



APPLICATION NUMBER	202241004316
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	25/01/2022
APPLICANT NAME	1. Dr. Piyush Gaur 2. Mr. M.S.Santhosh 3. Dr. Suyash Yashwantrao Fawar 4. Mr. Makarand Bhikaji Shrinie 5. Dr. Koli Gajanan Chandrashekhar 6. Mr. Beri Venkata Hinasekhar Sal 7. Mr. Prafulla Kumar Sahoo 8. Dr. Boda Surya Venkata Ramarao
TITLE OF INVENTION	Fatigue Testing For Reliability Assessments Of FRC Polymer Materials In Micro/Nano Systems
FIELD OF INVENTION	PHYSICS
E-MAIL (As Per Record)	mail2patentipr@gmail.com
ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	04/02/2022

APPLICATION STATUS

Awaiting Request for Examination

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In case of any discrepancy in status, kindly contact ipo-helpdesk@nit.in

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Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala - 416 201

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Controller General of Patents, Designs & Trade

Marks

G.S.T. Road, Guindy, Chennai-600032

Tel No. (091)(044) 22502081-84 Fax No. 044 22502066

E-mail: chennai-patent@nic.inWeb Site: www.ipindia.gov.in

सत्यमेव जयते

G.A.R.6

[See Rule 22(1)]

RECEIPT

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GEOGRAPHICAL INDICATIONS

Docket No 33373

Date/Time 2022/04/13 08:15:48

To
Harish Sharma

UserId: Inpa3649

A-2, Sect.-60, Noida, Uttar Pradesh

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/2595/2022/CHE	202241021963	2500	14767	FORM 9	
2	202241021963	TEMP/E-1/23794/2022-CHE	1600	14767	FORM 1	Wireless sensor based monitoring of air pollution Agriculture land

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0000950843	Online Bank Transfer	1304220000563	4100.00	1475001020000001

Total Amount : ₹ 4100.00

Amount in Words: Rupees Four Thousand One Hundred Only

Received from Harish Sharma the sum of ₹ 4100.00 on account of Payment of fee for above mentioned Application/Forms.

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FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 APPLICATION FOR GRANT OF PATENT (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY)	
				Application No.	
				Filing date:	
				Amount of Fee paid:	
				CBR No:	
				Signature:	
1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]					
Ordinary (✓)		Convention ()		PCT-NP ()	
Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()
3A. APPLICANT(S)					
Name in Full		Nationality	Country of Residence	Address of the Applicant	
1. Dr. P. Solainayagi		Indian	India	Associate Professor, Department of Computer Science and Engineering, Aarupadai Veedu Institute of Technology, Palayanoor, Chennai-603104.	
2. Dr. V. Nivedhitha		Indian	India	Associate Professor, Department of CSE, SSM Institute of Engineering and Technology, Dindigul-Palani Highway, Dindigul – 624002.	
3. Dr. Shashishankar.A		Indian	India	Professor and Head, Department of Civil Engineering, AMC Engineering College, (Affiliated to VTU), Bannerghatta Road, Bengaluru-560083.	
4. Ganesh S S Y		Indian	India	Assistant Professor, Civil Engineering Department,	

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			AMC Engineering College, (Affiliated to VTU), Bannerghatta Road, Bengaluru-560083.
5. Mr. Shivaprasad D	Indian	India	Assistant Professor, Mechanical Engineering Department, AMC Engineering College, (Affiliated to VTU), Bannerghatta Road, Bengaluru-560083.
6. Mr. Sardar Balaso Deshmukh	Indian	India	Assistant Professor, Mechanical Engineering Department, Sanjeevan Engineering & Technology Institute, Panhala Sanjeevan knowledge city, A/P - Somwar Peth-Injole, Panhala, Tal. Panhala, Dist. Kolhapur - 416201.
7. Mr. Umashanker.L	Indian	India	Associate Professor, Mechanical Engineering Department, AMC Engineering College, (Affiliated to VTU), Bannerghatta Road, Bengaluru-560083.
8. Dr.N. Sivakumar	Indian	India	Professor, Department of Mechanical Engineering, 39D/3A, Vivekkandar Salai, Housing Board Colony, Sarakkal Villai, Nagercoil-629002.
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]			
Natural Person (✓)		Other than Natural Person	
		Small Entity ()	Startup () Others ()
4. INVENTOR(S) [Please tick (✓) at the appropriate category]			
Are all the inventor(s) same as the applicant(s) named above?	Yes (✓)		No ()
If "No", furnish the details of the inventor(s)			
Name in Full	Nationality	Country of Residence	Address of the Inventor
Same as Applicant			
5. TITLE OF THE INVENTION			
"Wireless sensor based monitoring of air pollution Agriculture land"			

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[See Rule 22(1)]
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GEOGRAPHICAL INDICATIONS

Docket No 42255

Date/Time 2022/05/10 20:27:37

Harish Sharma A-2, Sect.-60, Noida, Uttar Pradesh

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Fee Payment	Remarks
1	202241027022	TEMP/E-1/29893/2022-CHE	1600	18683	FORM 1	Full	ADVANCED ROBOT FOR MANUFACTURING ASSEMBLY SELF-BALANCING ELECTRIC SCOOTER
2	E-12/3424/2022/CHE	202241027022	2500	18683	FORM 9	Full	

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0000962922	Online Bank Transfer	1005220026671	4100.00	1475001020000001

Total Amount : ₹ 4100.00

Amount in Words: Rupees Four Thousand One Hundred Only

Received from Harish Sharma the sum of ₹ 4100.00 on account of Payment of fee for above mentioned Application/Forms.

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ORIGINAL

मूल/No : 121603



भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE

डिजाइन के पंजीकरण का प्रमाणपत्र
CERTIFICATE OF REGISTRATION OF DESIGN

डिजाइन सं. / Design No. : 353912-001
तारीख / Date : 29/11/2021
पारस्परिकता तारीख / Reciprocity Date* :
देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में वर्णित डिजाइन जो A FOLDABLE ELECTRIC VEHICLE CHASSIS से संबंधित है, का पंजीकरण, श्रेणी 12-11 में 1.Dr. Vinayaka N 2. Dr. Barla Madhav 3.Dr. Koli Gajanan Chandrashekhar 4.Mr. Katkar Ajit Ashok के नाम में उपर्युक्त संख्या और तारीख में कर लिया गया है।

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 12-11 in respect of the application of such design to A FOLDABLE ELECTRIC VEHICLE CHASSIS in the name of 1.Dr. Vinayaka N 2. Dr. Barla Madhav 3.Dr. Koli Gajanan Chandrashekhar 4.Mr. Katkar Ajit Ashok.

डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अध्वधीन प्रावधानों के अनुसरण में।

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

निर्गमन की तारीख/Date of Issue : 23/12/2022

महानिर्वाहक पेटेंट डिजाइन और व्यापार चिह्न
Controller General of Patents, Designs and Trade Marks

पारस्परिकता तारीख (यदि कोई हो) जिसकी अनुमति देश के नाम पर की गई है। डिजाइन का सत्त्वधिकार पंजीकरण की तारीख से दस वर्षों के लिए होगा जिसका विस्तार, अधिनियम एवं नियम के निर्बंधनों के अधीन, पाँच वर्षों की अतिरिक्त अवधि के लिए किया जा सकेगा। इस प्रमाण पत्र का उपयोग विधिक कार्यवाहियों अथवा विदेश में पंजीकरण प्राप्त करने के लिए नहीं हो सकता है।

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Ministry of Science & Technology
Government of India

Project Proposal On

*"Harnessing Artificial Intelligence and CST Technology for Smart Fish
Drying Enhancing Food Safety and Quality for Fisherfolk"*

Submitted to

Division :SEED

Programme or Scheme : STI Hub for SC Community

Submitted by

Project Investigator:

Dr. KOLI GAJANAN CHANDRASHEKHAR

SANJEEVAN ENGINEERING AND TECHNOLOGY INSTITUTE,
PANHALA-PANHALA

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Sanjeevan Engg. & Tech. Institute

Part 1 : General Information

General Information:

Name of the Institute/University/Organisation submitting the Project Proposal :

SANJEEVAN ENGINEERING AND
TECHNOLOGY INSTITUTE,
PANHALA

State

Maharashtra

Principal Investigator Name:

Dr. KOLI GAJANAN CHANDRASHEKHAR

Category:

OBC

Type of the Institue :

Academic Institutions (Private)

Project Title :

Harnessing Artificial Intelligence and CST Technology for Smart Fish Drying
Enhancing Food Safety and Quality for Fisherfolk

Division :

SEED

Programme Or Scheme :

STI Hub for SC Community

Academic Area :

Mechanical Engineering,

Application Area :

Energy, Food and agriculture,

Goverment National Initiative :

Make in India, Startup India,

Type of Proposal :

Proposal Against Call

Project Duration :

3 Years

Proposal Submit Date :

30/07/2023

Project Keywords :

Artificial Intelligence, CSM, Smart Fish Drying, and Fisherfolk

Project Summary :

The innovative project aims to improve food safety and quality for fisherfolk by harnessing the power of Artificial Intelligence AI and CST Cognitive Sensing Technology for smart fish drying. The system will utilize AI algorithms and CST sensors to monitor and optimize the fish drying process, ensuring uniformity and reducing the risk of spoilage and contamination. Real-time data analysis will enable timely interventions, preserving essential nutrients and enhancing the overall quality of dried fish products. By empowering fisherfolk with advanced technology, this project strives to create sustainable economic opportunities while promoting safer and healthier food practices in coastal communities.

Part 2: Particulars of Investigators

Principal Investigator:


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Somwar Peth, Panhala - 416 201



1. Name:

Dr. KOLI GAJANAN CHANDRASHEKHAR

Gender:

Male

Date of Birth:

12/06/1982

Designation :

ASSOCIATE PROFESSOR

Department:

MECHANICAL ENGINEERING

Institute/University:

SANJEEVAN ENGINEERING AND TECHNOLOGY
INSTITUTE, PANHALA

State:

Maharashtra

District:

Kolhapur

City/Place:

PANHALA

Address:

SOMWAR PETH-INJOLE, PANHALA, DIST KOLHAPUR

Pin:

416201

Communication Email:

gckoli@gmail.com

Alternate Email:

Mobile:

7722076379

Phone:

Fax:

Category:

OBC

Co-Investigator:

1. Name:

Dr. Sanjeev N Jain

Gender:

Male

Date of Birth:

23/01/1968

Designation :

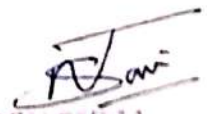
Principal

Department:

Electronics engineering

Institute/University:

SANJEEVAN ENGINEERING AND TECHNOLOGY
INSTITUTE, PANHALA


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Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala - 416 201



State: Maharashtra
District: Kolhapur
City/Place: Panhala
Address: Sanjeevan Engineering amp Technology Institute
Panhala, MH, India
Pin: 416201
Communication Email: gckoli@gmail.com
Alternate Email:
Mobile: 7722076379
Phone:
Fax:
Category: General

Part 3: Suggested Refrees

Suggested Refrees: NA

Part 4: Financial Details

Financial Details:

A. Non - Recurring

Equipment

S.	Equipments	Qty.	Justification	1 Year	Total
1.	Linear Fresnel lenses	2	This is the main piece of equipment that will be used to dry the fish. The dryer should be able to control the temperature and humidity levels to ensure that the fish is dried safely and evenly.	400000	400000
Total				400000	400000

B. Recurring

Project Staff

S.	Project Staff	No.	Justification	1 Year	2 Year	3 Year	Total
1.	Others	2	Mechanical Engineer, and CST Technology expert	266000	266000	266000	798000

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2.	Project Manager	1	The project manager will be responsible for overseeing the entire project, from planning to implementation. They will be responsible for ensuring that the project stays on track and within budget.	133000	133000	133000	399000
Total				399000	399000	399000	1197000

Consumables

S.	Items	Qty.	Justification	1 Year	2 Year	3 Year	Total
1.	camera	3	The camera will be used to monitor the fish drying process. The camera will be able to capture images of the fish at regular intervals, which will be used by the AI to assess the drying process and make adjustments as needed.	300000	0	0	300000
2.	Food Safety Testing Equipment	2	Laboratory equipment for testing fish quality and safety, including microbial testing, moisture content analysis, and chemical analysis.	60000	0	0	60000
3.	Kuro WorkStation Model C1	1	The computer will be used to run the AI software. The software will analyze the images captured by the camera and make recommendations on how to adjust the drying process.	200000	0	0	200000
4.	Networking Equipment	1	Routers, switches, and cables: For setting up a local network between the AI hardware, IoT devices, and data collection systems.	150000	0	0	150000
5.	Temperature and Humidity Sensors	4	These sensors are essential to monitor the drying conditions inside the dryer and provide data for AI analysis and control.	24000	0	0	24000
Total				734000	0	0	734000

Contingency

S.	Description	Justification	1 Year	2 Year	3 Year	Total
1.	other expenses and unexpected cost	other expenses and unexpected cost	25000	25000	25000	75000
Total			25000	25000	25000	75000

Travel

S.	Description	Justification	1 Year	2 Year	3 Year	Total
1.	Experts Travel	Experts Travel and expenses.	35000	35000	35000	105000
2.	Transporting the equipment and consumables	Transporting the equipment and consumables	30000	30000	30000	90000
Total			65000	65000	65000	195000

Overhead

S.	Description	Justification	1 Year	2 Year	3 Year	Total
1.	unexpected expenses and other cost	unexpected expenses and other cost	25000	25000	25000	75000
Total			25000	25000	25000	75000

Budget Head Summary in (INR)

Budget Head	Year-1	Year-2	Year-3	Total
1- Non-Recurring				
Equipment	400000	0	0	400000
Subtotal (Capital)	400000	0	0	400000
2- Recurring				
Project Staff	399000	399000	399000	1197000
Consumables	734000	0	0	734000
Contingency	25000	25000	25000	75000
Travel	65000	65000	65000	195000
Overhead	25000	25000	25000	75000
Subtotal (General)	1248000	514000	514000	2276000



Total Project Cost (Capital + General)	1648000	514000	514000	2676000
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Part 5: PFMS Details

PFMS Unique Code Available: No

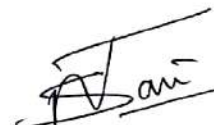
Type of Registration : Academic Institutions (Private)
PAN Number : -
Agency Name : SANJEEVAN ENGINEERING AND TECHNOLOGY INSTITUTE, PANHALA
Act Registration No. : AICTE ID: 1-8019451
Registering Authority : Any Other
Registering Authority Other : ALL INDIA COUNCIL FOR TECHNICAL EDUCATION NEW DELHI
TIN Number : -
TAN Number : KLPP024OGB
GST Number : -
Block No /Building /Village /Name of Premises : SANJEEVAN ENGINEERING & TECHNOLOGY INSTITUTE, PANHALA
Road/Street/Post Office : SOWWAR PETH - INJOLE
Area/Loacality : SANJEEVAN KNOWLEDGE CITY
City : PANHALA
Pin Code : 416201
State : Maharashtra
District : Kolhapur
Contact Person : Dr.Koli Gajanan Chandrasehekhar
Designation : ASSOCIATE PROFESSOR
Phone Number : 02312686600
Mobile Number : 7722076379
Email ID : gckoli@gmail.com


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Bank Name : The Cosmos Cooperative Bank Ltd
Branch Address of the Bank : Laximpuri Branch
Bank Branch Name : Laximpuri branch
Bank Account Number of the Beneficiary : 088100102356
IFSC Code of the bank : COSB0000088
MICR Code of the bank : COSB000000

Part 6: Current Ongoing Project

Current Ongoing Project: NA



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**OFFICIAL JOURNAL
OF
THE PATENT OFFICE**

DATE: 18/03/2022

Sanjeevan Engg. & Tech. Institute
Sundernagar, Panbala-416 203

(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application : 27/02/2022

(21) Application No. 202241010481 A

(43) Publication Date : 18/03/2022

(54) Title of the invention : AI BASED SMART METER FOR MUNICIPAL WASTE WATER TREATMENT BY ELECTROCHEMICAL TECHNIQUE AND QUALITY MONITORING USING IOT

(51) International classification : G01F0015060000, G01F0015000000, G06Q0050060000, G01F0001075000, E03B0007070000
(86) International Application No : PCT//
Filing Date : 01/01/1900
(87) International Publication No : NA
(61) Patent of Addition to Application Number : NA
Filing Date : NA
(62) Divisional to Application Number : NA
Filing Date : NA

(71) Name of Applicant :

1) Santosh M Nejakar

Address of Applicant : Nejakar Technologies, Siddadevanagar, Near Head Post Office -----

2) PRASHANT BASAVARAJ BHAGAWATI

Name of Applicant : NA

Address of Applicant : NA

(72) Name of Inventor :

1) PRASHANT BASAVARAJ BHAGAWATI

Address of Applicant : Assistant Professor, Civil Engineering, Annasaheb Dange College of Engineering and Technology Ashta Ashta Maharashtra India 416301 -----

2) B. RAMESH BABU

Address of Applicant : Professor Process Engineering Division, CSIR-Central Electrochemical Research Institute Karaikudi, Tamilnadu India 630003 -----

3) DR. SUHAS GAJANAN SAPATE

Address of Applicant : Professor Computer Science and Engineering, Annasaheb Dange College of Engineering and Technology Ashta Ashta Maharashtra India 416301 -----

4) SAYED AHMED IMRAN BELLARY

Address of Applicant : Professor Mechanical Engineering, Anjuman-I-Islam's Kalsekar Technical Campus, Plot# 2 and 3, Sector 16, Near Thank Naka New Panvel, Navi Mumbai Maharashtra India -----

5) DR. SANTOSH M HERUR

Address of Applicant : Associate Professor and Head, Dept of ECE, Jain Institute of Technology Bada Cross Davanagere Karnataka India 577005 -----

(57) Abstract :

Due to the drawback highlighted in the existing system, there should be a meter which can overcome all this drawbacks and this can be done by installing our Smart Water Meter in your building/Apartment. Smart Water Meter which provides the water consumption details (with the help of water flow sensor) and checks if any leakage detection and quality of water (Turbidity sensor) can be checked. we can check all this things with the help of our website and with our App, both are developed to check the consumption details and we can make an billing through the website/App and we can monitor the quality of water also through this website/App and the details can be exported to the excel sheet and we can analyze the consumption of water on monthly basis according to requirements of the user and main admin can check the consumption of each house holders in the Apartment/building by using their login credentials and the house holders can check their water consumption details with help of their login credentials which will be provided by the main admin while installing this Smart Water Meter. And if any waste water is entered through the valve it will be detected by our smart meter and the indication will be sent to the App as a pop-up message and eventually user can use that water if the needed or else he can stop that water or else water can be exited in other exit valve. And in the same manner if any leakage is found anywhere in the connection(pipe) Smart Meter will show the indication with the help of website/App to the user by sending the pop-up and then the action can be taken, by the respective users(house holders).

No. of Pages : 12 No. of Claims : 3

The Patent Office Journal No. 11/2022 Dated: 18/03/2022

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Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala, Dist. Kolhapur. (MS)



HOD
Department of Computer Science
& Engineering
Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala - 416 206

1. Patent Search

Ai Based Smart Meter For Municipal Waste Water Treatment By Electrochemical Technique And Quality Monitoring Using Iot

ORDINARY APPLICATION

published



Ai Based Smart Meter For Municipal Waste Water Treatment By Electrochemical Technique And Quality Monitoring Using Iot

Documents

Updated 8 months ago

- Information
- Documents

Due to the drawback highlighted in the existing system, there should be a meter which can overcome all this drawbacks and this can be done by installing our Smart Water Meter in your building/Apartment.

Smart Water Meter which provides the water consumption details (with the help of water flow sensor) and checks if any leakage detection and quality of water(Turbidity sensor) can be checked.

we can check all this things with the help of our website and with our App, both are developed to check the consumption details and we can make an billing through the website/App and we can monitor the quality of water also through this website/App and the details can be exported to the excel sheet and we can analyze the consumption of water on monthly basis according to requirements of the user and main admin can check the consumption of each house holders in the Apartment/building by using their login credentials and the house holders can check their water consumption details with helpof their login credentials which will be provided by the main admin while installing this Smart Water Meter.

And if any waste water is entered through the valve it will be detected by our sr
will be sent to the App as a pop-up message and eventually user can use that w
can stop that water or else water can be exited in other exit valve. And in the sa
found anywhere in the connection(pipe) Smart Meter will show the indication with the help of website/App
to the user by sending the pop-up and then the action can be taken, by the respective users(house holders).

Message Us

Application ID 202241010481

Invention Field PHYSICS

Date of Application 2022-02-27

Publication Number 11/2022

Inventors

Name	Address	Country	Nationality
Santosh M Nejakar	Nejekar Technologies, Siddadevanagar, Near Head Post Office	India	India
PRASHANT BASAVARAJ BHAGAWATI	Assistant Professor, Civil Engineering, Annasaheb Dange College of Engineering and Technology Ashta Ashta Maharastra India 416301	India	India

Applicants

Name	Address	Country	Nationality
PRASHANT BASAVARAJ BHAGAWATI	Assistant Professor, Civil Engineering, Annasaheb Dange College of Engineering and Technology Ashta Ashta Maharastra India 416301	India	India
B. RAMESH BABU	Professor Process Engineering Division, CSIR-Central Electrochemical Research Institute Karaikudi, Tamilnadu India 630003	India	India
DR. SUHAS GAJANAN SAPATE	Professor Computer Science and Engineering, Annasaheb Dange College of Engineering and Technology Ashta Ashta Maharastra India 416301	India	India
SAYED AHMED IMRAN BELLARY	Professor Mechanical Engineering, Anjuman-I-Islam's Kalsekar Technical Campus, Plot# 2 and 3, Sector 16, Near Thank Naka New Panvel, Navi Mumbai Maharashtra India	India	India
DR. SANTOSH M HERUR	Associate Professor and Head, Dept of ECE, Jain Institute of Technology Bada Cross Davanagere Karnataka India 577005	India	India

Documents

Name	Date
202241010481-STATEMENT OF UNDERTAKING (FORM 3) [27-02-2022(online)].pdf	2022-02-27
202241010481-FORM-9 [27-02-2022(online)].pdf	2022-02-27
202241010481-DRAWINGS [27-02-2022(online)].pdf	2022-02-27
202241010481-DECLARATION OF INVENTORSHIP (FORM 5) [27-02-2022(online)].pdf	2022-02-27
202241010481-FORM 1 [27-02-2022(online)].pdf	2022-02-27
202241010481-COMPLETE SPECIFICATION [27-02-2022(online)].pdf	2022-02-27

Orders

Applicant Section Controller Decision Date 10/03/2022

Specification

PRINCIPAL
Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala, Dist. Kolhapur. (MS)



pele
HOD
Department of Computer Science
& Engineering
Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala - 415 201



Accredited 'A' Grade by NAAC, Bengaluru

No 0 207 6

Date: 27/12/2022

27 DEC 2022

Shivaji University, Kolhapur

Dear Sir,

You are requested to accept the proposal

Dr. Mohan B. Vanarotti
Director

PRINCIPAL

Sanjeevan Engg. & Tech. Institute
Somwar Peth, Panhala - 416 201

Mechanical Engineering
Santienyan Engg. & Tech. Institute Puri



A Research Project Proposal

Under

Diamond Jubilee Research Initiation scheme

Shivaji University, Kolhapur

Entitled

Chemical synthesis of SnO_2 -Polymer nanocomposites for coating
and study of anticorrosive properties of coated steel.

Submitted by



Dr. UDAYSINH SHIVAJI BHAPKAR

Department of Mechanical Engineering

Kolhapur Institute of Technology's

College of Engineering (Autonomous), Kolhapur-416234 (MS)

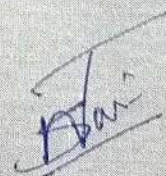
December 2022



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SHIVAJI UNIVERSITY, KOLHAPUR
DIAMOND JUBILEE
RESEARCH INITIATION SCHEME
Format for Submission of Proposal for Research Project

PART-I

- 1) Broad Subject: Material Science Faculty: Mr. Dhananjay Vasanttrao Patil
 2) Area of Specialization: Anticorrosive Coating
 3) Duration: 36 months
 4) Principal Investigator:


i)	Name	Dr. U.S.Bhapkar
ii)	Sex	Male
iii)	Date of Birth	05/03/1977
iv)	Qualification	Ph.D. Mechanical Engineering Thermal and Fluids Engineering
v)	Designation	Professor
vi)	Address Office : Residence :	KIT's College of Engineering, (Autonomous) Kolhapur.
vii)	Date of joining the service as a teacher	01/07/2004
viii)	Date of confirmation	01/07/2004

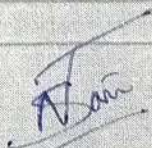
- 5) Co-Investigator(s) (If any):

i)	Name	Mr. Dhananjay Vasanttrao Patil
ii)	Sex	Male
iii)	Date of Birth	09/10/1986
iv)	Qualification	M.E. Mechanical Engg.
v)	Designation	Assistant Professor
vi)	Address Office : Residence :	Sanjeevan Engineering and Technology Institute, Panhala. At/p.Vadanage, Tal. Karveer, Dist.Kolhapur. 416229.

- 1) Co-Investigator(s) (If any):

i)	Name	Dr. S.S. Potdar
ii)	Sex	Male
iii)	Date of Birth	20/12/1982


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iv)	Qualification	MSc. Ph.D.
v)	Designation	Assistant Professor
vi)	Address Office : Residence :	Sanjeevan Engineering and Technology Institute, Panhala. At/p.Vadanage, Tal. Karveer, Dist.Kolhapur. 416229.

6) Details of the College/Institution where the project will be undertaken:

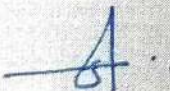
a. Department: **Mechanical Engineering Department**

b. Name of the College: **KIT's College of Engineering, (Autonomous)
Kolhapur.**

7) Teaching and Research Experience of Principal Investigator:

a.	Teaching experience	21 Years
b.	Research experience	06 Years
c.	Title of Ph.D./M. Phil. thesis if PI has been awarded	Experimental Investigation of Fluid Flow, Heat Transfer and Acoustic Aspects of Impinging Synthetic Jets
d.	Publications	Peer reviewed Journals – 17 International Conferences - 03
	i. Papers Published Accepted Communicated	
	ii. Books Published	

(Please enclose the list of papers and books published and/or accepted during last five years)


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Part II

8) Proposed Research work:


i) Project title

Chemical synthesis of SnO_2 -Polymer nanocomposites for coating and study of anticorrosive properties of coated steel.

ii) Introduction

a) Origin of the research problem and interdisciplinary relevance:

Corrosion is an undesirable natural process that has arisen from the use of metallic materials; therefore, serious efforts to prevent this phenomenon are ongoing through this century. Corrosion is defined as an attack on a material by its reaction to the environment and the resulting deterioration of the material's properties. Most often, it is related to an electrochemical reaction with a liquid or gaseous medium [1]. Aside from industrial dangers, corrosion affects our lives as we travel to school, work, and for leisure. Endangering public safety and resulting in significant repair costs are the effects of corrosion on bridges, parking structures, buildings, electrical towers, highways, etc. should these collapses, because of a weak, corroded section and disaster could result. The most effective method of preventing the harmful effect of the corrosion attack on the parts is adding a protective barrier between the part and the corrosive environment. Protective coatings have been widely used for metal corrosion control. The use of conducting polymers for the inhibition of corrosion is an area which is very recently gaining increasing attention [2]. There are many types of coatings available, but all work toward the same outcome lengthening the life and usability of parts, components, machinery, products, etc. the protection of these elements not only helps to maintain an industry's equipment but can help protect human lives as well. Various strategies, such as metal surface coating, environmental modifications, the use of corrosion inhibitors, and changes in pH and potential by cathodic or anodic reaction, are used to lower corrosion rate. Recently, nanostructured materials have attracted great interest due to their electrical, optical, magnetic and mechanical properties contributed by confining the dimensions of materials, and the entire behaviors of nanostructured materials show combination of surface and bulk properties. Low-dimensional nanostructured materials have been


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successfully synthesized and have drawn much attention because of their fundamental roles in understanding the quantum size effect and great potential applications in light-emitting diodes, gas sensors, Nano thermometers, solar cells, fuel cells, anti-corrosive testing, etc. Nanomaterial's and their additives are effective corrosion inhibitors because they have a higher surface-to-volume ratio than traditional macroscopic materials [3]. By inhibiting active sites on metal surfaces, nano compounds limit surface reactions and control corrosion rates. The most important application of nanoparticles in the industrial field is their ability to protect metals from corrosion in different environments.

b) Review of research and development in the subject:

Aisha Ganash [2] experimentally tested anticorrosive properties of Poly (o-phenylenediamine)/ZnO nanocomposites coated stainless steel. Poly (o-phenylenediamine) and poly (o-phenylenediamine)/ZnO (PoPd/ZnO) nanocomposites coating were prepared on type-304 austenitic stainless steel (SS) using H_2SO_4 acid as electrolyte by potentiostatic methods. Fourier transforms infrared spectroscopy and scanning electron microscopy techniques were used to characterize the composition and structure of PoPd/ZnO nanocomposites. The corrosion protection of polymer coatings ability was studied by Eocp-time measurement, anodic and cathodic potentiodynamic polarization and impedance techniques in 3.5 % NaCl as corrosive solution. It was found that ZnO nanoparticles improve the barrier and electrochemical anticorrosive properties of poly (o-phenylenediamine). Ana Karen Acero-Gutierrez *et al.* [4] studied to improve corrosion resistance; carbon steel is successfully coated with SiO_2 by the sol-gel process. The addition of SnO_2 nanoparticles to the coating has a significant effect on the formation of the sol-gel film and thus the resistance of the coated substrate in the corrosive medium. The sol-gel SiO_2 incorporation of tin oxide (IV) coating helps protect A36 steel from corrosion. Very low and very high SnO_2 concentrations led to reduced inhibition, and the optimal concentration of SnO_2 nanoparticles was found to be 2.5 vol %. Muna Ibrahim *et al.* [5] investigated enhanced corrosion protection of Epoxy/ZnO-NiO nanocomposite coating on steel. The sol-gel method ZnO-NiO nanocomposite with epoxy coating a mild steel was fabricated. The structural and morphological characterization of the metal oxide nanocomposite was carried out. Electrochemical impedance spectroscopy authenticated that the corrosion resistance has improved for the nanocomposites of

ZnO-NiO coated along with epoxy on steel in comparison to that of the pure epoxy-coated steel. Rasoul Babaei-Sati *et al.* [6] studied electrodeposition of polypyrrole/metal oxide nanocomposites for corrosion protection of mild steel. Electrodeposition of polypyrrole (PPy) and PPy-metal oxide nanocomposites on mild steel (MS) was carried out in oxalic acid solution by constant potential technique. The protective properties of coatings were studied in 0.5M H₂SO₄ solution by Tafel polarization and electrochemical impedance spectroscopy (EIS). The effect of different nanoparticles (Al₂O₃, ZnO, TiO₂, CeO₂ and SnO₂) on the protection performance of the nanocomposite coatings was compared. The results reveal that PPy/Al₂O₃ nanocomposite provided the best performance for corrosion protection of the MS by reducing its corrosion current density by 18 times. Shihui Qiu *et al.* [7] investigated long-term corrosion protection of mild steel by an epoxy coating containing self-doped polyaniline nanofiber sulfonated polyaniline (SPANI). SPANI was synthesized via the copolymerization of 2-aminobenzenesulfonic acid and aniline and then characterized. The SPANI/epoxy composite coatings on the steel substrate were prepared for the anti-corrosive investigations in a 3.5 wt % NaCl solution via electrochemical impedance spectroscopy and polarization curves. It turned out that composite coatings with SPANI exhibited excellent protective performance with high impedance modulus during the 120 days immersion while blank epoxy coating was invalid after 80 days immersion. Ali Olad *et al.* [8] have worked on preparation and corrosion resistance of nanostructured PVC/ZnO-polyaniline hybrid coating. They were prepared, characterized the composition and structure of ZnO-polyaniline nanocomposite. The ZnO-polyaniline nanocomposite was mixed with polyvinyl chloride (PVC) through a solution mixing method. Three components PVC/ZnO-polyaniline hybrid material was applied as coating on iron coupon by the solution casting method. Corrosion protection efficiency of hybrid coating studied by open circuit potential and Tafel technique in 3.5 % NaCl solution as corrosive environment. It was found that ZnO nanoparticles improve the barrier and electrochemical anticorrosive properties of polyaniline and addition of PVC increases the barrier effect of polyaniline coating. M. Kantorova *et al.* [9] investigated mixed metal oxides with the structure of perovskite for anticorrosion organic coatings. Mixed metal oxides pigments of TiO₂.ZnO, 2TiO₂.ZnO, Zn₂TiO₄, MgTiO₃, CaTiO₃, TiO₂.ZnO.MgO, and TiO₂.ZnO.SrO were synthesized from corresponding oxides or carbonates at high temperature. The obtained metal mixed oxides were characterized



According to literature survey, PANI/SnO₂ composite exhibited excellent anticorrosion performance ($E_{\text{corr}} = -196.0 \text{ mV}$, $I_{\text{corr}} = 0.210 \mu\text{A}/\text{cm}^2$, $\text{CR} = 0.177 \text{ mpy}$)

[23] than well-known ZnO, NiO *etc* and their composites. However, SnO₂ and its composite with different polymers are less investigated for anticorrosion [23, 27]. Therefore, preparing SnO₂ – Polymer nanocomposite as an anticorrosion agent for steel. Utilizing a simple and inexpensive chemical method with various compositions is a bottleneck problem that must be thoroughly researched.

d) Research Problem:

Up to now, different composites such as, SnO₂/SiO₂, epoxy/ZnO-NiO, polypyrrole/metal oxide, sulfonated polyaniline and epoxy, PVC/ZnO-polyaniline hybrid coating, epoxy-zinc oxide, TiO₂ [4-9] *etc.* coatings were successfully used as corrosion resistance coatings for steel substrate. Moreover, SnO₂ is an n-type semiconductor with a band gap of 3.7 eV. SnO₂ is an important material due to its high degree of transparency and good chemical, physical and thermal properties [4]. Recent advancement in SnO₂ has been increased with a wide range of applications such as gas sensors, transistors, catalyst electrodes, anticorrosion coating *etc.*

Therefore, Polymer-SnO₂ nanoparticles composite will be synthesized using the Sol-gel method in the proposed research. The structural, morphological, and compositional study of synthesized material will be carried out by using different characterization techniques. The performance of synthesized Polymer-SnO₂ nanocomposite material will be studied for corrosion resistance properties in different mediums by Tafel polarization and electrochemical impedance spectroscopy (EIS) on steel.

iii) Objectives:

The following objectives are identified as a part of this proposed research.

1. To synthesize SnO₂ nanoparticles by using a Sol-gel method.
2. To prepare different compositions of polymer-SnO₂ by adding SnO₂ nanoparticles in a different polymer matrix.
3. To characterize synthesized composite by applying different characterization techniques like XRD, SEM, TEM, UV-visible, EDAX, FTIR *etc.*
4. To study the corrosion protection performance of polymer-SnO₂ nanocomposite materials over 304 austenitic stainless steel by using the Tafel polarization curve and electrochemical impedance spectroscopy (EIS) in different mediums.

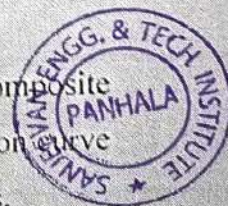

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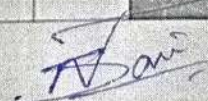
iv) Methodology:

1. In detail, additional literature survey will be carried out for anticorrosion coating of steel substrate.
2. The 304 austenitic stainless steel samples to be used in the experiments will be prepared with suitable dimensions. These samples will be chemically cleaned, and the suitable method will be used for coating deposition on the sample.
3. Sol-gel method will be used for synthesis of SnO_2 nanoparticles. Different size SnO_2 nanoparticles will be synthesized by changing the different preparative parameters.
4. The synthesized SnO_2 nanoparticles will be characterized for their structural determination, surface morphology, optical and compositional properties by different characterization methods like XRD, SEM, TEM, UV-Visible, EDAX, FTIR, etc.
5. Synthesize and coat different polymer compositions with optimum-sized SnO_2 nanoparticles on steel using a suitable coating technique. Also, the influence of coating thickness on steel for anticorrosion properties will be studied.
6. Evaluate corrosion protection properties of synthesized nanocomposites in a different corrosive environment (acid, base, salt) by Tafel polarization and electrochemical impedance spectroscopy.

v) Year wise Plan of work and targets to achieve:

Table: Distribution of work for three years						
Milestones	Target Months					
Target to achieve	1-6	7-12	13-18	19-24	25-30	31-36
<ul style="list-style-type: none"> ➤ Literature Survey ➤ Synthesis of SnO_2 nanoparticles of different size by Sol gel method. ➤ Study of structural and morphological properties. ➤ SnO_2 nanoparticles coating on 304 austenitic stainless steel by deep coating method. ➤ Test its performance for corrosion protection. 						
➤ Synthesis of SnO_2 - first Polymer						


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(PVA or polyurethane) nanocomposite.						
➤ Study of structural and morphological properties.						
➤ Test its performance in different medium for corrosion protection by Tafel polarization and EIS.						
➤ Synthesis of SnO ₂ - second Polymer (PMMA or PVC) nanocomposite.						
➤ Study of structural and morphological properties.						
➤ Test its performance in different medium for corrosion protection by Tafel polarization and EIS.						
➤ Comparing and finding optimum corrosion coating thickness of Polymer-SnO ₂ ,						
➤ Project report writing and submission.						

vi) Details of collaboration, if any intended

9) Financial Assistance required

Item	Estimated Expenditure
A) Non-recurring component *: (upto 70% of the project cost)	
i) Equipment which may include Characterization like XRD, SEM, TEM, UV-Visible, EDAX, FTIR etc., Experimental Setup etc., laptop	1,75,000/-
ii) Books/Journals	30000/-
B) Recurring component :	
(i) Hiring Services	-----
(ii) Field Work and Travel	50,000/-
(iii) Chemicals and glassware	50,000/-
(iv) Contingency (including special needs)	20,000/-
Total (Rs.)	3,25,000/-


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10) (a) Details of the project/scheme completed or on going with the P.I.

Name of the Equipment	Year	Total Infrastructural facilities obtained	Agency	Started	Completed
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proposed work

Equipment: Magnetic stirrer with hot plate, muffle furnace, digital weight balance, digital pH meter, chemical hot bath.



11) Any other information which the investigator may like to give in support of this proposal which may be helpful in evaluating.

To certify that:

- a) General physical facilities, such as furniture/space etc., are available in the College / Institution.
- b) I/we shall abide by the rules governing the scheme in case assistance is provided to me/us from the University for the above project.
- c) I/we shall complete the project within the stipulated period. If I/we fail to do so and if the University is not satisfied with the progress of the research project, the University may terminate the project immediately and ask for the refund of the amount received by me/us.
- d) The above Research Project is not funded by any other agency.

Name and Signature

(a) Principal Investigator Dr. U. S. Bhargava UAC

(b) Co-Investigator ① Mr. Dhananjay V. Patil, 
② Dr. S.S. Potdar, 

(c) Principal/Head of the University Department (Signature with Seal)

Director
Kolhapur Institute of Technology's
College of Engineering (Autonomous),
Kolhapur



Publications in reputed Journals

S. No.	Author(s)	Title	Name of Journal	Volume	Year
1	Bhaskar U., Srivastava A., Agrawal A	Acoustic and heat transfer aspects of an inclined impinging synthetic jet	International Journal of Thermal Sciences	74	2013
2	Bhaskar U., Srivastava A., Agrawal A	Interferometry based whole-field measurements of an impinging turbulent synthetic jet	International Communications in Heat and Mass Transfer	58	2014
3	Bhaskar U., Srivastava A., Agrawal A	Acoustic and heat transfer characteristics of an elliptical synthetic jet generated by acoustic actuator	International Journal of Heat and Mass Transfer	79	2014
4	Bhaskar U., Srivastava A., Agrawal A	Proper cavity shape can mitigate confinement effect in synthetic jet impingement cooling	Experimental Thermal and Fluid Science	68	2015
5	Bhaskar U., Yadav H., Agrawal A	PIV study of radial wall jet formed by normal impinging turbulent synthetic jet	International Journal of Flow Visualisation and Image Processing	26 (2)	2019
6	Bhaskar U., Patil S., Sawant A., Manthan Y., Pawar S., Bhat J.	Innovative Battery-less Power House for Mobile Devices	Accepted for AIP conference proceedings	-	2021
7	Bhaskar U., Khan J., Bhat J., Chougule A., Sangale S.	Design and development of smart solar powered street sweeping machine	Materials Today	46	2021.
8	Bhaskar U., Desai M., Bhat J.,	Optimization of process parameters by Hybrid Taguchi-Grey Relational Analysis for thermal behaviours of lubricant oil of worm gearbox	Materials Today	--	2021.
9	Bhaskar U., Desai M., Sonawane B., Bhat J.	The compound Taguchi and grey relational analysis used to optimize the tribological parameters of worm gear under wet condition	Materials Today	47	2021
10	Bhaskar U. and Benade M.,	Modelling and fatigue analysis of the composite material camshaft using	Advances and applications in mathematical	20	2021

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Somwar Peth, Panhala, Solapur



To,
The coordinator,
RGSTC Scheme,
Dr. Babasaheb Ambedkar Technological University,
Vidyavihar, Lonere

Respected Sir,

Thanking you.

Dr. Vishal S. Patil

SETI, Panhala

Research & Development
SETI, Panhala

SETI, Panhala
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Somwar Peth, Panhala - 416 201



1) **Title of the project proposal:** Novel herbal composition and method to improve milk production, fat, lactation period and reproductive health in cattle.

2) **Name of the Institution where the work will be carried out:**
Department of Basic Sciences and Humanities, Sanjeevan Engineering and Technology Institute Panhala, Dist- Kolhapur, Maharashtra 416201

3) **Name of the investigator:**

3.1) Name - Dr. Vishal S. Patil

3.2) Department - Basic Sciences and Humanities

3.3) Designation - Assistant Professor

3.4) Organization and Institute name - Sanjeevan Engineering and Technology Institute, Somwar Peth, Panhala

3.5) Address: Sanjeevan Engineering and Technology Institute, Somwar Peth, Panhala, Dist- Kolhapur, Maharashtra 416201

E-Mail: vishalpatil.chem@gmail.com Contact no.- 9049439898

4) **Name of the co-investigator:**

4.1) Name - Dr. Dhanshri V. Patil

4.2) Department - Chemistry

4.3) Designation - Assistant Professor

4.4) Organization and Institute name - Krishna Mahavidyalaya Rethare Bk.

4.5) Address: Krishna Mahavidyalaya Rethare Bk. Tal- Karad, Dist- Satara, Maharashtra 415108 E-Mail: dtg:phy@gmail.com

5) **Objective of the project:**

- i) To provide a novel herbal composition for enhancing milk production, fat and lactation period in cattle.
- ii) To maintain normal duration of an estrous cycle and helps cattle to conceive in time.
- iii) To develop a commercially viable composition to boost dairy farming in India.
- iv) To tackle the dairy farming problem for the betterment of mankind.