
Thiruvannamalai - 606 603.

PROJECT WORK
STUDENT PROJECTS SCHEME 2022-2023 [SPS]

NOVEL TECHNIQUE OF FABRICATION OFCOBALT OXIDE NANOPARTICLES FROM PLANT EXTRACT TO IMPROVE THE LITHIUM ION BATTERY PERFORMANCE

Submitted to
TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY,
DOTE Campus, CHENNAI – 25.

TNSCST

[PROJECT CODE – PS – 403]

Submitted by
Ms.A.THAHIRA JAHAN,
(Reg. No:20921P14022)
Ms.P.KAVIPRIYA,
(Reg.No.20921P14011)
Mr.M.DEEPAK,
(Reg.No:20921P14005)
II M.Sc CHEMISTRY

Under the guidance of

Dr. A.DINESH KARTHIK, M.Sc., M.Phil., Ph.D.,

ASSOCIATE PROFESSOR & HEAD,

PG & RESEARCH DEPARTMENT OF CHEMISTRY,

SHANMUGA INDUSTRIES ARTS AND SCIENCE COLLEGE

TIRUVANNAMALAI – 606 603.

MAY – 2023.

Dr. A. DINESHKARTHIK, M.Sc., MPhil.,Ph.D, NEA.
ASSOCIATE PROFESSOR & HEAD,
P.G & RESEARCH DEPARTMENT OF CHEMISTRY,
SHANMUGA INDUSTRIES ARTS AND SCIENCE COLLEGE,
NAAC Accredited with "B+" Grade
TIRUVANNAMALAI – 606 603.
Email ID : dineshkarthik2008@gmail.com,
dineshkarthikche@shanmugacollege.edu.in.
Mobile No : +91 9486878461/9500260601.

CERTIFICATE

This is to certify that the project work, entitled **"NOVEL TECHNIQUE OF FABRICATION OF COBALT OXIDE NANOPARTICLES FROM PLANT EXTRACT TO IMPROVE THE LITHIUM ION BATTERY PERFORMANCE"** submitted to the Thiruvalluvar University, in partial fulfillment of the requirements for the awards of degree of Master of Science in Chemistry is a record of original research work done by **Ms.A.THAHIRAJAHAN,** (Reg.No.20921P14022) **Ms.P.KAVIPRIYA,** (Reg.No.20921P1011) **Mr.M.DEEPAK** (Reg.No: 20921P14005), during the period **2022-2023** of their study in PG & Research Department of Chemistry, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603, Tamil nadu, India, under my supervision and guidance and the thesis has not formed the basis for the award of any Degree / Diploma / Associate ship / fellowship or other similar title to any candidate of any University.

25/5/23

HEAD OF THE DEPARTMENT
Dr.A.DINESH KARTHIK, M.Sc.,M.Phil.,Ph.D.,
Research Supervisor & Head,
P.G. and Research Department of Chemistry,
Shanmuga Industries Arts and Science College.
Thiruvannamalai - 606 603.

SIGNATURE OF THE GUIDE
Dr.A.DINESH KARTHIK, M.Sc.,M.Phil.,Ph.D.,
Research Supervisor & Head,
P.G. and Research Department of Chemistry,
Shanmuga Industries Arts and Science College
Thiruvannamalai - 606 603.

25/5/23

PRINCIPAL
PRINCIPAL
Shanmuga Industries Arts and
Science College (Co-Education)
Thiruvannamalai – 606 603.

PROJECT CODE: PS-403

"NOVEL TECHNIQUE OF FABRICATION OFCOBALT OXIDE NANOPARTICLES FROM PLANT EXTRACT TO IMPROVE THE LITHIUM ION BATTERY PERFORMANCE"

Ms.A.THAHIRA JAHAN, Ms.P.KAVIPRIYA, Mr.M.DEEPAK,
II M.Sc CHEMISTRY, PG & Research Department of chemistry,
Shanmuga Industries Arts and Science College Tiruvannmalai 60601.

Abstract

Green nanotechnology has significant applications in various novel techniques fields. Green synthesized cobalt nanoparticles, prepared by using meliadubia extracts and they are very toxic and hazardous and make the nanoparticles biologically incompatible. Thus there is need for green chemistry that includes a clean, non-toxic and environmental friendly method of nanoparticles synthesis. Cobalt, nanoparticles were synthesized using the meliadubia leaf where cobalt compounds were used as the metal precursor respectively. The change in colour from light brown to dark brown indicates the formation of cobalt nanoparticles. The nanoparticles were further characterized using UV visible spectroscopy, FTIR, and SEM.

The synthesised nanoparticle were analysed by different techniques such as x-ray diffraction (XRD),scanning electron microscopy (SEM),transmission electron microscopy(TEM)cobalt nanoparticle have been widely used in lithium-ion batteries, pigments, and dye, electronic thin film, capacitors, gaseous, heterogeneous catalysis, and for environmental remediation purposes. Different chemical and physical approaches have been used to synthesize cobalt and cobalt chloride or nitrate nanoparticle; however, these methods could be associated with eco-toxicity, cost effectiveness, high energy, and time consumption.

Keyword: nanotechnology, lithium-ion batteries, meliadubia Leaf, $Co(No_3)_2.6H_2o$ and $Cocl_2.6.H_2o$ green synthesis, application.

Introduction

Malabar neem tree is different name all over India. Originating from meliacae botanic family. One of the fastest and sizeable yield producing plantation crops to farmers like eucalyptus. In fact paper making industries and plywoodproducers are the major benefactors. To cultivators of meliadubia tree also called as a forest neem. The leaf of melia dubia is used to make medicine. People use meliadubia leaves of the medicinal plants are used for skin problems, like allergies, infections and rashes. Bacterial and viral infections during summer and rainy season can also be cured with the neem paste of this plant. Powdered leaves are also used as natural mosquitoes repellent this plant mainly used as dengue fever medication to improve the blood platelets count.

Materials and Methods

The materials employed during this work include Cobalt chloride hexa hydrate and cobalt nitrate hexa hydrate, DMSO(dimethyl sulfoxide) was purchased from (SRL and CDH) Delhi.

Collection and Extraction of meliadubia

The collected leave of *meliadubia* were collected aerial part of the plants were carefully washed under running tap water and rinsed severally with distilled water followed by sun-drying under air at room temperature for 24 hours . The dried materials were cut into minute sizes and ground with the aid of a crucible. About 5 g of it was weighed and dispersed in 50 ml of sterile distilled water in a 250 ml glass beaker and boiled at 80C for 2 hours and were allowed to cool and

the filtrate was used immediately for the synthesis of cobalt nanoparticles the heating was stopped and solution colour change was noted from dark green to light brown. The solution was kept to attain room temperature. After that, the solution was filtered through Whatman filter paper and stored in refrigerators for further use.

This research work is aimed at CoO nanoparticles from leaf meliadubia synthesize and characterizing. To green synthesize the CoO Nanoparticles using Cobaltnitrate and Cobaltchloride precursor. To signify the CoO Nanoparticles assist of analytical devices including UV- Visible spectroscopy, IR, XRD and SEM analysis. To synthesis the CoO Nanoparticle analysis by using green corrosion inhibitors for mild stell in hydrochloric acid. To synthesis the CoO Nanoparticles is various applications like larvicidal activity, antimicrobial activity, corrosion inhibition.

Results and Discussion

UV-VIS Spectroscopy

Fourier Transform Infrared (FTIR) Spectroscopy

XRD Analysis

Scanning Electron Microscopy X-ray (SEM).

Corrosion Inhibitor

Corrosion is a common phenomenon in industries, and it attracts considerable amount of interest because of its hazardous nature of interest because of its hazardous nature on metals result of corrosion effect detrimental to the usage of the material are considered.

Larvicidal Activities

Mosquitoes being vector for many s For tropical and subtropical countries,the vector and vector-borne diseases have become a big trouble for public health .

Lithium ion Battery

Lithium ion batteries (LIBs) have experienced a leap in their development, especially with shifting their application from small consumer electronics to the market of electric vehicles and energy storage power batteries The growth of the use and production imposes the need for infrastructure and strategies to handle LIB waste and potentially recover precious components of batteries without irreversible pollution and environmental damage.

Conclusion

In conclusion the field of nanotechnology is the development of reliable several conclusion have been made with synthesized cobalt nitrate hexahydrate and cobalt chloride hexahydrate nanoparticles firstly cobalt nitrate nanoparticles were synthesized by cost effective and eco-friendly processes by using meliadubia leaf extract and cobalt chloride hexahydrate for synthesis of metal Nanoparticles. To improve the efficiency of Li-ion batteries.

Guide: Dr. A.DINESH KARTHIK , Associate Professor & Head, PG & Research Department of Chemistry, Shanmuga Industries Arts And Science College,Tiruvannamalai.Cell:948688461.

TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
DOTE CAMPUS, CHENNAI – 600 025

Dr. R.Srinivasan
Member Secretary

Ref: TNSCST/SPS/BS/2022-23/

15.11.2023

To
The Principal
Shanmuga Industries Arts and Science College,
Tiruvannamalai-606 603

Sir/Madam,

22/11/23

Sub: Tamilnadu State Council for Science and Technology, Chennai - 25- Student Project Scheme (2022-23) – Completion certificate and Proceedings– Reg.

Ref: TNSCST/SPS/BS/2022-2023 dt.03.03.2023

*****

With reference to above, your students have been sanctioned the project under Student Project Scheme (2022-23). The following projects were completed as details below:-

Dr. A.Dinesh Karthik, Associate Professor and Head, Department of P.G & Research Department of Chemistry, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603	Novel technique of fabrication of Cobalt Oxide Nanoparticles from plant extract to improve the Lithium Ion Battery Performance.	A.Thahira Jahan, P.Kavipriya, M.Deepak,	PS-403

Please find enclosed herewith the project completion certificate of the students and proceedings of the project report. Kindly ensure that the certificate and proceedings in the pen drive to reach the students concerned.

Thanking you,

Yours faithfully

15/11/23

Member Secretary

Note: Those who have not submitted the Utilisation Certificate, kindly send it immediately.

Encl: Completion certificate
Proceedings (Card pen drive)

TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

TNSCST

GOVERNMENT OF TAMILNADU

CERTIFICATE

This is to certify that **Mr./Ms. A.Thahira Jahan, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603** has successfully completed the project titled **"Novel technique of fabrication of Cobalt Oxide Nanoparticles from plant extract to improve the Lithium Ion Battery Performance"** in the Sector **PHYSICAL SCIENCES** under **STUDENT PROJECT SCHEME** sponsored by the Council during the academic year 2022-2023.

Chennai-600 025
27.10.2023
PS-403/2023

Dr. R. SRINIVASAN
Member Secretary

TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

TNSCST

GOVERNMENT OF TAMILNADU

CERTIFICATE

This is to certify that **Mr./Ms. M.Deepak, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603** has successfully completed the project titled **"Novel technique of fabrication of Cobalt Oxide Nanoparticles from plant extract to improve the Lithium Ion Battery Performance"** in the Sector **PHYSICAL SCIENCES** under **STUDENT PROJECT SCHEME** sponsored by the Council during the academic year 2022-2023.

Chennai-600 025
27.10.2023
PS-403/2023

Dr. R. SRINIVASAN
Member Secretary

TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

TNSCST

GOVERNMENT OF TAMILNADU

CERTIFICATE

This is to certify that **Mr./Ms. P.Kavipriya, Shanmuga Industries Arts and Science College, Tiruvannamalai-606 603** has successfully completed the project titled **"Novel technique of fabrication of Cobalt Oxide Nanoparticles from plant extract to improve the Lithium Ion Battery Performance"** in the Sector **PHYSICAL SCIENCES** under **STUDENT PROJECT SCHEME** sponsored by the Council during the academic year 2022-2023.

Chennai-600 025
27.10.2023
PS-403/2023

Dr. R. SRINIVASAN
Member Secretary