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

I.AGNES PRISTY (REG NO:2020MSCP01)

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FATIMA COLLEGE(AUTONOMOUS)

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

Mary land , Madurai-625018

April 2022

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.

T. Sivarani

Prof. T. SIVARANI

Indian Institute of Astrophysics,

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A. Sheela Vimala Rani

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A. Sheela Vimala Rani

DR. A. SHEELA VIMALA RANI

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22/5/22

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.

I.AGNES PRISTY

(REG.NO:2020MSCP01)

Place: Madurai

Date: 27.05.2022

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 fulfillment of the requirements for the award of the degree

MASTER OF SCIENCE IN PHYSICS

Submitted by

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

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Mary Land, Madurai-625 018

April 2022

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,
Materials Research Centre,
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Emeritus professor,
Bharathiar University,
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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

Head, Research Centre of Physics,
Fatima College,
Madurai-18.

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.

K. Annie Roselin

(2020MSCP02)

Place: Madurai

Date: 27.05.2022

PERFORMANCE OF MAGNESIUM ION BATTERY USING BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA(ASHWAGANDHA)WITH MAGNESIUM NITRATE $Mg(NO_3)_2$

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

J. ANUSUYA (REG.NO:2020MSCP03)

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FATIMA COLLEGE (AUTONOMOUS)

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April – 2022

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.

S. Selvasekarapandian

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R. Alphonsa Fernando

Mrs. R. Alphonsa Fernando

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A. Sheela Vimala Rani

Dr. A. Sheela Vimala Rani

Head, Research Centre of Physics,

Fatima College, Madurai.

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.

J. Anusuya

Place: Madurai

J.Anusuya

Date: 27.05.2022

(2020MSCP03)

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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FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, Madurai-625 018.

April 2022

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

Place: Madurai

Assumptana Sirumalar. A

Date: 27.05.2022

(2020MSCP05)

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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Research Centre of Physics,

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Dr. A. Sheela Vimala Rani

Head and Associate Professor,

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Fatima College,

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27/5/2022

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

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Mary Land, Madurai-625 018.

April 2022

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,

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Dr. A. SHEELA VIMALA RANI

Head, Research Centre of Physics,

Fatima College,

Madurai.

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.

A. Darathy Celciya

A. Darathy Celciya

(2020MSCP06)

Place: Madurai

Date: 27.05.2022

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)

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Mary Land , Madurai-625018.

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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
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Dr. A. SHEELA VIMALA RANI
Head, Research Centre of Physics,
Fatima College,
Madurai.

22/5/22

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.

S. DeepithaKumari

(2020MSCP07)

Place: Madurai

Date : 27.05.2022

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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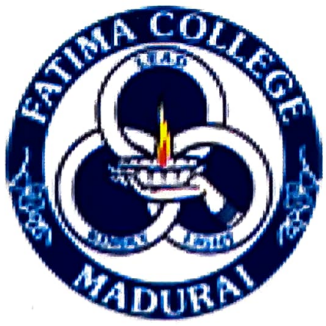

FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, Madurai-625 018.

April 2022

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.

T. Sivarani

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A. Sheela Vimala Rani

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A. Sheela Vimala Rani

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20/5/22

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.

T. Dheva Dharshini

Place: Madurai

T.DHEVA DHARSHINI

Date: 25/05/2022

(REG.NO.2020MSCP08)

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

FEMI.C (Reg. No : 2020MSC09)

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April 2022

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 **FEMI.C** 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,

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Center for Nanoscience and Technology,

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,

Research Centre of Physics,

Fatima College, Madurai.

27/5/2022

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.

C. Femi

Place: Madurai

Femi.C

Date: 27-05-'22

(2020MSCP09)

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

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Fatima College, Madurai.

FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, MADURAI – 625 018

May 2022

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled **"SYNTHESIS AND CHARACTERIZATONS 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. SheelaVimala Rani,
Head & Associate Professor
Research Centre of Physics,
Fatima College,
Madurai.

Dr.M.Ragam,
Assistant Professor,
Research Centre of Physics
Fatima College,
Madurai.

27/5/2022

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.

S Gopikavarshini

Place: Madurai

Date: 27.04.2022

S.GOPIKAVARSHINI

(2020MSCP10)

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

P.GOWSIKA (REG.NO 2020MSCP11)

External Guide

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FATIMA COLLEGE (AUTONOMOUS)

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Mary Land , Madurai-625 018.

April 2022

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 **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.

T. Sivarani

Prof. T. SIVARANI

Indian Institute of Astrophysics,

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A. Sheela Vimala

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Madurai.

A. Sheela Vimala

DR. A. SHEELA VIMALA RANI

Associate Professor and Head,

Research Centre of Physics,

Fatima College,

Madurai.

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

Date: 27.05.2022

P.Gowsika

P.GOWSIKA

(REG.NO.2020MSCP11)

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)

(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.INDU PRIYADARSHINI (REG.NO.2020MSCP12)

External Guide:

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SERB Research Scientist,

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FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, Madurai-625 018

APRIL 2022

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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Dr. Sr. G. JENITA RANI
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Fatima College,
Madurai.

Dr. A. SHEELA VIMALA RANI
Head, Research centre of physics,
Fatima College,
Madurai.

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.

S.Indu priyadarshini

Place: Madurai

S.Indu priyadarshini

Date: 27.05.2022

(2020MSCP12)

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

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Mary Land, Madurai -625 018

April 2022

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.

Dr. R. Selvarajan,

Teaching Fellow ,

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Associate Professor,

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Fatima College,

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Dr. A. Sheela Vimala Rani

Head and Associate Professor,

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Fatima College, Madurai.

28/5/2-22

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.

Karunya L

Karunya L

(2020MSCP13)

Place: Madurai

Date: 27/5/2022.

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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Mary Land, Madurai- 625 018.

April 2022

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

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Dr. A.SHEELA VIMALA RANI

Head, Research centre of physics,

Fatima College,

Madurai.

20/5/22

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)-3-(2,3-DICHLOROPHENYL)-1-PHENYLPROP-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.

M. Madhumitha

M.Madhumitha

(2020MSCP14)

Place: Madurai

Date: 27/5/2022

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

Dr. S.SELVASEKARAPANDIAN

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FATIMA COLLEGE (AUTONOMOUS)

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Mary Land, Madurai-625 018

APRIL - 2022.

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

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A. Sheela Vimala Rani

Dr. A. Sheela Vimala Rani
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29/5/2022

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.

C. Marshalin Reena

Place: Madurai

C.Marshalin Reena

Date: 27.5.2022

(2020MSCP15)

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

E. MUTHULAKSHMI (REG.NO:2020MSCP16)

External guide

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FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, Madurai- 625 018.

April 2022

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-(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.

Dr. A. KATHIRAVAN

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23/5/22

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.

E. Muthulakshmi.

Place: Madurai

Date: 27.05.2022

E.Muthulakshmi

(2020MSCP16)

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

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FATIMA COLLEGE (AUTONOMOUS)

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Mary Land, Madurai- 625 018.

April 2022

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.

Dr. A. KATHIRAVAN

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Dr. A.SHEELA VIMALA RANI

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Madurai.

20/5/22

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.

C. Richa Dharani

C.Richa dharani

(2020MSCP18)

Place: Madurai

Date: 27.05.2022

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

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

J.ROSHINI (REG.NO:2020MSCP19)

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

Mary Land, Madurai-625 018

APRIL 2022

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 Resaerch 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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Coimbatore,
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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.

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.

J.Roshini

Place: Madurai

Date: 27.05.2022

J.Roshini

(2020MSCP19)

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

MASTER OF SCIENCE IN PHYSICS

Submitted by

S.SELVASUBA (REG.NO 2020MSCP21)

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Mary Land, Madurai-625 018.

April 2022

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 **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

Prof. T. SIVARANI

Indian Institute of Astrophysics,

Bangalore-34.

A. Sheela Vimala Rani

Dr. A. SHEELA VIMALA RANI

Associate Professor and Head,

Research Centre of physics

Fatima College.

Madurai.

A. Sheela Vimala Rani

DR. A. SHEELA VIMALA RANI

Associate Professor and Head,

Research Centre of Physics,

Fatima College,

Madurai.

20/10/22

DECLARATION

I declare that the project work in this thesis entitled **"TRANSMISSION SPECTROSCOPY OF HD209458 IN ULTAVIOLET 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.

S.Selvasuba

S.SELVASUBA

Place: Madurai

Date: 27.05.2022

(REG.NO.2020MSCP21)

FABRICATION OF MAGNESIUM ION BATTERY USING BIOMATERIAL ELECTROLYTE BASED ON WITHANIA SOMNIFERA(ASHWAGANDHA) WITH MAGNESIUM CHLORIDE($MgCl_2$)

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.SHRINIDHY (REG.NO:2020MSCP22)

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Madurai.

FATIMA COLLEGE (AUTONOMOUS)

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

Mary Land, Madurai-625018

April - 2022

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.

Dr. S. Selvasekarapandian
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Materials Research Centre,
Coimbatore
& Emeritus professor,
Bharathiar University,
Coimbatore.

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.

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, Bharathair 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.

M. Shrinidhy

M.Shrinidhy

(2020MSCP22)

Place: Madurai

Date: 27.05.2022

SYNTHESIS AND CHARACTERIZATIONS OF Sm_2NiMnO_6 NANOPARTICLES

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

M.R SUBHAKARTHIKA (REG.NO:2020MSCP24)

External Guide & Internal Guide

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APRIL 2022

BONAFIDE CERTIFICATE

This is to certify that the work continued in the thesis entitled "**SYNTHESIS AND CHARACTERIZATIONS OF Sm_2NiMnO_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 Sm_2NiMnO_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.

Subhakarthika.M.R.

M.R .SUBHAKARTHIKA

(2020MSCP24)

Place: Madurai

Date: 27/5/22

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

Submitted by

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P.SURYAKALA

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

A Project work submitted to

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Place: Madurai

Date: 27/5/22

M.MARIA SUJI

(2020MSCP26)

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)

(Affiliated to MADURAI KAMARAJ UNIVERSITY, Madurai)

To the 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 **"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.

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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.

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S. M. Sonalee

(2020MSCP27)

Place: Madurai

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