



FATIMA COLLEGE

(Autonomous)

Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

I. Agnes Pristy - 2020MSCP01

TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET
WAVELENGTH USING HUBBLE SPACE TELESCOPE

A project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

LAGNES PRISTY (REG NO:2020MSCP01)

External Guide :

PROF.T. SIVARANI

Indian Institution of Astro physics

Bangalore-64

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Associate Professor and Head

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Madurai.



FATIMA COLLEGE(AUTONOMOUS)

RE-ACCREDITED WITH 'A++' GRADE BY NAAC (CYCLE-4)

Mary land , Madurai-625018

April 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **I. Agnes Pristy** at Indian Institute of Astrophysics, Bangalore under the guidance of **Dr. A. Sheela Vimala Rani**, Associate Professor and Head, Research Centre of Physics, Fatima College, Madurai and **Prof. T. Sivarani**, Indian Institute of Astrophysics, Bangalore during April-May 2022.


Prof. T. SIVARANI

Indian Institute of Astrophysics,
Bangalore-34.


Dr. A. SHEELA VIMALA RANI

Associate Professor and Head,
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DR. A. SHEELA VIMALA RANI

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20/05/22



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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Dr. A. SHEELA VIMALA RANI**, Assistant Professor, Head, Research centre of Physics, Fatima College, Madurai and **PROF.T.SIVARANI**, Indian Institute of Astrophysics, Bangalore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 21.05.2022

LAGNES PRISTY

(REG.NO:2020MSCP01)



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Mary Land, Madurai - 625018, Tamil Nadu

K. Annie Roselin - 2020MSCP02

FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING
BIO MATERIAL ELECTROLYTE BASED ON WITHANIA
SOMNIFERA (ASHWAGANDHA) WITH LITHIUM NITRATE ($LiNO_3$)

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

K. ANNIE ROSELIN (REG.NO:2020MSCP02)

External Guide:

Dr. S.SELVASEKARAPANDIAN

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Associate Professor,
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Fatima College,
Madurai



FATIMA COLLEGE (AUTONOMOUS)

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Mary Land, Madurai-625 018

April 2022



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*Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu*

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH LITHIUM NITRATE (LiNO_3)" is submitted to Fatima College, Madurai in fulfillment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **K. Annie Roselin**, at Materials Research Centre, Madurai under the guidance of **Mrs. R. Alphonsa Fernando**, Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore and Emeritus professor, Bharathiar University, Coimbatore during April-May 2022.

S. Selvasekarapandian
Dr.S.SELVASEKARAPANDIAN

The Director,
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R. Alphonsa Fernando
Mrs.R.ALPHONSA FERNANDO

Associate Professor,
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A. Sheela Vimala Rani
Dr. A. SHEELA VIMALA RANI

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Mrs. 20/06/22



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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH LITHIUM NITRATE (LiNO_3)" is based on the original work done by me for the degree of Master of Science under the guidance of **Mrs.R.Alphonsa Fernando**, Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr.S.Selvasekarapandian**, The Director, Materials Research Centre Coimbatore & Emeritus professor, Bharathiar University, Coimbatore. I also hereby declare that this work in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27-05-2022

K. Annie Roselin

(2020MSCP02)



FATIMA COLLEGE

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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

J. Anushya - 2020MSCP03

PERFORMANCE OF MAGNESIUM ION BATTERY USING
BIOMATERIAL ELECTROLYTE BASED ON WITHANIA
SOMNIFERA(ASHWAGANDHA) WITH MAGNESIUM NITRATE
Mg(NO₃)₂

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

J. ANUSUYA (REG.NO:2020MSCP03)

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Fatima College,

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FATIMA COLLEGE (AUTONOMOUS)

RE-ACCREDITED WITH 'A++' GRADE BY NAAC (Cycle 4)

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April - 2022



FATIMA COLLEGE

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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "**PERFORMANCE OF MAGNESIUM ION BATTERY USING BIOMATERIAL ELCTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH MAGNESIUM NITRATE $Mg(NO_3)_2$** " is submitted to Fatima College, Madurai in fulfillment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **J.Anusuya** at Materials Research Centre, Madurai under the guidance of **Mrs.R.Alphonsa Fernando**, Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr.S.Selvasekarapandian**, The Director, Materials research Centre ,Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore during April – May 2022.


Dr. S. Selvasekarapandian

The Director,
Materials Research Centre,
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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "**PERFORMANCE OF MAGNESIUM ION BATTERY USING BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) (WS) WITH MAGNESIUM NITRATE $Mg(NO_3)_2$** " is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Mrs. R. Alphonsa Fernando**, Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore & Emeritus professor, Bharathiar university, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.05.2022

J. Anusuya

(2020MSCP03)



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A. Assumptana Sirumalar - 2020MSCP05

SYNTHESIS AND CHARACTERISATION OF COPPER OXIDE NANO PARTICLES

A Project work Submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

In fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

ASSUMPTANA SIRUMALAR A. (Reg.No.2020MSCP05)

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Madurai.



FATIMA COLLEGE (AUTONOMOUS)

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Mary Land, Madurai-625 018.

April 2022



FATIMA COLLEGE

(Autonomous)

Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I hereby declare that the project work in this thesis entitled "SYNTHESIS AND CHARACTERIZATION OF COPPER OXIDE NANO PARTICLES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. L. Caroline Sugirtham, Associate Professor, Research Centre of Physics, Fatima College, Madurai. and Dr. R. Selvarajan, (Nano Science and Technology), Teaching Fellow, Centre for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

A. Assumptana Sirumalar

Assumptana Sirumalar, A

Place: Madurai

Date: 27.05.2022

(2020MSCP05)



FATIMA COLLEGE

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Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

This is to certify that this project work entitled "SYNTHESIS AND CHARACTERISATION OF COPPER OXIDE NANO PARTICLES" is submitted to Fatima College, Madurai in partial fulfilment of the requirements for the award of the Degree of Master of Science in Physics. This is the record of original work done by **Assumptana Sirumalar .A** under the guidance of **Dr. L. Caroline Sugirtham**, Associate Professor, Research Centre of Physics, Fatima College, Madurai, and **Dr. R. Selvarajan**, (Nano Science and Technology), Teaching Fellow, Centre for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai, during 2021-2022.

Dr. R. Selvarajan,

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Mary Land, Madurai - 625018, Tamil Nadu

A. Darathy Celciya - 2020MSCP06

FABRICATION OF SODIUM ION BATTERY USING BIO MATERIAL
ELECTROLYTE BASED ON WITHANIA SOMNIFERA WITH
SODIUM NITRATE

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

A. DARATHY CELCIYA (REG.NO:2020MSCP06)

External Guide:

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Internal Guide:

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Fatima College,

Madurai.



FATIMA COLLEGE (AUTONOMOUS)

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Mary Land, Madurai-625 018.

April 2022



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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

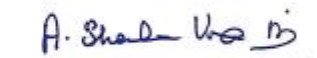
This is to certify that the work continued in the thesis entitled "FABRICATION OF SODIUM ION BATTERY USING BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA WITH SODIUM NITRATE (NaNO_3)" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done By **A. Darathy Celciya** at Materials Research Centre, Madurai under the guidance of **Dr. M.V. Leena Chandra**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials research Centre, Coimbatore and Emeritus Professor, Bharathiar University, Coimbatore during April-May 2022.


DR. S. SELVASEKARAPANDIAN

The Director,
Materials Research Centre,
Coimbatore
& Emeritus Professor,
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DR. M.V. LEENA CHANDRA

Assistant Professor,
Research Centre of Physics,
Fatima College,
Madurai.


DR. A. SHEELA VIMALA RANI

Head, Research Centre of Physics,
Fatima College,
Madurai.





FATIMA COLLEGE

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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "FABRICATION OF SODIUM ION BATTERY USING BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA WITH SODIUM NITRATE (NaNO_3)" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. M.V. Leena Chandra, Assistant Professor, Research centre of Physics, Fatima College, Madurai and Dr. S. Selvasekarapandian, The Director, Materials Research Centre, Coimbatore and Emeritus Professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.05.2022

A. Darathy Celciya
A. Darathy Celciya
(2020MSCP06)



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Mary Land, Madurai - 625018, Tamil Nadu

S. DeepithaKumari - 2020MSCP07

**FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING
BIOMATERIAL ELECTROLYTE BASED ON WITHANIA
SOMNIFERA (ASHWAGANDHA) WITH LITHIUM CHLORIDE**

A project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

S.DEEPITHAKUMARI (Reg. No. 2020MSCP07)

External Guide

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Internal Guide

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FATIMA COLLEGE (AUTONOMOUS)

RE-ACCREDITED WITH 'A++' GRADE BY NAAC (Cycle 4)

Mary Land , Madurai-625018.

April 2022



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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

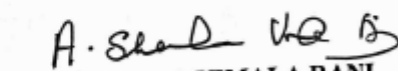
This is to certify that the work continued in the thesis entitled “FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH LITHIUM CHLORIDE” is submitted to the Fatima College, Madurai in fulfillment for the award of the degree of Master of Science in Physics. This is the record of original project work done by S.DeepithaKumari at Materials Research Centre, Madurai under the guidance of Dr. M.V. Leena Chandra, Assistant Professor, Research Centre of Physics, Fatima College, Madurai and Dr. S. Selvasekarapandian, The Director, Materials Research Centre, Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore during April-May 2022.

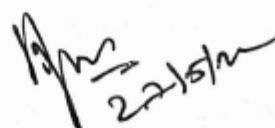

Dr. S. SELVASEKARAPANDIAN

The Director,
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Dr. M.V. LEENA CHANDRA

Assistant Professor,
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22/5/22



FATIMA COLLEGE

(Autonomous)

Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled **“FABRICATION OF LITHIUM ION CONDUCTING BATTERY USING BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH LITHIUM CHLORIDE”** is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Dr. M.V. Leena Chandra**, Assistant professor, Research Centre of Physics Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore & Emeritus professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date : 27.05.2022

S. Deepitha Kumari

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FATIMA COLLEGE

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Mary Land, Madurai - 625018, Tamil Nadu

T. Dheva Dharshini - 2020MSCP08

TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET
WAVELENGTH USING HUBBLE SPACE TELESCOPE

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

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FATIMA COLLEGE (AUTONOMOUS)

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April 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **T. Dheva Dharshini** at Indian Institute of Astrophysics, Bangalore under the guidance of **Dr. A. Sheela Vimala Rani**, Associate Professor and Head, Research Centre of Physics, Fatima College, Madurai and **Prof. T. Sivarani**, Indian Institute of Astrophysics, Bangalore during April-May 2022.


Prof. T. SIVARANI

Indian Institute of Astrophysics,
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Dr. A. SHEELA VIMALA RANI

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DR. A. SHEELA VIMALA RANI

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FATIMA COLLEGE

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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "**TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE**" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Dr. A. Sheela Vimala Rani**, Associate Professor and Head, Research Centre of Physics, Fatima College, Madurai and **Prof. T. Sivarani**, Indian Institute of Astrophysics, Bangalore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 26/05/2022


T.DHEVA DHARSHINI

(REG.NO.2020MSCP08)



FATIMA COLLEGE

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Mary Land, Madurai - 625018, Tamil Nadu

C. Femi - 2020MSCP09

SYNTHESIS AND CHARACTERISATION OF MANGANESE DIOXIDE
NANO PARTICLES

A Project work Submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

In fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

FEMLC (Reg. No : 2020MSC09)

External guide

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FATIMA COLLEGE (AUTONOMOUS)

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April 2022



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BONAFIDE CERTIFICATE

This is to certify that this project work entitled "SYNTHESIS AND CHARACTERISATION OF MANGANESE DIOXIDE NANO PARTICLES" is submitted to Fatima College, Madurai in fulfilment of the requirements for the award of the Degree of Master of Science in Physics, This is the record of original work done by **FEMLC** under the guidance of **Dr. L. Caroline Sugirtham**, Associate Professor, Research Center of Physics, Fatima College, Madurai. and **Dr. R. Selvarajan**, (Nano Science and Technology), Teaching Fellow, Center for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai. during 2021-2022.

Dr. R. Selvarajan,

Teaching Fellow,

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AC Tech Campus,

Anna University, Chennai.

Dr. L. Caroline Sugirtham,

Associate Professor,

Research Center of Physics,

Fatima College,

Madurai.

Dr. A. Sheela Vimala Rani

Head and Associate Professor,

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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I hereby declare that the project work in this thesis entitled "SYNTHESIS AND CHARACTERIZATION OF MANGANESE DIOXIDE NANO PARTICLES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. L.Caroline Sugirtham, Associate Professor, Research Center of Physics, Fatima College, Madurai. and Dr. R.Selvarajan, (Nano Science and Technology), Teaching Fellow, Center for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai.. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27-05-'22

C. Femi

Femi.C

(2020MSCP09)



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S. GopikaVarshini - 2020MSCP10

SYNTHESIS AND CHARACTERIZATIONS OF Y_2NiMnO_6 NANOSTRUCTURES

A project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to **MADURAI KAMARAJ UNIVERSITY**, Madurai)

To partial fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

S.GOPIKAVARSHINI (2020MSCP10)

External Guide & Internal Guide

Dr. M. RAGAM, M.Sc., M.Phil., Ph.D.

Assistant Professor, Research Centre of Physics,

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FATIMA COLLEGE (AUTONOMOUS)

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(74th Rank in India Ranking 2020 (NIRF) by MHRD)

Mary Land, MADURAI – 625 018

May 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

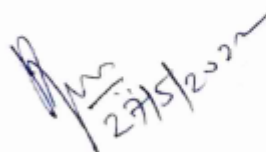
This is to certify that the work continued in the thesis entitled "SYNTHESIS AND CHARACTERIZATIONS OF Y_2NiMnO_6 NANOSTRUCTURES" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **S. GOPIKAVARSHINI** at Materials Research Centre, Madurai under the guidance of **DR. M. RAGAM**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai during May 2022.


Dr. A. Sheela Vimala Rani,

Head & Associate Professor
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Dr. M. Ragam,

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27/5/2022



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Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "SYNTHESIS AND CHARACTERIZATIONS OF Y_2NiMnO_6 NANOSTRUCTURES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. M. RAGAM, Assistant Professor, Research Centre of Physics, Fatima College, Madurai. I also hereby declare that this work, in part or full, has not been submitted for any Degree or Diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.06.2022

S.GOPIKAVARSHINI

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Mary Land, Madurai - 625018, Tamil Nadu

P. Gowsika - 2020MSCP11

**TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTAVIOLET
WAVELENGTH USING HUBBLE SPACE TELESCOPE**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

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April 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONA FIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **P. Gowsika** at Indian Institute of Astrophysics, Bangalore under the guidance of **Dr. A. Sheela Vimala Rani**, Associate Professor and Head, Research Centre of Physics, Fatima College, Madurai and **Prof. T. Sivarani**, Indian Institute of Astrophysics, Bangalore during April-May 2022.

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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project report in the entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Dr. A. SHEELA VIMALA RANI**, Assistant Professor, Head, Research Centre of Physics, Fatima College, Madurai and **Prof. T.SIVARANI**, Indian Institute of Astrophysics, Bangalore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institution.

Place: Madurai

P. Gowesika
P.GOWSIKA

Date: 27.05.2022

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Mary Land, Madurai - 625018, Tamil Nadu

S. Indu Priyadarshini - 2020MSCP12

**A THEORETICAL INVESTIGATION OF STRUCTURAL
TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE (E)-
1-(1,3-BENZODIOXOL-5-YL)-3-(2,4,5-TRI-METHOXYPHENYL)PROP-
2-EN-1-ONE**

A Project work Submitted to

FATIMA COLLEGE (AUTONOMOUS)

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To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

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APRIL 2022



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Mary Land, Madurai - 625018, Tamil Nadu*

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "A THEORETICAL INVESTIGATION OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE (E)-1-(1, 3-BENZODIOXOL-5-YL)-3-(2,4,5-TRI-METHOXYPHENYL)PROP-2-EN-1-ONE" is submitted to Fatima College fulfillment for the award of the Degree of Master of Science in Physics. This is the record of original project work done by **S. INDU PRIYADARSHINI** under the guidance of **Dr. Sr. G. JENITA RANI**, Assistant Professor, Research centre of physics, Fatima College, Madurai and **Dr. A. KATHIRAVAN**, Associate Professor, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Avadi, Chennai during April-May 2022.

Dr. A. KATHIRAVAN
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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "A THEORETICAL INVESTIGATION OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIOMOLECULE (E)-1-(1,3-BENZODIOXOL-5-YL)-3-(2,4,5-TRI-METHOXY PHENYL) PROP-2-EN-1-ONE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. Sr. G.JENITA RANI, Associate Professor, Research centre of Physics, Fatima College, Madurai and Dr. A. KATHIRAVAN, SERB research scientist, vel tech R & D institute of science and technology Avadi, Chennai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.05.2022

S.Indu priyadarshini

(2020MSCP12)



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L. Karunya - 2020MSCP13

SYNTHESIS AND CHARACTERISATION OF MANGANESE DIOXIDE
NANO PARTICLES

A Project work Submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

In fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

KARUNYA L. (Reg. No : 2020MSCP13)

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April 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE

This is to certify that this project work entitled "SYNTHESIS AND CHARACTERISATION OF MANGANESE DIOXIDE NANO PARTICLES" is submitted to Fatima College, Madurai in fulfilment of the requirements for the award of the Degree of Master of Science in Physics. This is the record of original work done by **KARUNYA L** under the guidance of **Dr. L. Caroline Sugirtham**, Associate Professor, Research Center of Physics, Fatima College, Madurai. and **Dr. R. Selvarajan**, (Nano Science and Technology), Teaching Fellow, Center for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai. during 2021-2022.

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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I hereby declare that the project work in this thesis entitled "SYNTHESIS AND CHARACTERIZATION OF MANGANESE DIOXIDE NANO PARTICLES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. L. Caroline Sugirtham, Associate Professor, Research Center of Physics, Fatima College, Madurai. and Dr. R. Selvarajan, (Nano Science and Technology), Teaching Fellow, Center for Nanoscience and Technology, AC Tech Campus, Anna University, Chennai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27/5/2022

Karunya L.

Karunya L.

(2020MSCP13)



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Mary Land, Madurai - 625018, Tamil Nadu

M. Madhumitha - 2020MSCP14

**A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND
NBO ANALYSIS OF THE BIO MOLECULE "(E)-3-(2,3-
DICHLOROPHENYL)-1-PHENYLPROP-2-EN-1-ONE"**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

M.MADHUMITHA (REG.NO:2020MSCP14)

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April 2022




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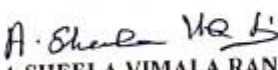
*Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu*

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE "(E)-3-(2,3-DICHLOROPHENYL)-1-PHENYLPROP-2-EN-1-ONE" is submitted to Fatima College fulfillment for the award of the Degree of Master of Science in Physics. This is the record of original project work done by M.MADHUMITHA under the guidance of Dr. Sr. G. JENITA RANI, Assistant Professor, Research centre of physics, Fatima College, Madurai and Dr. A. KATHIRAVAN, Associate Professor, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Avadi, Chennai during April-May 2022.


Dr. A. KATHIRAVAN
Associate Professor,
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Vel Tech Rangarajan Dr Sagunthala
R&D Institute of Science and
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Assistant Professor,
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Dr. A.SHEELA VIMALA RANI
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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

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Place: Madurai

Date: 27/5/2022

M. Madhumitha

M.Madhumitha

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Mary Land, Madurai - 625018, Tamil Nadu

C. Marshalin Reena - 2020MSCP15

**SYNTHESIS AND CHARACTERIZATION OF BIOMATERIAL ELECTROLYTE
BASED ON WITHANIA SOMNIFERA AND AMMONIUM NITRATE (NH_4NO_3)
FOR PROTON BATTERY APPLICATION**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

C.MARSHALIN REENA (REG.NO. 2020MSCP15)

External Guide

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BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "SYNTHESIS AND CHARACTERIZATION OF BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA AND AMMONIUM NITRATE (NH_4NO_3) FOR PROTON BATTERY APPLICATION" is submitted to Fatima college, Madurai in fulfillment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **C. Marshalin Reena** at Materials Research Center, Madurai under the guidance of **Mrs. R. Alphonsa Fernando** Associate professor, Research center of physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research center, Coimbatore & Emeritus professor, Bharathiar University, Coimbatore during April-May 2022

S. Selvasekarapandian
Dr. S. Selvasekarapandian

The Director,
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R. Alphonsa Fernando

Mrs. R. Alphonsa Fernando
Associate professor,
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Madurai.

A. Sheela Vimala Rani
Dr. A. Sheela Vimala Rani

Head, Research Centre of Physics,
Fatima College, Madurai.

29/5/2022



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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "SYNTHESIS AND CHARACTERIZATION OF BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA AND AMMONIUM NITRATE (NH_4NO_3) FOR PROTON BATTERY APPLICATION" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Mrs. R. Alphonsa Fernando**, Associate Professor, Research center of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research center, Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27-5-2022

C. Marshalin Reena

C. Marshalin Reena

(2020MSCP15)



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Mary Land, Madurai - 625018, Tamil Nadu

E. Muthulakshmi - 2020MSCP16

**A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND
NBO ANALYSIS OF THE BIO MOLECULE (E)-1-(1,3- BENZODIOXOL
-5-YL)-3-[4-(DIMETHYL-AMINO) PHENYL] PROP-2-EN-1-ONE**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

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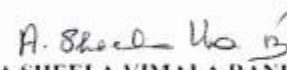
This is to certify that the work continued in the thesis entitled "A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE (E)-1-(1,3- BENZODIOXOL -5-YL)-3-[4-(DIMETHYL-AMINO) PHENYL] PROP-2-EN-1-ONE" is submitted to Fatima College fulfillment for the award of the Degree of Master of Science in Physics. This is the record of original project work done by E. MUTHULAKSHMI under the guidance of Dr. Sr. G. JENITA RANI, Assistant Professor, Research centre of physics, Fatima College, Madurai and Dr. A. KATHIRAVAN, Associate Professor, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai during April-May 2022.

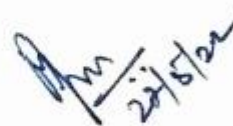

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Dr. Sr. G. JENITA RANI

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22/5/22



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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE (E)-1-(1,3- BENZODIOXOL -5-YL)-3-[4-(DIMETHYL-AMINO) PHENYL] PROP-2-EN-1-ONE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Dr. Sr. G. JENITA RANI**, Assistant Professor, Research centre of Physics, Fatima College, Madurai and **Dr. A. KATHIRAVAN**, Associate Professor, Department of Chemistry, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Avadi, Chennai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.05.2022

E. Muthulakshmi

E Muthulakshmi

(2020MSCP16)



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C. Richa Dharani - 2020MSCP18

A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO
ANALYSIS OF THE BIO MOLECULE "(E)-1-(5-CHLOROTHIOPHEN-2-
YL)-3-(2,4-DIMETHYLPHENYL) PROP-2-EN-1-ONE"

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

C.RICHA DHARANI (REG.NO:2020MSCP18)

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April 2022



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Mary Land, Madurai - 625018, Tamil Nadu

BONAFIDE CERTIFICATE


This is to certify that the work continued in the thesis entitled "A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE "(E)-1-(5-CHLOROTHIOPHEN-2-YL)-3-(2,4-DIMETHYLPHENYL) PROP-2-EN-1-ONE" is submitted to Fatima College fulfillment for the award of the Degree of Master of Science in Physics. This is the record of original project work done by C. RICHA DHARANI under the guidance of Dr. Sr. G. JENITA RANI, Assistant Professor, Research centre of physics, Fatima College, Madurai and Dr. A. KATHIRAVAN, Associate Professor, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Avadi, Chennai during April-May 2022.


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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in the thesis entitled "A THEORETICAL STUDY OF STRUCTURAL, TOPOLOGICAL AND NBO ANALYSIS OF THE BIO MOLECULE "(E)-1-(5-CHLOROTHIOPHEN-2-YL)-3-(2,4-DIMETHYLPHENYL) PROP-2-EN-1-ONE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. Sr. G. JENITA RANI, Assistant Professor, Research centre of Physics, Fatima College, Madurai and Dr. A. KATHIRAVAN, Associate Professor, Department of Chemistry, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Avadi, Chennai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27.05.2022

C. Richa Dharani

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J. Roshini - 2020MSCP19

**PRELIMINARY STUDY OF BIOMATERIAL ELECTROLYTE BASED
ON WITHANIA SOMNIFERA WITH AMMONIUM FORMATE
(NH_4HCO_2) FOR FABRICATION OF PROTON CONDUCTING
BATTERY**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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To the fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

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BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled
“PRELIMINARY STUDY OF BIOMATERIAL ELECTROLYTE BASED ON
ASHWAGANDHA WITH AMMONIUM FORMATE FOR FABRICATION OF
PROTON CONDUCTING BATTERY” is submitted to Fatima College, Madurai in
fulfillment for the award of the degree of Master of Science in Physics. This is the
record of original project work done by **J. Roshini**, at Materials Research
Centre, Madurai under the guidance of **Dr. M.V. Leena Chandra**, Assistant
Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S.
Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore and
Emeritus professor, Bharathiar University, Coimbatore during April-May 2022.


Dr.S.SELVASEKARAPANDIAN

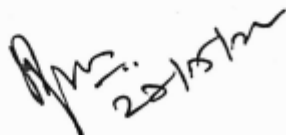
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DECLARATION

I declare that the project work incorporated in this thesis entitled “**PRELIMINARY STUDY OF BIOMATERIAL ELECTROLYTE BASED ON ASHWAGANDHA POWDER WITH AMMONIUM FORMATE FOR FABRICATION OF PROTON CONDUCTING BATTERY**” is based on the original work carried out by me for the degree of Master of Science in Physics under the guidance of **Dr. M.V.Leena Chandra**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai and **Dr.S.Selvasekarapandian**, Director, Materials Research Centre, Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

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S. Selvasuba - 2020MSCP21

**TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET
WAVELENGTH USING HUBBLE SPACE TELESCOPE**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To fulfillment of the requirements for the award of the degree

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This is to certify that the work continued in the thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done by S. Selvasuba at Indian Institute of Astrophysics, Bangalore under the guidance of Dr. A. Sheela Vimala Rani, Associate Professor and Head, Research Centre of Physics, Fatima College, Madurai and Prof. T. Sivarani, Indian Institute of Astrophysics, Bangalore during April-May 2022.

T. Sivarani
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Mary Land, Madurai - 625018, Tamil Nadu

DECLARATION

I declare that the project work in this thesis entitled "TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTRAVIOLET WAVELENGTH USING HUBBLE SPACE TELESCOPE" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of DR.A. SHEELA VIMALA RANI , Associate Professor and Head, Research Centre of Physics, Fatima College , Madurai and PROF.T.SIVARANI, Indian Institute of Astrophysics, Bangalore .I also hereby declare that this work,in part or full,has not been submitted for any degree or diploma of Madurai Kamaraj University or any institution.

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M. Shrinidhy - 2020MSCP22

FABRICATION OF MAGNESIUM ION BATTERY USING
BIOMATERIAL ELECTROLYTE BASED ON WITHANIA
SOMNIFERA(ASHWAGANDHA) WITH MAGNESIUM
CHLORIDE(MgCl₂)

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled “**FABRICATION OF MAGNESIUM ION BATTERY USING BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA (ASHWAGANDHA) WITH MAGNESIUM CHLORIDE ($MgCl_2$)**” is submitted to Fatima College, Madurai in fulfillment for the award of the degree of Master of science in Physics. This is the record of original project work done by **M. Shrinidhy** at Materials Research Centre, Madurai under the guidance of **Dr. M. V. Leena Chandra**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials research Centre, Coimbatore & Emeritus professor, Bharathiar University, Coimbatore during April-May 2022.


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DECLARATION

I declare that the project work in the thesis entitled “**FABRICATION OF MAGNESIUM ION BATTERY USING THE BIOMATERIAL ELECTROLYTE WITHANIA SOMNIFERA (ASHWAGANDHA) WITH MAGNESIUM CHLORIDE SALT ($MgCl_2$)**” is based on the original work done by me for the degree of Master of Science under the guidance of **Dr. M. V. Leena Chandra**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore & Emeritus professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

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M. R. Subhakarthaika - 2020MSCP24

SYNTHESIS AND CHARACTERIZATIONS OF $\text{Sm}_2\text{NiMnO}_6$

NANOPARTICLES

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "**SYNTHESIS AND CHARACTERIZATIONS OF $\text{Sm}_2\text{NiMnO}_6$ NANOPARTICLES**" is submitted to Fatima College, Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done By **M.R. SUBHAKARTHIKA** at Research Centre, Madurai under the guidance of **Dr. M. RAGAM**, Assistant Professor, Research Centre of Physics, Fatima College, Madurai .

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DECLARATION

I declare that the project work in the thesis entitled **"SYNTHESIS AND CHARACTERIZATIONS Of $\text{Sm}_2\text{NiMnO}_6$ NANOPARTICLES"** is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. M. RAGAM, Assistant Professor, Research Center of Physics, Fatima College, Madurai. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

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P. Suryakala - 2020MSCP25

**SYNTHESIS AND CHARACTERIZATION OF COBALT-
NICKEL CO-DOPED BISMUTH FERRIC OXIDE
NANOSTRUCTURES**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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To the fulfilment of the requirements for the award of the degree

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Submitted by

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BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled
"SYNTHESIS AND CHARACTERIZATION OF COBALT-
NICKEL CO-DOPED BISMUTH FERRIC OXIDE
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DECLARATION

I declare that the project work in the thesis entitled "SYNTHESIS AND CHARACTERIZATION OF COBALT-NICKEL CO-DOPED BISMUTH FERRIC OXIDE NANOSTRUCTURES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. M. Ragam, Assistant Professor, Research Center of Physics, Fatima College, Madurai. I also hereby declare that this work, in part or full, has not been submitted for any Degree or Diploma of Madurai Kamaraj University or any other institutions.

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M. Maria Suji - 2020MSCP26

**SYNTHESIS AND CHARACTERIZATION OF COBALT-
NICKEL CO-DOPED BISMUTH FERRIC OXIDE
NANOSTRUCTURES**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the fulfilment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

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This is to certify that the work continued in the thesis entitled
"SYNTHESIS AND CHARACTERIZATION OF COBALT-NICKEL CO-DOPED BISMUTH FERRIC OXIDE NANOSTRUCTURES" is submitted to Fatima College (Autonomous), Madurai in fulfilment for the award of the degree of Master of Science in Physics. This is the record of original project work done By M.Maria suji at Research Centre of Physics, Madurai under the guidance of Dr. M. Ragam, Assistant Professor, Research Centre of Physics, Fatima College(Autonomous), Madurai .

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DECLARATION

I declare that the project work in the thesis entitled "SYNTHESIS AND CHARACTERIZATION OF COBALT-NICKEL CO-DOPED BISMUTH FERRIC OXIDE NANOSTRUCTURES" is based on the original work done by me for the degree of Master of Science in Physics under the guidance of Dr. M. Ragam, Assistant Professor, Research Center of Physics, Fatima College, Madurai. I also hereby declare that this work, in part or full, has not been submitted for any Degree or Diploma of Madurai Kamaraj University or any other institutions.

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S. M. Sonalee - 2020MSCP27

**DEVELOPMENT OF BIO MATERIAL ELECTROLYTE BASED ON
WITHANIA SOMNIFERA WITH ZINC CHLORIDE ($ZnCl_2$) FOR
SOLID STATE BATTERY APPLICATION**

A Project work submitted to

FATIMA COLLEGE (AUTONOMOUS)

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This is to certify that the work continued in the thesis entitled "**DEVELOPMENT OF BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA WITH ZINC CHLORIDE ($ZnCl_2$) FOR SOLID STATE BATTERY APPLICATION**" is submitted to Fatima College, Madurai in fulfillment for the award of the degree of Master of Science in Physics. This is the record of original project work done by **S. M. Sonalee** at Materials Research Centre, Madurai under the guidance of **Mrs. R. Alphonsa Fernando** Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore during April-May 2022.


Dr. S.SELVASEKARAPANDIAN

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DECLARATION

I declare that the project work in the thesis entitled **"DEVELOPMENT OF BIO MATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA WITH ZINC CHLORIDE ($ZnCl_2$) FOR SOLID STATE BATTERY APPLICATION"** is based on the original work done by me for the degree of Master of Science in Physics under the guidance of **Mrs. R. Alphonsa Fernando**, Associate Professor, Research Centre of Physics, Fatima College, Madurai and **Dr. S. Selvasekarapandian**, The Director, Materials Research Centre, Coimbatore & Emeritus Professor, Bharathiar University, Coimbatore. I also hereby declare that this work, in part or full, has not been submitted for any degree or diploma of Madurai Kamaraj University or any other institutions.

Place: Madurai

Date: 27/5/2022

S. M. Sonalee

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A. Sheela Vimala Rani

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