ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

Shobhavan Campus, Mijar, Moodbidri - 574225

(Affiliated to Visvesvaraya Technological University, Belagavi

Approved by AICTE, New Delhi & Recognized by Government of Karnataka)

ALVA'S

Education Foundation®

A Report on

"ALVA'S CENTER FOR ADVANCED RESEARCH"

PRINCIPAL

Alva's Institute of Engg. & Technology,

Mijar, MOODBIDRI - 574 225, D.K.

Contents

1. Mission, Vision, Objectives of the Lab

Vision: Creation of a common research center to support the theme of Project-based learning through UG/PG/PhD Research Projects leading to enhancement of knowledge and institutional status.

Mission

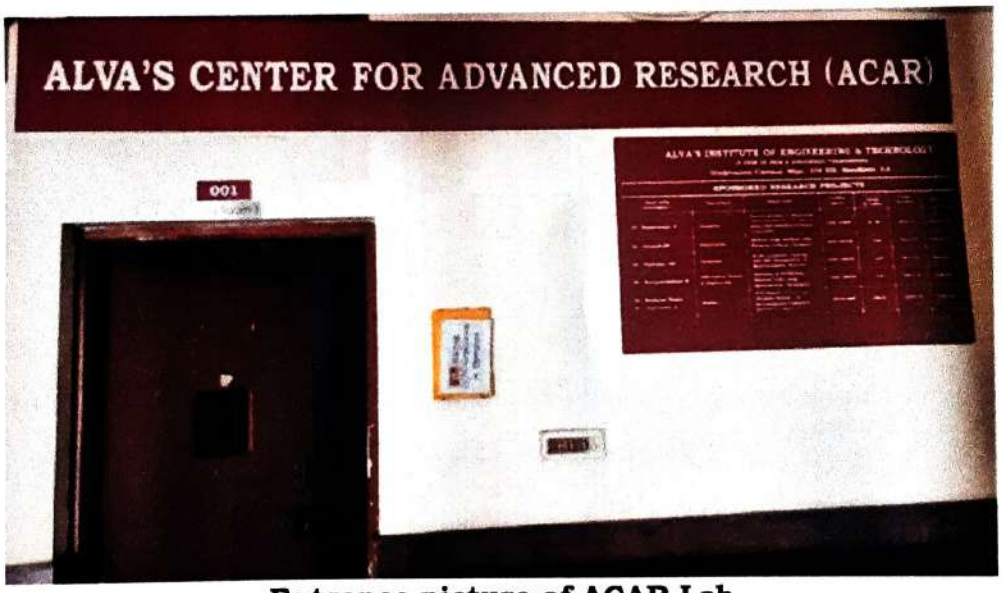
- Identification of research projects in the field of Health, Energy, Environment, Water, Communication etc.
- Enhances the ability to perform research in a global community
- Supports strong infrastructure for interdisciplinary research
- Involvement of Resource persons from premier institutes;
- Enhancement of Faculty/student knowledge through UG/PG/PhD Research Projects;
- Setting up common research facility with partial support from Govt. funded schemes (KCTU, DST, VGST, BRNS, CPRI and others);
- Publications and Patents of research results;
- Reduction of industry-academia gap through Industry-Relevant Research Projects;

Objectives

- To focus research on gas sensors, fuel cells, optical materials and other materials related research.
- Implementation of projects by involving Faculty and students from UG and PG level; Ph.D Research students are the key to connect and implement UG/PG/PhD research projects.
- Enhancement of student placement through UG/PG/PhD Research Projects;
- Enhancement of institutional outreach through Conferences and Seminars;
- Overall enhancement of institutional status

2. Establishment details of Lab

Alva's center for advanced research (ACAR) is **established in the year 2017**. ACAR is envisioned to be a state-of-the-art research center for achieving excellence in important areas of science and technology. It is known that technology advances due to the advancement of science. Research based Projects connect science and technology leading to industrial products for the benefit of society. Further, teaching and research go together in most of the Institutes/universities in the world. Hence, most of the basic research based projects for industries are carried out in institutes and universities which bridge the industry-academia gap. However, the industry-academia gap is large in India due to which the quality of higher education is neglected in majority of Institutions/Universities in India which largely affects placement of students.



Entrance picture of ACAR Lab

Though the projects are mandatory for UG/PG students a per VTU/MU norms, they are not research based and hence, lack novelty; they also may lack faculty involvement and may not be industry-relevant thereby affecting both publications and placement. Further, teaching load of faculty, more so with labs, is high with little time for research; also lack of research advisors and resource persons hampers the introduction and sustenance research in most engineering institutions. Lack of basic common research facility for students/faculty to carryout UG/PG/PhD research based projects is the main reason for widening the industry-academia gap which affects placement.

3. Components or equipment in the labs with specifications and details

Equipment at ACAR

1) Spray Pyrolysis Setup for growth of thin films

Purchased year: 2020
Make: M/s Excel Instruments, Vasai, Mumbai.

Specifications: Film growth chamber, 250mm Diameter, 250 mm height with observation windows 2 Nos., Mounted on a laminated work table with castor wheels having dimensions: 600mm x 600mm area, height 750mm, with substrate heater having 50mm diameter with PID controller; Maximum Temp. 800deg C;

Nebulizer assembly: The nebulizer is to be integrated on a 250mm diameter SS chamber with height adjustable (100mm to 200mm) stage for spray pyrolysis; It will have flowmeters, 2nos. for 2 gases, each having flowrates 0-5L/min and with exhaust connection at bottom of 250mm diameter SS Chamber, exhaust flow 100 CFM;

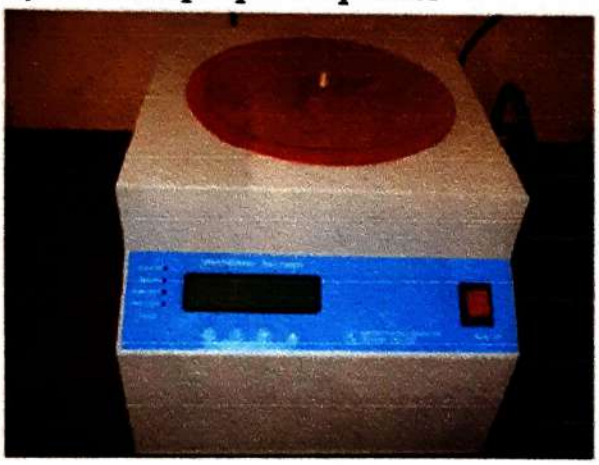
X - Y scan system with SS platform for substrate heater: The X-Y scan system will have scan range of 50mm x 50mm complete with stepper motors and drive system;

2) Gas sensor measurement setup

Purchased year: 2020
Make: M/s Excel Instruments, Vasai, Mumbai.
Specifications:

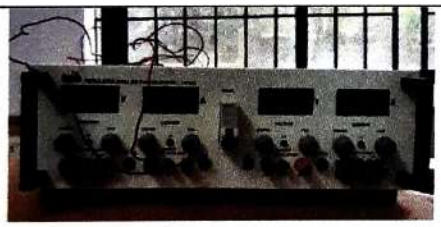
- Flowmeter-1: 0-70ml for test gas
- Flowmeter-2: 0-5000ml for N_2 dilution
- Mixing chamber with 2 inch dia SS and 4 inch long
- Measurement chamber with a lid with a window
- Heater upto 500°C with on/off controller
- Gas valve and Kf-16 pump valve
- 4 leads for measurements
- Dial gauge for vacuum measurements

3) General purpose Spinner



Purchased year: 2019
Make: M/s Spektron Instruments Inc., Chennai
Specifications:

- Actuator: Brushless DC motor
- Spinning speed: 60 - 9999 rpm
- Substrate diameter: 30 mm to 70 mm
- Power input: 230V, 50Hz
- Read out: 20 x 4 line LCD
- Spin chamber: Nylon
- Acceleration: 5 - 1000 rpm / sec
- Spinning Speed Accuracy: < 5%
- Programmable parameters: Speed, acceleration, dwell time and no. of steps
- Maximum no of steps: 9
- Program memory: 9 programs (non – volatile)
- Dimension: 400mm Depth x 275mm W x 500mm H
- Oil free diaphragm vacuum pump: Capacity: 75 LPM

4) Electrochemical Work station	
	**Purchased year: 2017** **Funding: Alva's Education Foundation** **Cost:** Rs. 8,36,109.00 **Specifications:** o Potentiodynamic Polarization Studies o Electrochemical Impedance Method o Cyclic Voltammetry Studies o Chrono Potentiometric, Amperometric studies
5) DC Power Analyzer, KeySight N6705C	
	**Purchased year: 2017** **Funding: Alva's Education Foundation & VGST Grant** **Cost:** Rs. 5,95,433.34 **Specifications:** Monolayer and Multilayer Deposition of Alloys Using Different Power Patterns
6) DC Power Analyzer, APLAB Make 0-32V/0-5A dual channel	
	**Purchased year: 2017** **Funding: Alva's Education Foundation** **Cost:** Rs. 32000 **Specifications:** Monolayer Deposition of Alloys

4. Compositions of lab

4.1 Coordinator details and Faculty Lab in-charge details.

Coordinator details

Dr. Richard Pinto
Dean Research
Department of Electronics and Communication Engineering
Alva's institute of engineering and technology
Shobhavan Campus, Mijar, Moodbidri – 574225
Email: rpinto1942@gmail.com

Faculty Lab in-charge details.

Dr. Jayarama A
Associate Professor
Department of Physics
Alva's institute of engineering and technology
Shobhavan Campus, Mijar, Moodbidri – 574225
Email: jrmarasalike@gmail.com

Signature of the Coordinator

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Research Activity Report on

"ALVA'S CENTER FOR ADVANCED RESEARCH"

Academic Year 2017 - 18

PRINCIPAL

Alva's Institute of Engg. & Technology,

Mijar, MOODBIDRI - 574 225, D.K.

Contents

1) Research Activity Report of Academic year 2017-18

In this academic year Electrochemistry and Nanoscience (ENS) related projects were carried out. ENS projects include fabrication of Monolayer and Nano- structured Multilayer Alloy coatings using electrodeposition method by modulating current pulse. This new class of materials with alternating layers of different metal composition, having a thickness of few nanometers with ultrafine microstructure is of interest because of their fundamental and technologicalimportance.

Electrochemical water splitting into Hydrogen/ Oxygen evolution reaction in acidic or alkaline solution, using an effective electro catalyst plays a growing role in the fabrication of alternative energy devices. In this context, the designing and development of various earth-abundant transition metals along with nano particles as highly efficient electro catalysts will benefit the technology through clean and sustainable energy system. In this context ENS project activity aims at the development of electro catalyst by electrodeposition method and characterizationas electro catalyst using electrochemical workstation.

In this way ACAR lab supports Research and Development activity at Alva's Institute of Engineering and Technology, Mijar, Moodabidri.

2) Research Student Details of academic year 2017-18

Sl.No.	Name of Ph.D Student	Research Guide details
1)	Ms. Rashmi D Research Scholar Department of Chemistry Alva's institute of engineering and technology	Dr. Pavithra G.P Sr. Assistant Professor Department of Chemistry Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
2)	Ms. Abhijna Research Scholar Department of Chemistry Alva's institute of engineering and technology	

B.E Project student details

Sl.No.	Name of UG Student	Research Guide details
1.	Avinash Poojary 7th Semester, AIET	Dr. Pavithra G.P Sr. Assistant Professor Department of Chemistry Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
2.	Jameson Keisham 7th Semester, AIET	
3.	Koushik N. 7th Semester, AIET	
4.	Lathesh 7th Semester, AIET	

List of first year students worked on a project under the guidance of Dr. Pavithra G. P.

Sl.No	Ist Semester Students
1	Yashwanth V.
2	Yashwanth K.
3	Abdul Kareem
4	Kalyan Kumar D.
5	Sujana
6	Sujaya
7	Shailashree
8	Sanjana
9	Sonali

Sl. No.	2nd Semester Students
1	Sujana
2	Sujaya
3	Shailashree
4	VandanaV.Iragar
5	Shraddha Acharya
6	V.Anjana Pai

Research outcome/Publications:

1. "Development of Nanostructured Ni-Fe Alloy Coatings; Characterisation and Corrosion Analysis"- (**Accepted**) Surface Engineering and Applied Electrochemistry.
2. "Electrochemical Etching on Copper Surfaces to Achieve Superhydrophobicity" International Journal of Manufacturing and Materials Processing, (2019), 27–31.
3. "Development of Nanocrystalline Multilayer Ni-Fe alloy coatings: Characterization and its Corrosion behavior at elevated temperature"- (**Accepted**) Bulletin of Materials Science.

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Research Activity Report on

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Academic Year 2018 - 2019

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Alva's Institute of Engg. & Technology,

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Contents

1) **Research Activity Report of Academic year 2018-19**

- The MSc PG Students and PhD students has grown metal oxide thin films in association with NMAMIT Nitte.
- Two UG students worked in the area of optical materials and synthesized biologically important chalcones and published 4 papers and a patent application
- 4 B.E Students of neighboring institute did their project work on novel membrane in association with NOEL-EFNMR lab and published a paper in Elsevier journal
- Collaboration with TIFR IIT Bombay, MIT-Manipal, NMAMIT, and Alva's College etc in advanced projects with two self-financed Ph.D research Scholars (Arjun Rao and Rashmi K.R, Research students of D.V Manjunatha of Jayarama A) along with UG Engineering students during 2018 -19 has resulted in 2 AIET patent applications and 7 publications.
- ACAR lab was envisioned to be an advanced research centre at AIET with partial funding from KCTU project which was approved on September 2018.
- In continuation of earlier joint work with AIET and IITB we are planning an important research effort on hydrogen fuel cell implemented with in-situ generation of hydrogen using photo-catalyst with a leading catalyst expert at TIFR. Some part of the work will be carried out at IIT Bombay.
- This collaboration will lead to first International Conference at AIET in collaboration with TIFR/ IITB/IITM. The ideal time for this is after the IIT end semester.

2) **Research Student Details of academic year 2018-19**

Internal Ph.D Student Details

Sl.No.	Name of Ph.D Student	Research Guide details
1)	Mrs. Rashmi K.R USN: Department of Physics Alva's institute of engineering and technology	Dr. Jayarama A Associate Professor Department of Physics Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
2)	Mr. Ganesh V.N Assistant Professor Mangalore Institute of Engineering and Technology Moodbidri	
3)	Mr. Raghavendra Bairy Assistant Professor NMAMIT Nitte	
4)	Mr. Haleshappa Assistant Professor YIT, Moodabidri	
5)	Mrs. Niju Rajan Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Praveen J Professor and Dean Academics Dept of Electronics And Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
6)	Mr. Arjun Rao Assistant Professor Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Manjunatha D.V Professor and Head Dept of Electronics And Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225

External Ph.D Student details

Sl.No.	Name of Ph.D Student	Research Guide details
1)	Mr. Sandesh Kumar Rai Research Student VTU Research Resource Center Belagavi	Dr. Rajesh Rai Professor and Head Department of Mechanical Engineering AJ Institute of Engineering and Technology Mangalore
2)	Mrs. Charishma Assistant Professor Department of Electronics And Communication Engineering N.M.A.M. Institute of Technology, NITTE . Udupi District, Karnataka-574 110	Dr. Veena Devi Professor Department of Electronics And Communication Engineering N.M.A.M. Institute of Technology, NITTE . Udupi District, Karnataka-574 110

M.Sc Project Student details (2018-19)

Sl.No.	Name of PG Student	Guide details
1.	Ms. Anusha B.M Reg. No. 175026007 M.Sc 2nd year Alva's College Vidyagiri, Moodabidri	Dr. Jayarama A Associate Professor Department of Physics Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225 Dr. Richard Pinto Dean Research Department of Electronics and Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225 Email: rpinto1942@gmail.com Dr. Shashidhara Bhat Assistant Professor
2.	Ms. Sphoorthy P Shetty Reg. No. 175026024 M.Sc 2nd year Alva's College Vidyagiri, Moodabidri	
3.	Mr. Anvay Reg. No. 175026008 M.Sc 2nd year Alva's College Vidyagiri, Moodabidri	
4.	Ms. Basavadeepti Reg. No. 175026010 M.Sc 2nd year Alva's College Vidyagiri, Moodabidri	

5.	Ms. Ananya N. Bhat Reg. No. 175026003 M.Sc 2nd year Alva's College Vidyagiri, Moodabidri	Department of PG Studies in Physics Alva's College Vidyagiri, Moodabidri

External B.E Student details (2018-19)

Sl.No.	Name of UG Student	Research Guide details
1.	Deekshitha K USN: 4SO14CV015 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	Dr. Jayarama A Associate Professor Department of Physics Dr. Ramaprasad A.T Sr. Assistant Professor and HOD Department of Physics Alva's institute of engineering and technology Dr. Richard Pinto Dean Research Alva's institute of engineering and technology Dr. Nalini Rebello Professor and Head St. Joseph's Engineering College Vamanjoor, Mangalore
2.	Fathima Zilla USN: 4SO14CV018 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	
3.	Nishanth Shetty USN: 4SO14CV037 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	
4.	Chaithra K T USN: 4SO15CV402 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	

3. Research outcome/Publications in 2018-19

1. G K Dayananda, C Shantharama Rai, **A Jayarama A**nd Hyun Jae Kim, "Simulation model for electron irradiated IGZO thin film transistors", Journal of Semiconductors, Vol:39", Year: 2018, ISSN:1674-4926, Weblink:https://iopscience.iop.org/article/10.1088/1674-4926/39/2/022002/meta
2. RamKumar, T.Karthick, PoonamTandon, Parag Agarwal, Anthoni Praveen Menezes, **A.Jayarama**, "Structural and vibrational characteristics of a non-linear optical material 3-(4-nitrophenyl)-1-(pyridine-3-yl) prop-2-en-1-one probed by quantum chemical computation and spectroscopic techniques", Journal of Molecular Structure, Vol:1164, Page:180-190", Year: 2018,

ISSN:0022-2860,
Weblink:https://www.sciencedirect.com/science/article/abs/pii/S0022286018303491

3. "Haleshappa Davanagere, **Jayarama A**, Parutagouda Shankar Gouda Patil, Shivaraj R. Maidur, Ching Kheng Quah, & Huey Chong Kwong, ""The structural and third-order nonlinear optical studies of a novel nitro groupsubstituted chalcone derivative for nonlinear optical applications", Applied Physics A Materials Science & Processing Appl. Phys. A (2019) 125:1-13, ISSN:ISSN 0947-8396, Weblink:https://link.springer.com/article/10.1007/s00339-019-2616-7"
4. "Raghavendra Bairy, **A. Jayarama**, G. K. Shivakumar, P. S. Patil, and K. Udaya Bhat, "Zn doped CdO thin films with enhanced linear and third order nonlinear optical properties for optoelectronic applications", AIP Conference Proceedings 1943, 020070 (2018); 6"", Year: 2018, ISSN:doi: 10.1063/1.502964, Weblink: https://doi.org/10.1063/1.5029646"
5. Shobha R.Prabhua, V.Upadhyaya, **A.Jayarama**, ""Synthesis, Crystal structure and Hirshfeld surface analysis of a novel chalcone derivative: (2E)-3-(2,3-dimethoxyphenyl)-1-(3-nitrophenyl)prop-2-en-1-one"", Chemical Data Collections, Volumes: 11–12, , Pages 199-210"", Year: 2017, ISSN:2405-8300, Weblink:10.1016/j.cdc.2017.10.001"
6. Shobha R. Prabhua, **A. Jayarama**, K. Chandrasekharan, V. Upadhyaya, Seik Weng Ng, "Synthesis, growth, structural characterization, Hirshfeld analysis and nonlinear optical studies of a methyl substituted chalcone", Journal of Molecular Structure, Vol.1136 Page:244-252", Year: 2017, ISSN:0022-2860, Weblink:https://doi.org/10.1016/j.molstruc.2017.01.069
7. Vinutha PR, **Jayarama A**, Kaliprasad C, Narayana Y, Byrappa K, Madan Kumar S, Suresh Kumar MR,, "Synthesis, single crystal structure and spectroscopic aspects of chalcone 2(2E)-1-(4-bromobiphenyl-4-yl)-3-(2,3-dimethoxybenzaldhyde) prop-2-ene-1-one", Chemical Data Collections , Vol.9–10 Page:208-219", Year: 2017, ISSN:2278-3318, Weblink:https://doi.org/10.1016/j.cdc.2017.06.007

Institutional Patent Applications from students and faculties of AIET

Sl. No	Title	Patent Application number	Published date	Inventors
1	A process for fabrication of P(VDF-TrFE) piezoelectric beams and cantilevers as vibration sensors and energy harvesters	201841030070	14/12/2018	Rashmi K. R, **Jayarama A,** Richard Pinto, Siddhartha P. Duttagupta And ShriganeshPrabhu
2	Enhancement of micro direct methanol fuel cell (μ-DMFC) performance using micro channels fabricated from <100> silicon wafer orientation and P(VDF-TrFE) coated nafion membrane as proton exchange membrane	201841040380	14/12/2018	Arjun Sunil Rao, **Jayarama Arasalike,** ManjunathaDoddaballapuraVeerabhadraiah, Richard Pinto, Siddhartha Prakash Duttagupta And AchantaVenugopal

Signature of the Coordinator

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Research Activity Report on

"ALVA'S CENTER FOR ADVANCED RESEARCH"

(Common Research Facility for UG-PG-PhD Projects)

Academic Year 2019 - 2020

PRINCIPAL
Alva's Institute of Engg. & Technology,
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Contents

1. Research Activity Report of Academic year 2019-20

- Collaboration with TIFR and IIT Bombay in advanced projects with two self-financed Ph.D research Scholars (Arjun Rao and Rashmi K.R, Research students of D.V Manjunatha of Jayarama A) along with UG Engineering students during 2018 -20 has resulted in **6 AIET patent applications and 7 publications**.
- Collaboration with faculty members and students from other neighboring institutes like MIT-Manipal, NMAMIT, and Alva's College etc has resulted in **another 37 publications during 2019-20**.
- An International conference iCOLD-2019 in association with IIT-Madras in November 2019 held at AIET with funding supports from Laser Science Services and **DST (Rs. 3+1 Lakhs)** has led to materials today proceedings (SCI Journal) **publications with 33 AIET publications.**
- ACAR lab was envisioned to be an advanced research centre at AIET with partial funding from KCTU project which was approved on September 2018. However, implementation was delayed due to following reasons which were beyond our control.
  - The **Govt. changed purchase committee midway** which meant a loss of 6 months
  - KCTU R&D equipment are budgeted under 5% concession IGST. Since **VTU failed to give us 5% concessional IGST** certificate we approached DSIR directly which recognized **AIET as SIRO and issued registration certificate with 5% concessional DSIR certificate** in February 6, 2020 based on our research efforts.
  - At this point **AEF-FO could not commit the full amount** of Rs. 50Lakhs planned for phase-1 equipment. Hence the delivery of equipment had to be deferred to April/May 2020

- **Covid-19 pandemic** with lockdown in March 2020 further delayed the implementation process.
- We **asked KCTU for the extension** of project in September 2020; but KCTU transferred our letter to Department of Industry. The extension of KCTU project is currently waiting for final approval from the Department of Industry.

- In the meantime, ACAR lab is partially being established with **VGST funds received (Rs. 5 Lakhs)** through a collaborative project between AIET and Alva's College. With the equipment ordered under this project **one can carry out Environmental sensor work and Fuel cell work at ACAR lab.** We have placed orders for 1) Spray pyrolysis setup, 2) Gas sensor measurement unit, 3) Hot-air Oven, 4) Sample preparation Furnace, 5) Gases and related items for fuel cell work. We are obtaining all these through concessional budget through CEO of Excel Instruments who was earlier a TIFR staff.
- With the delay in KCTU implementation it is proposed that we should go for DST funding. However our attempts for DST funding in the past were not successful (Except for conference funding). Our analysis of DST-SERB sanctioned projects during last 5 years has shown that while many hundreds of projects are granted for institute of higher repute and high NIRF ranking, not a single project has been sanctioned to non NIRF institutes (including 5 proposals from AIET), **irrespective of quality of the proposal and expertise of PI.** In view of this **we are planning to tie-up with TIFR and IITB faculty as PIs** and Co-PIs from AIET with a **50% project fund to AIET**. This is possible mainly because of our collaborative work which has resulted in **joint patents and publications**.
- In continuation of earlier joint work with AIET and IITB we are planning an important research effort on **hydrogen fuel cell implemented with in-situ generation of hydrogen using photo-catalyst with a leading catalyst** expert at TIFR. Some part of the work will be carried out at IIT Bombay.
- This collaboration will lead to **second International Conference at AIET** in collaboration with TIFR/ IITB/IITM. The ideal time for this is after the IIT end semester.

2. Research Student Details of academic year 2019-20

Internal Ph.D Student Details

Sl.No.	Name of Ph.D Student	Research Guide details
1)	Mrs. Rashmi K.R USN: Department of Physics Alva's institute of engineering and technology	Dr. Jayarama A Associate Professor Department of Physics Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
2)	Mr. Ganesh V.N Assistant Professor Mangalore Institute of Engineering and Technology Moodbidri	
3)	Mr. Haleshappa Assistant Professor YIT, Moodabidri	
4)	Mrs. Niju Rajan Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Praveen J Professor and Dean Academics Dept of Electronics And Communication Engineering Alva's Institute of Engineering And Technology Shobhavan Campus, Mijar, Moodbidri – 574225
5)	Mr. Arjun Rao Assistant Professor Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Manjunatha D.V Professor and Head Dept of Electronics And Communication Engineering Alva's Institute of Engineering And Technology Shobhavan Campus, Mijar, Moodbidri – 574225

External Ph.D Student details

Sl.No.	Name of Ph.D Student	Research Guide details
1)	Mr. Sandesh Kumar Rai Research Student VTU Research Resource Center Belagavi	Dr. Rajesh Rai Professor and Head Department of Mechanical Engineering AJ Institute of Engineering and Technology Mangalore
2)	Mrs. Charishma Assistant Professor Department of Electronics And Communication Engineering N.M.A.M. Institute of Technology, NITTE . Udupi District, Karnataka-574 110	Dr. Veena Devi Professor Department of Electronics And Communication Engineering N.M.A.M. Institute of Technology, NITTE . Udupi District, Karnataka-574 110

M.Sc Project Student details (2019-20)

Sl.No.	Name of PG Student	Guide details
1.	Mr. Abhishek B Reg. No. 186015701 Alva's College Vidyagiri, Moodabidri	Dr. Jayarama A Associate Professor Department of Physics Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225 Dr. Richard Pinto Dean Research Department of Electronics and Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225 Email: rpinto1942@gmail.com Dr. Shashidhara Bhat Assistant Professor Department of PG Studies in Physics Alva's College Vidyagiri, Moodabidri
2.	Mr. Banupraksh M Reg. No. 186015705 Alva's College Vidyagiri, Moodabidri	
3.	Mr. Hrushikesh Acharya Reg. No. 186015710 Alva's College Vidyagiri, Moodabidri	

B.Sc Student details (2019-20)

Sl.No.	Name of UG Student	Research Guide details
1)	Ms. Srushti Shetty Dept. of Physics Alva's College Vidyagiri, Moodabidri	Dr. Jayarama A Associate Professor Department of Physics Dr. Shashi Kumar K. S Sr. Asst. Professor Department of Physics Dr. Richard Pinto Dean Research Alva's institute of engineering and technology
2)	Ms. Namratha W.N Dept. of Physics Alva's College Vidyagiri, Moodabidri	

External B.E Student details (2019-20)

Sl.No.	Name of UG Student	Research Guide details
1.	Mahima S Rao USN: 4SO15CV025 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	Dr. Jayarama A Associate Professor Department of Physics Dr. Ramaprasad A.T Sr. Assistant Professor and HOD Department of Physics Alva's institute of engineering and technology Dr. Richard Pinto Dean Research Alva's institute of engineering and technology Dr. Nalini Rebello Professor and Head St. Joseph's Engineering College Vamanjoor, Mangalore
2.	Melroy Royston D'souza USN: 4SO15CV028 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	
3.	Mahesha SM USN: 4SO15CV024 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	
4.	Vaishnavi T R USN: 4SO14CV051 Dept. of Civil Engineering St. Joseph's Engineering College Vamanjoor, Mangalore	

3. Collaborations

ACAR has active collaboration with following Research faculty

Sr.No	Name	Designation	Address
1	Dr. Shriganesh Prabhu	Associate Professor, TIFR Mumbai	FOTON Group, TIFR Mumbai, Dr. HomiBhabha Road, Navy Nagar, Colaba, Mumbai, Maharashtra 400005, Phone: 022 2278 22782932, C-224 Email : prabhu@tifr.res.in
2	Prof. Siddhartha P. Duttagupta	Professor, IIT Bombay	Electrical Engineering IIT Bombay, Powai Mumbai 400 076 India Phone:+91-22-2576-7866 Ph: 9833886730 Email: sdgupta@ee.iitb.ac.in
3	Dr. Pradeep Dixit	Assistant Professor, IIT Madras	Department Of Mechanical Engineering Indian Institute Of Technology Bombay , IIT Powai, Mumbai, Mumbai City, Maharashtra-400076 Email: dixit.pradeep@gmail.com
4	Dr. Poornesh KK	Assistant Professor, NITK, Surathkal	Department of Mechanical Engineering, National Institute of Technology, Karnataka, Surathkal
5	Dr. Y. Narayana	Professor, Mangalore University	Department of Physics, Mangalore University Konaje, D.K District, Karnataka Tel:
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4. Research outcome/Publications

1. Rashmi K.R., Rao A.S., **Jayarama A.**, Pinto R., "Piezoelectric P(VDF-TrFE) micro cantilevers and beams for low frequency vibration sensors and energy harvesters", Sensors and Actuators, A: Physical Vol: 295 574 585", Year: 2019, ISSN:9244247, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85067874578&doi=10.1016%2fj.sna.2019.06.021&partnerID=40&md5=e0387a43cb443b02ee3aae916b793312
2. Bairy R., **Jayarama A.**, Kulkarni S.D., Murari M.S., Vijeth H., "Role of Zn in tuning the band gap, surface morphology, photoluminescence and optical nonlinearities of CdO nanostructures for photonic device applications", Materials Research Express Vol: 6 9 96447 ", Year: 2019, ISSN:20531591, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070271400&doi=10.1088%2f2053-1591%2fab3329&partnerID=40&md5=7b25518a6b8703a977205acbeb0c0472
3. Rao A.S., Rashmi K.R., Manjunatha D.V., **Jayarama A.**, Pinto R., "Enhancement of power output in passive micro-direct methanol fuel cells with optimized methanol concentration and trapezoidal flow channels", Journal of Micromechanics and Microengineering Vol: 29 7 75006 ", Year: 2019, ISSN:9601317, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85068980740&doi=10.1088%2f1361-6439%2fab1db7&partnerID=40&md5=1b9db719596e0a7dd45e5d1887c7afe3
4. Rashmi K.R., Rao A.S., **Jayarama A.**, Pinto R., "Low frequency piezoelectric P(VDF-TrFE) micro-cantilevers with a novel MEMS process for vibration sensor and energy harvester applications", Smart Materials and Structures Vol: 28 6 65022 ", Year: 2019, ISSN:9641726, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85068459293&doi=10.1088%2f1361-665X%2fab19d2&partnerID=40&md5=1b87820693e2c85880e85deb4bf12e9c
5. Satheeshchandra S., Haleshappa D., Rohith S., **Jayarama A.**, Shetty N., "Novel benzofuran based chalcone material for potential nonlinear optical application", Physica B: Condensed Matter Vol: 560 191 196", Year: 2019, ISSN:9214526, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-

85062699539&doi=10.1016%2fj.physb.2019.02.014&partnerID=40&md5=43b9c379caffc23b3da7b526b336437e

6. Davanagere H., **Jayarama A.**, Patil P.S.G., Maidur S.R., Quah C.K., Kwong H.C., "The structural and third-order nonlinear optical studies of a novel nitro group-substituted chalcone derivative for nonlinear optical applications", Applied Physics A: Materials Science and Processing Vol: 125 5 309 ", Year: 2019, ISSN:9478396, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064179182&doi=10.1007%2fs00339-019-2616-7&partnerID=40&md5=67d6d9285b6efe05c0d7c0146b59894a
7. Haleshappa D., **Jayarama A.**, Bairy R., Acharya S., Patil P.S., "Second and third order nonlinear optical studies of a novel thiophene substituted chalcone derivative", Physica B: Condensed Matter Vol: 555 125 132", Year: 2019, ISSN:9214526, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85059336422&doi=10.1016%2fj.physb.2018.11.046&partnerID=40&md5=b1593481f4d19cc167a2630e17b86510
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12. Raghavendra Bairy, A. Jayarama, Suresh D. Kulkarni, M.S. Murari, H. Vijeth, Improved nonlinear optical absorption mechanism and susceptibility (x(3)) of CdS nanostructured thin films: Role of zinc doping, Materials Science in Semiconductor Processing, Volume 121,2021,
13. Rao A.S., Manjunatha D.V., **Jayarama A.**, Achanta V.G., Duttagupta S.P., Pinto R., "Power enhancement of passive micro-direct methanol fuel cells with self-sulfonation of P(VDF-TrFE) copolymer during lamination on Nafion membrane", International Journal of Hydrogen Energy Vol: 44 57 30375 30387", Year: 2019, ISSN:3603199, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073926624&doi=10.1016%2fj.ijhydene.2019.09.184&partnerID=40&md5=4e6d94f83e774538fb79541046e2a6a1
14. Rao A.S., Rashmi K.R., Manjunatha D.V., **Jayarama A.**, Prabhu S., Pinto R., "Pore size tuning of Nafion membranes by UV irradiation for enhanced proton conductivity for fuel cell applications", International Journal of Hydrogen Energy Vol: 44 42 23762 23774", Year: 2019, ISSN:3603199, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070105010&doi=10.1016%2fj.ijhydene.2019.07.084&partnerID=40&md5=444a0296415bae4d1c354d2ad5687bf0
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Institutional Patent Applications from students and faculties of AIET

Sl. No	Title	Patent Application number	Published date	Inventors
1	Enhancement of direct methanol fuel cell performance with nafion proton exchange membrane optimally exposed to ultraviolet rays	201941009746	10/5/2019	Arjun Sunil Rao, **Jayarama Arasalike,** ManjunathaDoddaballapuraVeerabhadraiah, Praveen Jayappa, Richard Pinto And Peter Fernandes
2	Smart shockwave velocity measurement system based on P(VDF-TrFE) piezosensors and arduino	201941024087	AWAITED	Ramaprasad A T, Arjun Sunil Rao, AnoopRadhaBalan, Jyothish Kumar Kunhipurayil, Arjun Ashok Ambattuparambil, **Jayarama Arasalike**, Richard Pinto And Peter Fernandes
3	A process for enhancing hydrogen fuel cells performance with nafion proton exchange membrane optimally exposed to ultraviolet rays	201941035383	13/09/2019	Preetham Castelino, Sohan Poojari, Sunny Ramniwas Sharma, Poojar, Prashant Shekar, Chirag Satish Poojari, **Jayarama Arasalike**, Satyanarayan, Richard Pinto, Shriganesh Prabhu, Siddhartha Prakash Duttagupta
4	'A Process of Synthesizing Novel Methyl Substituted Chalcone Molecules-The Potential Cancer Inhibitors'	201941046359	14-11-2019	Sarveshwara Heggadde Palachandra, Namratha Wooluvarana Naveen Kumar, Jayarama Arasalike, Richard Pinto, Shashidhara Bhat, Shashi Kumar Kumaraswamy, Shruthi, Shriganesh Prabhu,

Signature of the Coordinator

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

Shobhavan Campus, Mijar, Moodbidri - 574225

(Affiliated to Visvesvaraya Technological University, Belagavi

Approved by AICTE, New Delhi & Recognized by Government of Karnataka)

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Contents

1. Research Activity Report of ACAR during Academic year 2020-21

o Collaboration with TIFR and IIT Bombay in advanced projects with a self-financed Ph.D research Scholar (Shubhava Shetty Research student of Jayarama A) along with faculty of IITB and TIFR has resulted in 2 Elsevier publications.

o Collaboration with faculty members and students from other neighbouring institutes like MIT-Manipal, NMAMIT, and Alva's College etc has resulted in another 26 publications during 2020-21.

o There are a many areas of research that are currently being carried out at ACAR, MET some of them are the following:

a) Development of Breath ammonia sensor for early detection of renal disease: In this work, we are developing technique for the detection of trace ammonia vapor in exhaled air, a biomarker for renal disorders, using extremely selective, sensitive, and stable sensors at sub-ppm levels. This painless, efficient method will enhance the existing gold standard for detecting renal disease, allowing for speedy and early identification. At present the surface microstructure of V205 grown by spray pyrolysis has shown good promise in the detection of trace quantity of ammonia.

b) Enhancing theoretical knowledge in Fundamentals of Quantum Chemical calculations - ab initio, Semi-empirical, Hartree-Fock and Density Functional Theory (DPI) calculations, 2) -Using of GaussView- a visualizing software to view and build molecules, clusters, complexes,3) Initialization of all type of Gaussian (G09/ 16) job calculations using GaussView and 4) Gaussian jobs viz., Geometry Optimization, Frequency Calculation, Theoretical IR frequency analysis , NMR property calculations, UV-Vis excited state calculations , Molecular Orbital Analysis, HOMO LUMO plot and analysis.

c) Development of Electrochemical discharge machined serpentine micro-channels in fused quartz for photo-catalytic in-situ hydrogen evolution in

hydrogen fuel cells: Experiments carried out on HFCs with 19mm x 17.5mm active area with optimally UV exposed nation have shown a power output enhancement by a factor of 2 for 50um nafion membrane compared to those HFCs with unexposed nafion (our Patent Appl no: 201941035383).

d) Electrochemical Etching on Copper Surfaces to Achieve Superhydrophobicity: An attempt has been made to create superhydrophobicity on copper substrate by etching the surface at different parameters (current density and time). Etching time was varied from 30 to 240 minutes. Untreated copper surface exhibited contact angle of 91.4°. The best etched surface exhibited a maximum contact angle of 142.1° for a current density of 0.01A/cm^2 and etching time of 60 minutes. The structure-property relationship of etched copper surface has been discussed by interpreting atomic force microscope results with contact angle.

e) Development of Piezoelectric P(VDF-TrFE) micro cantilevers and beams for low frequency vibration sensors and energy harvester applications: Piezoelectric P(VDF-TrFE) micro-cantilevers and beams have been developed with a novel MEMS based Si bulk micromachining process based on design and simulation of micro-cantilevers and beams carried out using Comsol Multiphysics. Micro-cantilevers and beams were characterized with Laser Doppler Vibrometer to measure resonant frequency, voltage and power output. This novel process has potential for the development of low and very low frequency vibration sensors and energy harvesters.

2. Research Student Details of academic year 2020-21

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1)	Mrs. Rashmi K.R USN: Department of Physics Alva's institute of engineering and technology	Dr. Jayarama A Associate Professor Department of Physics Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
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3)	Mr. Ganesh V.N Assistant Professor Mangalore Institute of Engineering and Technology Moodbidri	
4)	Mrs. Niju Rajan Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Praveen J Professor and Dean Academics Dept of Electronics And Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225
5)	Mr. Arjun Rao Assistant Professor Department of Electronics and Communication Engineering Alva's institute of engineering and technology	Dr. Manjunatha D.V Professor and Head Dept of Electronics And Communication Engineering Alva's institute of engineering and technology Shobhavan Campus, Mijar, Moodbidri – 574225

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5)	Mr. Prajwal Reg. No.: 1930131107 Alva's College Vidyagiri, Moodabidri	
6)	Mr. Sukshith Reg. No.: 193013115 Alva's College Vidyagiri, Moodabidri	

7)	Ms. Tejaswini S Reg. No.: 193013117 Alva's College Vidyagiri, Moodabidri	

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3)	Ms. Pratheeksha N Regd. No.:201821403109 Department of PG Studies in Physics Alva's College Vidyagiri, Moodabidri	
4)	Ms. Sameeksha Department of PG Studies in Physics Alva's College Vidyagiri, Moodabidri	
5)	Ms. Niveditha Department of PG Studies in Physics Alva's College Vidyagiri, Moodabidri	
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2	Prof. Siddhartha P. Duttagupta	Professor, IIT Bombay	Electrical Engineering IIT Bombay, Powai Mumbai 400 076 India Phone:+91-22-2576-7866 Ph: 9833886730 Email: sdgupta@ee.iitb.ac.in
3	Dr. Pradeep Dixit	Assistant Professor, IIT Madras	Department Of Mechanical Engineering Indian Institute Of Technology Bombay , IIT Powai, Mumbai, Mumbai City, Maharashtra-400076 Email: dixit.pradeep@gmail.com
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5	Dr. Y. Narayana	Professor, Mangalore University	Department of Physics, Mangalore University Konaje, D.K District, Karnataka Tel:
6	Dr. Iddya Karunasagar.	Advisor (Research and Patents)	Advisor (Research and Patents) Nitte University University Enclave, Medical Sciences Complex, Deralakatte Mangalore-575018, India Tel: 9481202750

4. Research outcome/Publications

1) Davanagere H., **Arasalike J.**, Quah C.K., Kwong H.C., Patil P.S., "Investigation of structural, physical, linear, and nonlinear optical properties of two novel thiophene centred D-Ï€-A type push-pull organic derivatives for nonlinear optical applications", Journal of Molecular Structure Vol: 1220 128763 ", Year: 2020, ISSN:222860, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087327415&doi=10.1016%2fj.molstruc.2020.128763&partnerID=40&md5=27a1ac9a0bff07c837593562bb3ecf2f
2) Prabhu S.R., Parol V., Upadhyaya V., **Jayarama A.**, Maidur S.R., Patil P.S., "Novel nitro based chalcone derivative single crystals: characterization on structural, linear optical, thermal, and third-order nonlinear optical properties", Applied Physics A: Materials Science and Processing Vol: 126 11 855 ", Year: 2020, ISSN:9478396, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85092429546&doi=10.1007%2fs00339-020-04039-7&partnerID=40&md5=f77924264322935424d3d462eec68653
3) Bairy R., **Jayarama A.**, Murari M.S., "Significant effect of film thickness on morphology and third-order optical nonlinearities of Cd1â^'xZnxO semiconductor nanostructures for optoelectronics", Applied Physics A: Materials Science and Processing Vol: 126 8 603 ", Year: 2020, ISSN:9478396, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087859524&doi=10.1007%2fs00339-020-03771-4&partnerID=40&md5=bb73c93ea0d4557e2898e3a95509450f
4) Haleshappa D., **Jayarama A.**, Quah C.K., Kwong H.C., "A novel bromo-substituted thiophene based centrosymmetric crystals: Thermal, mechanical, and third order NLO properties for the optical limiting

applications", Physica B: Condensed Matter Vol: 585 412083 ", Year: 2020, ISSN:9214526, Weblink:https://www.scopus.com/inward/record.uri?eid=2-s2.0-85080989036&doi=10.1016%2fj.physb.2020.412083&partnerID=40&md5=a6814136dcb8d76bb78cb67ca12c490b

5) Rao, Arjun Sunil; Rashmi, KR; Manjunatha, DV; **Jayarama, A**; Shastrimath, V Veena Devi; Pinto, Richard; , "Methanol crossover reduction and power enhancement of methanol fuel cells with polyvinyl alcohol coated Nafion membranes", Materials Today: Proceedings", Year: 2020, ISSN:2214-7853, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320308385

6) Haleshappa, D; **Jayarama, A**; Patil, Parutagouda Shankaragouda; , "Structure and property relationship of methoxy substituted novel organic crystals for photonic applications", Materials Today: Proceedings", Year: 2020, ISSN:2214-7854, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320311111

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9) Banuprakash, M; Abhishek, B; Acharya, Hrushikesh; Bairy, Raghavendra; Bhat, Shashidhara; Vijeth, H; Murari, MS; **Jayarama, A**; Pinto, Richard; , "Structural, linear and nonlinear optical characterization of Ni and Al Co-Doped CdO semiconductor nanostructures for nonlinear optical device applications", Materials Today: Proceedings", Year: 2020, ISSN:2214-7857, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320315455

10) Rashmi, KR; Rao, Arjun Sunil; Shastrimath, V Veena Devi; **Jayarama, A**; Pinto, Richard; , "Simulation and analysis of P (VDF-TrFE) cantilever-beams for low frequency applications", Materials Today: Proceedings",

Year: 2020, ISSN:2214-7858, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320314644

11) Ganapayya, B; Haleshappa, D; **Jayarama, A**; Shetty, Srushti S; Dharmaprakash, SM; Pinto, Richard; , "Synthesis, growth and NLO studies of a novel pyridine centered chalcone derivative", Materials Today: Proceedings", Year: 2020, ISSN:2214-7859, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320316503

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13) Castelino, Preetam; Shah, Amit; Gokhale, Mahesh; **Jayarama, A**; Suresh, KV; Fernandes, Peter; Prabhu, Shriganesh; Duttagupta, Siddhartha; Pinto, Richard; , "Optimum hydrogen flowrates and membrane-electrode clamping pressure in hydrogen fuel cells with dual-serpentine flow channels", Materials Today: Proceedings", Year: 2020, ISSN:2214-7861, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320315753

14) Deekshitha, K; Rebello, Nalini; Ramaprasad, AT; **Jayarama, A**; Pinto, Richard; , "Development of novel porous membrane for filtration of dump yard ground water contaminants", Materials Today: Proceedings", Year: 2020, ISSN:2214-7862, Weblink:https://www.sciencedirect.com/science/article/pii/S2214785320315716

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16) Kamath, Laxminarayana; Bairy, Raghavendra; **Jayarama, A**; Narayana, B; Gummagol, Neelamma B; Patil, Parutagouda Shankaragouda; Samshuddin, S; , "Preparation, characterization and study on the nonlinear optical parameters of novel biphenyl-4-carbohydrazide

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