Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)
(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)
Accredited by NAAC
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
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Website : www.bharathuniv.ac.in
173, Agaram Road, Selaiyur, Tambaram,
Chennai - 600 073. Tamil Nadu.

Ref No.SMS-2018-O-16

Date: 22/07/2019

BHARATH INSTITUTE OF HIGHER EDUCATION & RESEARCH (Declared as Deemed to be University U/S 3 of UGC Act, 1956) 17 ... 2019 OFFICE OF THE DEAN-RESEARCH Selaiyur, Chennai-600 073. INDIA

TO

Mrs. Ms. Merina Paul Das,

Asst. Professor/Industrial Biotechnology,

BIHER.

Thro: Concern Head of the Department

Greetings!!!

We are happy to announce that the Research Advisory Committee has approved your proposal for Seed Money Scheme-2018 which was presented by you. You are requested to complete the proposal and send the progress report to the Dean Research in the prescribed time period.

Title of the Project: Green synthesis and characterization of metal and metal oxide nanoparticles for biomedical and environmental applications

Seed Money Amount: Rs.1, 00,000/- (Rupees One Lakh Only)

Approved on: 17/07/2019

Payment details:

Cheque No.375318 **Dated: 17/07/2019**

Bank Name: Indian Bank, Selaiyur, Chennai.

With Regards

Dean-Research

इंडियन बैंक
Indian Bank

सेलैयूर (तांबरम) शाखा, चेन्नई – 600 073
SELAIYUR (TAMBARAM) BRANCH. CHENNAI - 600 073
IFS Code: IDIB000S246

"VALID FOR THREE MONTHS ONLY"

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D	D	M	M	Y	Y	Y	Y

या धारक को OR BEARER

Ms. Merina Paul Das

RUPEES रुपये One Lakh Only

अदा करें ₹ 1,00,000/-

खा. सं. A/c. No. CA 66/0628110

HMCIA
CBS Code: 02505

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"PAYABLE AT PAR AT ALL OUR BRANCHES"

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"375318" 600019250

PROPOSAL SUBMISSION

1. **Details of Principal Investigator**

Name	: Ms. Merina Paul Das
Designation	: AssistantProfessor
Highest Qualifications	: M. Tech
Department	:Industrial Biotechnology
E-mail	:merina.bt@bharathuniv.ac.in
Contact no	:9840800567
Date of Joining	:01.09.2005

2. **Details of Co - Principal Investigator**

Name	:Dr.L.Jeyanthi Rebecca
Designation	:Professor
Highest Qualifications	:D.Sc.
Department	:Industrial Biotechnology
E-mail	:hodibt@bharathuniv.ac.in
Contact no	:9444649109
Date of Joining	:08.08.2005

Technical details

1. Introduction

In 21st century, research in nanotechnology is rapidly mushrooming throughout the world in the field of science and technology. Nanotechnology is a developing interdisciplinary technology that is expected to have wide ranging implications across all the other science fields and technology such as physics, material science, chemistry, biology, mechanics, electronics, optics, energy, etc.This advance technology describes the fabrication of new materials with nano-dimension range. The nano-size dimensionsof the materials determines its physical, chemical and biological properties has opened up with wide range of novel fundamental and applied frontiers, since change in properties of the nano-objects is fundamentally occurred at the individual atoms/molecules level. Thus nano-scale materials display distinct properties based on its morphology, size, and distribution than the bulk one. Nanomaterial may have a greateroptical characteristics catalytic activity, electrical properties and higher toxicity. These unique properties can be exploited for novel applications where the bulk material properties are unsuitable.Researches have been always keenly interested about this particular features to implement in the service of mankind. Recently nanotechnology is utilized as a tool to explore the darkest avenues of materialchemistry, medicines, drug delivery system, environmental pollution control, etc. Noble metal and metal oxide nanoparticlesare well known to have unique physico-chemical properties like magnetic, catalytic, optical, electronic.Therefore, synthesis of stable metal and metal oxide nanoparticles are found to have the potential applications in the areas such as sensor technology, biological labeling, catalysis,opticaldevices,drug delivery system, antimicrobials, treatment of cancer, degradation of organic pollutants, surface-enhanced Raman scattering (SERS) detection, etc. by exploiting its improved physical, chemical and biological properties. It has been reported that the shape, size, dispersity, and stability of the nano-structured materials could be controlled by reaction conditions, interaction between metal ion and reducing agents, synthetic reaction kinetics, arrangements of stabilizing agents and metal nanoparticles, thereby to tune their properties.Hence, the synthesis of metal and metal oxide nanoparticles with controlled morphology, size, distribution, and properties is anarena of constant interest.

2. Review of status of Research and Development in the subject

Effects and applications of silver nanoparticles in Different fields

Prasanta Kr. Biswas and SubhadipDey

Silver nanoparticles are the most important nanoparticles used in food and other industries. Silvernanoparticles may eventually offer treatment of various diseases. Their extremely large surface areapermits the coordination of a vast number of ligands. The properties of silver nanoparticles applicable tohuman treatments are under investigation in laboratory and animal studies, assessing potential efficacy,toxicity, and costs.

Short Review on Application of Gold Nanoparticles

AvniksTomar and Garima Garg

Nanoparticles have several biomedical and industrial applications in diagnosis of disease, targetedchemotherapy and in drug delivery. Multifunctionality and sub-micronic size is the main characteristics ofnanoparticles. Nanoparticles can be integrated with ligands, imaging labels, therapeutic agents and otherfunctionalities for site specific drug delivery and cellular uptake. In the present review we are discussing theapplication and synthesis of gold nanoparticles which is the most studied among all metallo-nanoparticles.Various anticancer drugs are available but these are cause the necrosis of cancerous cell as well as normalcells. But gold nanoparticles cause the necrosis of only cancer cells. These are targeted drug delivery systemswhich are smaller than human cells so can easily penetrate the tumour and destroy the cancerous cell.Various anticancer drugs conjugated with gold nanoparticles result in increased efficiency of anticancer drug.Gold nanoparticles are beneficial for chemotherapy and also for diagnosis of cancer due to their photophysical property and optical property. Gold nanoparticles can be functionalized with protein, peptides andnucleic acid. So these have a great application not only in bio sensing drugs but also in drug, gene and proteindelivery.

A review study of zinc oxide nanoparticles synthesis fromPlant extracts

Sagili Jhansi Lakshmi, Roopa Bai R S,Sharanagouda H, Ramachandra C Tand UdaykumarNidoni

The development of nanotechnology is making the interest of researchers towards thesynthesis of nanoparticles for thebioapplication. Metal oxides such as ZnO have received increasing attentionas antibacterial materials in recent years becauseof their stability under harsh processing conditions, and also because they are generally regarded as safe materials for humanbeingsand animals. Zinc activates 300 enzymes, and it plays a role in many another phenomenon like growth, membranestability, bone mineralization, tissue growth, and repair, wound healing and cell signaling.Many studies have shown that ZnOnanoparticles have enhanced antibacterial activity. Use of plant and plant materials for the synthesis of Zinc nanoparticles isrelatively new and exciting research field. Various plants were used for the synthesis of nanoparticles using green synthesismethod. Nanoparticles were synthesized from all the parts of the plant separately like stem, flower, leaf, latex, root, peel,stem bark and fruits. The prepared nanoparticles of Zinc oxide were characterized by using XRD, FTIR, UV-VISSpectroscopy, EDAX, Particle size analyzer, TGA, and SEM. The objective of this review was to report on thesynthesis of Zinc oxide nanoparticles by using different plant extracts and their significance in different fields.

Green synthesis of iron oxide (Fe3O4) nanoparticles using twoselected brown seaweeds: Characterization and application forlead bioremediation

El-KassasHala Y., Aly-Eldeen Mohamed A. and GharibSamiha M

The exploitation of different plant materials for the biosynthesis of nanoparticles is considered a green technologybecause it does not involve any harmful chemicals. In this study, iron oxide nanoparticles (Fe3O4-NPs) weresynthesized using a completely green biosynthetic method by reduction of ferric chloride solution using brownseaweed water extracts. The two seaweeds Padinapavonica (Linnaeus) Thivy and Sargassumacinarium(Linnaeus) Setchell 1933 were used in this study. The algae extract was used as a reductant of FeCl3 resulting inthe phytosynthesis of Fe3O4-NPs. The phytogenic Fe3O4-NPs were characterized by surface plasmon bandobserved close to 402 nm and 415 nm; the obtained Fe3O4-NPs are in the particle sizes ranged from 10 to 19.5 nmand 21.6 to 27.4 nm for P. pavonica and S. acinarium, respectively. The strong signals of iron were reported intheir corresponding EDX spectra. FTIR analyses revealed that sulphated polysaccharides are the mainbiomolecules in the algae extracts that do dual function of reducing the FeCl3 and stabilizing the phytogenicFe3O4-NPs. The biosynthesized Fe3O4-NPs were entrapped in calcium alginates beads and used in Pbadsorption nexperiments. The biosynthesized

Fe3O4-NPs alginate beads via P. pavonica (Linnaeus) Thivy had high capacity forbioremoval of Pb (91%) while that of S. acinarium (Linnaeus) Setchell 1933 had a capacity of (78%) after 75 min.The values of the process parameters for the maximum Pb removal efficiency by Fe3O4-NPs alginate beadssynthesized via P. pavonica (Linnaeus) Thivy were also estimated.

2.1 International Status: NIL

2.2 National Status: NIL

3. Progress/achievement so far,

a) Reference papers were collected.

b) Literature survey was studied.

c) Synthesis and characterization of nanoparticles work has been started.

4. Work Plan:

4.1 Methodology:

The main objectives of this project are as follows,

i) To synthesize metal and metal oxide nanoparticles like AgNPs, AuNPs, ZnO NPs, and Fe3O4 NPs using potential biological materials such as plants or plant parts.

ii) To characterize the biosynthesized metal and metal oxide nanoparticles using various analytical techniques such as UV-visible spectroscopy, field emission scanning electron microscopy (FESEM) coupled with energy dispersive x-ray (EDX), transmission electron microscopy (TEM), fourier transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD).

iii) To evaluate the free radical scavenging activity, antibacterial activity, and in vitro cytotoxic response of biosynthesized AgNPs using Wedeliachinensis leaf extract.

iv) To investigate the catalytic activity of biosynthesized AuNPs using aqueous peel extract of Citrus maxima.

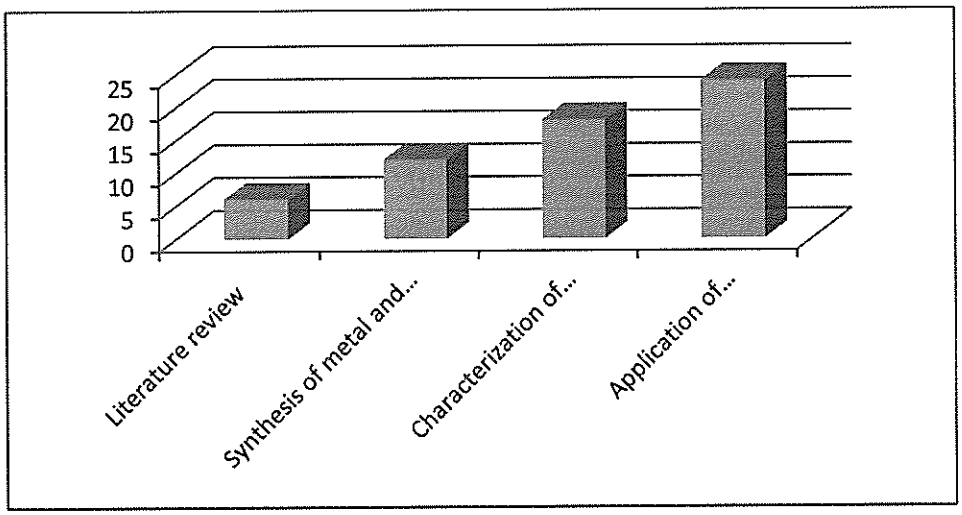
v) To explore the antibacterial activity of synthesized ZnO NPs using aqueous leaf extract of Cardiospermumhalicacabum.

vi) To study the heavy metal removal efficiency of biosynthesized Fe3O4 NPs using *Trigonella foenumgraecum* leaf extract.

4.2 Time Schedule of activities giving milestones through BAR diagram.

Work plan (including detailed methodology and time schedule)

Sl. No.	Activity / Milestone	1st Year		2nd Year	
1.	Literature review	1-6			
2.	Synthesis of metal and metal oxide nanoparticles		7-12		
3.	Characterization of nanoparticles			13-18	
4.	Application of nanoparticles				19-24



4.3.Expected outcome within the time period of Seed Money Scheme

a) Biosynthesis and applications of metal and metal oxide nanoparticles

5. Suggested Plan of action stating the name of funding agency where the project will be communicated for financial support within the time period of project.

Nil

6. Bibliography: Nil

7. List of Projects submitted/implemented by the Investigators (Separate for Pi

and Co-PI)

Nil

7.1 Details of Projects submitted to various funding agencies:

Sl. No.	Title	Cost in lakhs	Month of submission	Role as PI/ Co-PI	Agency	Status
	NA	NA	NA	NA	NA	NA

7.2 Details of Projects under implementation

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/ Co-PI	Agency
	NA NA	NA	NA	NA	NA

7.3 Details of Projects completed during the last 5 years

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/Co-PI	Agency
	NA	NA	NA	NA	NA

8. List of publications published by the Investigators, if any:

a) Co - Principal Investigator

Sl No	Author	Title	Journal	Year	Volume(issue)	Page no
1	Dr. L. Jeyanthi Rebecca	Plant extracts inhibiting the adhesion of oral bacteria	Drug Invention Today	2018	10(7)	100-1101
2	Dr. L. Jeyanthi Rebecca	Green synthesized silver nanoparticles as an antimicrobialagent	Drug Invention Today	2018	10(6)	950-953

		in dentistry				
3	Dr. L. Jeyanthi Rebecca	Current trends in reducing microbial adhesion to acrylic denture base resins.	Drug Invention Today	2018	10(6)	946-949
4	Dr. L. Jeyanthi Rebecca	Study on the antibacterial activity and identification of cellulolytic bacteria from cow urine	Research Journal of Pharmacy and Technology	2018	11(9)	1-5
5	Dr. L. Jeyanthi Rebecca	Antibacterial activity of phytochemicals against oral bacteria.	Drug Invention Today	2018	10(7):	1091-1093
6	Dr. L. Jeyanthi Rebecca	Screening of marine actinomycetes for fibrinolytic enzymes	Res.J of Pharmacy and technology	2018	11(10)	4365-4369
7	Dr. L. Jeyanthi Rebecca	Plant Extracts with Activity against Oral Bacteria	Drug Invention Today	2018	10(7)	1088-1090
8	Dr. L. Jeyanthi Rebecca	Isolation of Pseudomonas aeruginosa from Quarry Sand	Journal of Chemical and Pharmaceutical Research	2018	10(1)	6-8
9	Dr. L. Jeyanthi Rebecca	Optimization of protease enzyme production by marine actinomycetes	Int J Pharma Bio Sci	2017	8	188-194
10	Dr. L. Jeyanthi Rebecca	Antimicrobial Activity of Marine Actinomycetes against Human Pathogenic Bacteria	Pharm. Sci. & Res.	2017	9(11)	2086-2088

b) Principal Investigator

Sl No	Authors	Title	Journal	Year	Volume/Issue	Page no
1	Merina Paul Das, Renuka M., Vijaylakshmi J. V., Suguna P. R. and Karpurampras ad.	Removal of Methylene Blue by Adsorption Using Fish Scale Chitin.	Nature Environment and Pollution Technology	2018	17(3)	993-998
2	Merina Paul Das, L. Jeyanthi Rebecca	Removal of lead (II) by phyto-inspired iron oxide nanoparticles.	Nature Environment and Pollution Technology	2018	17(2)	569-574
3	Merina Paul Das, Jeyanthi Rebecca Livingstone, PandiyarasanVeluswamy, Jayabrata Das.	Exploration of Wedeliachinensis leaf-assisted silver nanoparticles for antioxidant, antibacterial and in vitro cytotoxic applications.	Journal of Food and Drug Analysis	2018	26	917-925
4	Merina Paul Das, L. Jeyanthi Rebecca	Characterization of antidiabetic activity of silver nanoparticles using aqueous solution of *Ficusglomerata* (fig) gum.	International Journal of Pharma and Bio Sciences	2017	8(2)	424-429
5	Merina Paul Das, Karpuram Prasad, Vijaylakshmi JV, Renuka M, Suguna PR.	A study on assessment of propriety of fish scale collagen	Research Journal of Pharmaceutical, Biological and Chemical Sciences	2017	8(2)	2473-2479

9. Budget

Sl. No.	Equipment	Quantity	Amount in INR
1	Soxhlet apparatus	1	10,000
2	Balance	1	20,0000
3	Incubator	1	35,000
4	Hot air oven	1	25, 000
5	Consumables	As per requirement	10,000
	Total		1,00,000

10. Name of at least two subject experts from the Institute and one from the outside Institute with their contact details:

a) Dr.S.Sharmila – Associate Professor, Dept of IBT, BIHER, Chennai-600073.

b) Dr. S. Subhashini– Assistant Professor, Dept of Biotechnology, SRM Institute of Science and Technology, Chennai.

CERTIFICATE FROM THE INVESTIGATOR

Project Title: Green synthesis and characterization of metal and metal oxide nanoparticles for biomedical and environmental applications

It is certified that

1. I do hereby agree to submit a complete proposal for financial support to the external funding agency within the time period of SMS-2018
2. I undertake that spare time on equipment procured in the project will be made available to other users.
3. I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in to.
4. I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involves field trails/experiments/exchange of specimens, human & animal materials etc.
5. I agree to abide by the terms and conditions of SMS-2018, BIHER, and Chennai.

Merina Paul Das

Name and signature of
Principal Investigator

Dr. L. Jeyanthi Rebecca

Name and signature of
Co-Principal Investigator

Date:03.10.2018

Place: Chennai - 73

Forwarded by Head of the Department

Signature of the Head

PROJECT EVALUATION FORMAT

Recommendation Sheet

Name of the Principal Investigator	Ms. Merina Paul Das
Name of the Co-Investigator	Dr. L. Jeyanthi Rebecca
Name of the Department	IBT
Title of project	Green synthesis and characterization of metal and metal oxide nanoparticles for biomedical and environmental applications
Recommendation of the evaluation committee	— Recommended —
Financial allocation recommended	Rs. 100,000 —

Sl. No.	Equipment	Quantity	Amount in INR
1	Soxhlet apparatus	1	10,000
2	Balance	1	20,0000
3	Incubator	1	35,000
4	Hot air oven	1	25, 000
5	Consumables	As per requirement	10,000
	Total		1,00,000

Name and Signature of the Research Advisory Committee members with date

Naveenchandran

BIHER * Internal Quality Assurance Cell * IQAC Selaiyur Chennai-73