



Anand Nagar, Krishnankoil - 626126, Srivilliputtur (via), Virudhunagar District, Tamilnadu.

**APPLICATION FOR ADMISSION TO Ph.D. PROGRAMMES**

Date of Application:24-11-2020

Department	PHYSICS	Application No.	202020028
Area of Research	NANO TECHNOLOGY	Research Mode	FULL TIME

**Name** :SARANYA.P  
**Date of Birth / Age** :18-04-1995 / 25 Years  
**Gender** :FEMALE  
**Category** :BC  
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<b>Father's/Husband's Name</b>	PICHAIMANI.P	<b>Father's/Husband's Occupation</b>	FARMER
<b>Family Income</b>	82000	<b>Residential Type</b>	RURAL
<b>Birth Place</b>	TAMIL NADU	<b>Mother Tongue</b>	TAMIL
<b>Religion</b>	HINDU	<b>Martial Status</b>	SINGLE
<b>Aadhaar No.</b>	306038185637	<b>PAN No.</b>	-
<b>Physically Challenged</b>	NO	<b>Type of Disability</b>	-
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Qualification						
Degree	Discipline	College/university	Year Passed	AVG/CGPA	Class	Mode
10	STATE BOARD	NSKP.HR.SEC SCHOOL	APR 2010	83	FIRST CLASS	REGULAR
12	STATE BOARD	NSKP.HR.SEC.SCHOOL	APR 2012	88	FIRST CLASS	REGULAR
UG	PHYSICS	SRI ADI CHUNCHANAGIRI WOMENS COLLEGE	APR 2015	83	FIRST CLASS WITH DISTINCTION	REGULAR
PG	PHYSICS	KARPAGAM ACADEMY OF HIGHER EDUCATION	APR 2018	89	FIRST CLASS WITH DISTINCTION	REGULAR

Experience				
Organization	Designation	Experience From	Experience TO	Work Nature

Payment Details

Transaction ID	Reference	Date of transaction	Amount	Status
202020028_201212120718	VHD49551328000	12-12-2020	600	SUCCESS

# **RESEARCH PROPOSAL**

**on**

## **STRUCTURAL AND ELECTRICAL STUDIES ON PURE AND Mn DOPED LANTHANUM NICKEL OXIDE NANOPARTICLES**

Submitted By

**P.SARANYA  
[16PHPO20]**

## **ABSTRACT**

Rare-earth compounds are of immense significance due to the presence of *f*-orbital electrons and the resultant magnetic, electronic, catalytic, chemical and optical qualities. This leads to their practical application in diverse fields, such as luminescent devices or phosphors (component in LEDs, household compact fluorescent lamps, high-resolution flat panel displays), medical diagnostics and imaging, biochemical probes, powerful magnets, sensors, and in the catalysis of some technically important chemical processes. However, much attention has recently been devoted to the synthesis of rare-earth-based compounds in nanometric dimensions that can perform multiple functions, such as fluorescence imaging, drug delivery, and so on. In this mini review, a short summary of the applications of rare-earth nanomaterials in the fluorescent labelling of cells, MRI contrast imaging, and dual imaging modalities have been discussed.

## **INTRODUCTION**

Nanomaterials are cornerstones of nanoscience and nanotechnology. Nanostructure science and technology is a broad and interdisciplinary area of research and development activity that has been growing explosively worldwide in the past few years. It has the potential for revolutionizing the ways in which materials and products

are created and the range and nature of functionalities that can be accessed. It is already having a significant commercial impact, which will assuredly increase in the future. The new advanced technologies need new materials with improved characteristics, like lower weight, higher resistance to environmental exposures, lower production costs, higher strength and durability. In order to fulfil these requirements, scientists strive to find solutions among more sophisticated materials, *i.e.* composites. Composites are systems "composed" of two or more physically distinguishable components that combine the individual properties of their constituents and yield new features and better performances. Although the concept of composite materials has been known for thousands of years, recent advances in this field are particularly appealing. The origin of the renaissance of composites lies in the progress of the synthesis of nano particular materials as fillers, resulting in new properties.

Therefore, the today's composites offer a great variety of properties and find numerous applications in various industrial branches, including: aerospace, automotive, electronics, construction, energy, bio-medicine, just to name a few of them. Furthermore, composite materials have improved the properties of a plethora of everyday products. The high-energy-density capacitors are the promising power source and have attracted considerable attention in recent years. The increasing pollution due to electrical vehicles and explosive growth of portable electronic devices has pushed the development of highperformance supercapacitors as the urgent requirement.

Polymer-based composites with excellent dielectric performance are currently very popular topics in the field of materials science, and have received increasing attention in recent years .

Polymers are presently the materials for energy storage applications because of their features such as high electric breakdown field, low dielectric loss, easy processing, and low cost. However, the dielectric constant ( $k$ ) of common polymers is low (i.e.  $k < 3$ ). Thus, a key issue is to enhance dielectric constant of polymers while retaining other excellent performances. Such composites could be useful as high-energy-density capacitors .

## **LITERATURE REVIEW**

- High-surface carbons, noble metal oxides, and conducting polymers are the main families of electrode materials studied for supercapacitor applications. Conductive polymers have been extensively studied in supercapacitors. The main conductive polymer materials that have been investigated for the supercapacitor electrode are polyaniline (PANI), polypyrrole (PPY), polythiophene (PTH) and their derivatives, and so on. Among these polymers, PANI is considered the most promising material because of its high capacitive characteristics, low cost, and ease of synthesis. However, the relative poor cycling life restricts its practical applications. Recently, advancement of nanoscale binding technique provides an innovative route to prepare PANI-based composites with better

- performance as electrode material. It has been demonstrated that PANI composite with metal oxides exhibit improved supercapacitor performance.
- Graphene is a two-dimensional form of graphite, the high surface area, excellent mechanical properties and conductivity of this new material have attracted great interests. Graphene oxide, bearing oxygen functional groups on their basal planes and edges, is a single sheet of graphite oxide and exhibits good performance. It can be obtained by exfoliation of graphite oxide. The tunable oxygenous functional groups of graphene oxide facilitate the modification on the surface and make it a promising material for composites with other materials. Recent reports on ultracapacitors based on graphene have attracted great interest. Many graphene composites with conducting polymers have been developed. However, the effect of raw graphite material sizes and feeding ratios on the electrochemical properties of such composites have not been investigated intensively [5].
  - Cheng Yang et al reported that the multiwall Carbon nanotube (MWCNTs) -polypyrrole (PPy) composites prepared by an inverse microemulsion polymerization. Transmission electron microscopy, X-ray photoelectron spectroscopy and Raman spectroscopy indicated that the MWCNTs were coated with PPy. The composites presented a stable high dielectric constant ( $\sim 44$ ), rather low loss ( $\ll 0.07$ ), and large energy density (up to  $4.95 \text{ J cm}^{-2}$ ). Such MWCNT composites can be used to store charge, high-energy-density capacitors and electrical energy and play a key

role in modern electronics and electric power systems .

- Qun Li et al reported that the chemically purified multiwalled carbon nanotube/poly(vinylidene fluoride) (MWCNT /PVDF) composites were fabricated. Raman spectroscopy and transmission electron microscopy indicated that the catalysts metal particles amorphous. The most important result is that the dielectric constant
- Ranulfo Allen et al suggested a method to align carbon nanotubes with in-situ polymerization of conductive polymer to form composite films and fibers. Use of the conducting polymer raised the conductivity of the films by 2 orders of magnitude. The carbon nanotube conductive polymer composite films and fibers had conductivities of 3300 and 170  $S/cm$ , respectively. The relatively high conductivities were attributed to the polymerization process, which doped both the SWNTs and the polymer. In-polymerization can be a promising solution-processable method to enhance the conductivity of carbon nanotube films and fibers .
- Chuang Peng et al reported that composites of conducting polymers (CP) and carbon nanotubes (CNT) show improved mechanical, electrical, and electrochemical properties compared with conducting polymers alone, leading to a wide variety of applications including sensors, catalysis, and energy storage. CP-CNT composites combined the large pseudocapacitance of the polymers and the mechanical and structural properties of the nanotubes and are thus highly promising in novel supercapacitors with ultra-

high capacitance and power density. Three methods have been developed to prepare CP-CNT composites.

## **OBJECTIVES**

The proposed research work covers the structural and electrical studies on pure and Mn Doped Lanthanum Nickel Oxide of Nanoparticles and nanostructure based polymer composites to form the basis of new materials and processes of interest for future applications.

- The objectives of the proposed research problem will come in shape with following experimental steps:
- The physicochemical structural properties will be analyzed by in situ X-ray diffraction (XRD) and Raman spectra.
- The morphological properties will be studied using Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) Characterization.
- The electrical properties i.e. dielectric constant, impedance, resistivity, capacitance, tangent loss etc. will be studied using impedance analyzer.
- Finally a comparative study will be done to draw concrete conclusions.

## **REFERENCES**

- 1.D. Hull, An introduction to composite materials, Vol. Cambridge Solid State Science Series, Cambridge University Press, Cambridge, 1981.
2. Li IY, Zhang L, Ducharme S. 'Electric energy density of dielectric composites', Appl Phys Lett

90(13)(2007) 132901-3.

3. Chu B, Zhou X, Ren K, Neese B, Lin M, Wang Q, et al. 'A dielectric polymer with high electric energy density and fast discharge speed', *Science* 313(5785) (2006) 334-7.

4. Cheng Yang, Yuanhua Lin, C.W. Nan, 'Modified carbon nanotube composites with high dielectric constant, low dielectric loss and large energy density', *carbon* 47 (2009) 1096-1101.

5. Hualan Wang, Qingli Hao , Xujie Yang, Lude Lu, Xin Wang " Effect of Graphene Oxide on the Properties of Its Composite with Polyaniline', *ACS Appl. Mater. Interfaces*, 2 (3) (2010) 821-828.



12122ER027



அறிவியல் புலம்  
**FACULTY OF SCIENCE**

அன்னை தெரசா மகளிர் பல்கலைக்கழக ஆட்சிக்குழு  
சரண்யா. பி

இயற்பியலில் அறிவியல் இளையர் பட்டம்

பெறுவதற்கு தகுதியுடையவர் என முறையாக அமைக்கப்பெற்ற தேர்வினோர்  
ஏப்ரல் 2015 இல் நடத்திய தேர்வுகளில் சான்றளித்தபடி

அன்னவர் \_\_\_\_\_ தனிச்சிறப்பு முறையில் வகுப்பில் தேர்வு பெற்று  
இந்தப் பட்டப்பேற்றுக்கு உரியவர் ஆகின்றார் என்று இதன் வழி அறிவித்துக்கொள்கின்றது.

பல்கலைக்கழக முத்திரையுடன் பெறுகின்றது

The Executive Council of the **MOTHER TERESA WOMEN'S UNIVERSITY**

hereby makes known that \_\_\_\_\_ **SARANYA.P**

has been admitted to the \_\_\_\_\_ **DEGREE OF BACHELOR OF SCIENCE IN PHYSICS**

she having been certified by duly appointed Examiners to be qualified to receive the same

at the Examination held in \_\_\_\_\_ **APRIL 2015** \_\_\_\_\_ in the

**FIRST CLASS WITH DISTINCTION<sup>a</sup>** class.

Given under the seal of the University



*[Signature]*  
Vice-Chancellor

*[Signature]*

*[Signature]*  
Registrar

பரண்யா பி  
Controller of Examinations

கொடை நகரம்  
Kodukanal  
திகதி Dated: 13.02.2016  
ISSUED ON: 29.02.2016



# Mother Teresa Women's University, Kodaikanal

B.Sc PHYSICS

## STATEMENT OF MARKS AND GRADES (CHOICE BASED CREDIT SYSTEM)



Name of the Examinee & Date of Birth	Register Number	Folio Number	Exam Year
SARANYA P 18/04/1995	12122ER027	33152	APRIL 2015
Name of the College	Date of Result		
SSI ADI CHITHIRANGALI WOMEN'S COLLEGE, CHENNAI	16/07/2015		

SEMESTER	SUBJECT CODE	TITLE OF COURSE	CREDIT	MAXIMUM			MARKS SECURED			GRADE POINT	GRADE	RESULT	Month & Year
				ESE	CIA	TOTAL	ESE	CIA	TOTAL				
1	PH101	CONDENSED MATTER PHYSICS	3	75	25	100	51	22	73	7.3	A+	Nov 16	
1	PH102	ELECTRONIC DEVICES AND CIRCUITS	3	75	25	100	52	25	77	7.7	A+	Nov 16	
1	PH103	THERMODYNAMICS AND STATISTICAL MECHANICS	3	75	25	100	59	24	83	8.3	DP	Nov 16	
1	PH104	MATHEMATICAL PHYSICS	3	75	25	100	51	19	70	7.0	A+	Nov 16	
1	PH105A	MATERIAL SCIENCE	3	75	25	100	44	21	65	6.5	B	Nov 16	
1	PH105B	GENERAL PHYSICS PRACTICAL - I	2	75	25	100	47	24	71	7.1	A+	Nov 16	
1	PH105C	ELECTRONICS PRACTICAL - I	2	75	25	100	44	21	65	6.5	B	Nov 16	
1	PH105D	CLASSICAL MECHANICS AND RELATIVITY	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105E	QUANTUM MECHANICS - I	2	75	25	100	41	21	62	6.2	D+	Nov 16	
1	PH105F	NUCLEAR PHYSICS	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105G	SPECTROSCOPY	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105H	THIN FILM PHYSICS	2	75	25	100	47	24	71	7.1	A+	Nov 16	
1	PH105I	GENERAL PHYSICS PRACTICAL - II	2	75	25	100	47	24	71	7.1	A+	Nov 16	
1	PH105J	ELECTRONICS PRACTICAL - II	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105K	QUANTUM MECHANICS - II	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105L	LASER AND APPLICATIONS	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105M	ELECTROMAGNETIC THEORY AND ELECTRODYNAMICS	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105N	DIGITAL ELECTRONICS AND MICROPROCESSOR	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105O	SOLAR ENERGY AND ITS UTILIZATION	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105P	ADVANCED PHYSICS PRACTICALS	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105Q	ADVANCED ELECTRONICS PRACTICALS	2	75	25	100	45	24	69	6.9	D+	Nov 16	
1	PH105R	PROJECT AND VIVA VOCE	2	75	25	100	45	24	69	6.9	D+	Nov 16	

\*\*\* END OF STATEMENT \*\*\*

CREDITS EARNED IN THE CURRENT SEMESTER	GPA	PART	CUMULATIVE CREDITS EARNED (IN ALL SEMESTERS)	CUMULATIVE CGPA	CUMULATIVE GRADE	CUMULATIVE CLASSIFICATIONS
27	9.230	I	12.00	7.450	A++	First Class
2	7.600	II	12.00	6.475	A	First Class
		III	95.00	8.397	D+	First Class with Distinction*
		IV	20.00	7.950	D	
		V	1.00	9.300	O	

\*Original should bear competent attestation of the Mother Teresa Women's University, Kodaikanal with Official seal, else the Certificate is Invalid.

*Dehemana*  
CONTROLLER OF EXAMINATIONS



# KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)  
(Established Under Section 3 of UGC Act, 1956)  
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Tamil Nadu - India

## CONSOLIDATED STATEMENT OF GRADES

NAME: SARANYA P  
PROGRAMME: B.Sc  
BRANCH: Physics  
FOILS NO: 001111  
REGISTER NO: 16PH1020  
MONTH & YEAR OF LAST APPEARANCE: April 2018



Sl. No	Subject Code	Subject Title	Credits	Letter Grade	Grade Point	Month & Year of Passing
1	16PH101	Condensed Matter Physics	4.0	A	8.0	Nov 16
1	16PH102	Electronic Devices and Circuits	4.0	A	8.0	Nov 16
1	16PH103	Thermodynamics and Statistical Mechanics	4.0	A+	9.0	Nov 16
1	16PH104	Mathematical Physics	4.0	A	8.0	Nov 16
1	16PH105A	Material Science	2.0	A+	9.0	Nov 16
1	16PH111	General Physics Practical - I	2.0	A	8.0	Nov 16
1	16PH112	Electronics Practical - I	4.0	A+	9.0	Apr 17
2	16PH201	Classical Mechanics and Relativity	4.0	A+	9.0	Apr 17
2	16PH202	Quantum Mechanics - I	4.0	A+	9.0	Apr 17
2	16PH203	Nuclear Physics	4.0	A	8.0	Apr 17
2	16PH204	Spectroscopy	4.0	A	8.0	Apr 17
2	16PH205C	Thin Film Physics	2.0	A+	9.0	Apr 17
2	16PH211	General Physics Practical - II	2.0	O	10.0	Nov 17
2	16PH212	Electronics Practical - II	4.0	A+	9.0	Nov 17
2	16PH201	Quantum Mechanics - II	4.0	A+	9.0	Nov 17
3	16PH302	Laser and Applications	4.0	A	8.0	Nov 17
3	16PH303	Electromagnetic theory and Electrodynamics	4.0	A+	9.0	Nov 17
3	16PH304	Digital Electronics and Microprocessor	4.0	O	10.0	Nov 17
3	16PH305B	Solar Energy and its utilization	2.0	A+	9.0	Nov 17
3	16PH311	Advanced Physics Practicals	2.0	O	10.0	Nov 17
3	16PH312	Advanced Electronics Practicals	2.0	O	10.0	Nov 17
4	16PH401	Project and Viva Voce	18.0	O	10.0	Apr 18

\*\*\*\* End of Statement \*\*\*\*  
Cumulative Grade Point Average : 8.97  
Classification: FIRST CLASS WITH DISTINCTION



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## TRANSFER CUM CONDUCT CERTIFICATE

T.C No.11881

Admission No.0198

1. Name of the Student : SARANYA P
2. Name of the Parent/Guardian : PITCHAIMANI
3. Mother Name : VEERUSIINNU
4. Date of Birth : 18/04/1995
5. Gender : FEMALE
6. Nationality, Religion, Community : INDIAN,HINDU, BC, SHANAR
7. Date of Admission : 15/07/2016
8. Class in which the student was studying at the time of leaving : M.SC [PHYSICS]
9. Whether qualified for promotion : REFER MARK SHEETS
10. Whether the student has paid all the fees due to the University : YES
11. Date on which the student actually left the University : 06/04/2018
12. Date of issue of Transfer Certificate : 06/04/2018
13. Reason for leaving the university : COMPLETED
14. Conduct and Character of the student : GOOD

Office Seal



  
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Coimbatore - 641 021.

No Experience

आयकर विभाग  
INCOME TAX DEPARTMENT



भारत सरकार  
GOVT. OF INDIA



ई-स्थायी लेखा संख्या कार्ड  
e - Permanent Account Number Card

**NQOPS1105M**



नाम / Name  
**SARANYA**

पिता का नाम / Father's Name  
**PITCHAIMANI**

जन्म की तारीख /  
Date of Birth

**18/04/1995**

हस्ताक्षर / Signature



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**आयकर पैन सेवा यूनिट, UTHITSL**

**प्लॉट नं: ३, सेक्टर ११, सी.बी.डी.बेलापुर,**

**नवी मुंबई-४०० ६१४.**



இந்திய தேர்தல் ஆணையம்  
Election Commission of India



வாக்காளர் புகைப்பட அடையாள அட்டை ELECTOR PHOTO IDENTITY CARD



NNH0981290



வாக்காளரின்: சரண்யா

பெயர்

Elector's Name : SARANYA

உறவினரின்: பிச்சைமணி

பெயர்

Relation's Name : PITCHAIMANI

3749/07

R Dis /200 d:

BC



வட்டக் குறியீடு எண்  
District Code

29

சான்றிதழ் எண்  
Certificate No.

வட்டக் குறியீடு எண்  
Taluk Code

04

4868103

கிராமக் குறியீடு எண்  
Village Code

027

சாதிச் சான்றிதழ்  
COMMUNITY CERTIFICATE

மாவட்டம்: உடுச்சி மாவட்டம்  
கிராமத்தகம்: திருச்செல்வன் / செல்வி  
செல்வன்: சரண்யா  
பெயர்: சரண்யா  
திருச்செல்வன் - சரண்யா

வகுப்பைச் சார்ந்தவர். அரசு ஆணை நிலை எண் 28, பிற்பட்ட மற்றும் பின்புற பிழைப்பு பிரிவில், தலத் துறை, நாள் 19-7-1994 வரிசை எண் 82, பிற்பட்ட பிரிவினரை சார்ந்தவர் எனச் சான்றளிக்கப்படுகிறது.

This is to certify that SARANYA Son Daughter of Thiru THIRUCHELVAN of Keela Village/Town Thiruchelvam Taluk - Gudalur District of the State of Tamil Nadu belongs to Hindu - Shermas Community, which is recognised as a Backward Class as per Government Order (Ms.) No. 28, Backward Classes and Most Backward Classes Welfare, dated 19th July 1994. vide Serial No. 82.

2. திருச்செல்வன் / செல்வி சரண்யா என்பவரும் அவருடைய குடும்பத்தினரும் தமிழ்நாட்டில் மாவட்டத்தில் உடுச்சி மாவட்டத்தில் திருச்செல்வன் கிராமத்தில் / நகரத்தில் வசித்து வருகிறார்கள் எனச் சான்றளிக்கப்படுகிறது.

2. It is certified that Thiru/Tmt/Selvan/Selvi Saranyya and his/her family ordinarily reside(s) at Keelagu Village/Town Thiruchelvam Taluk Thend District of Tamil Nadu.



கையொப்பம்  
Signature

நாள்  
Date

பெயர் (தனி எழுத்துக்களில்)  
Name (In Capital Letters)

பதவி  
Designation

[Signature] 29/07

[Signature] 29/07

தலைமை இடத்துத் துணை வட்டாட்சியு  
உத்தமபாளையம்