

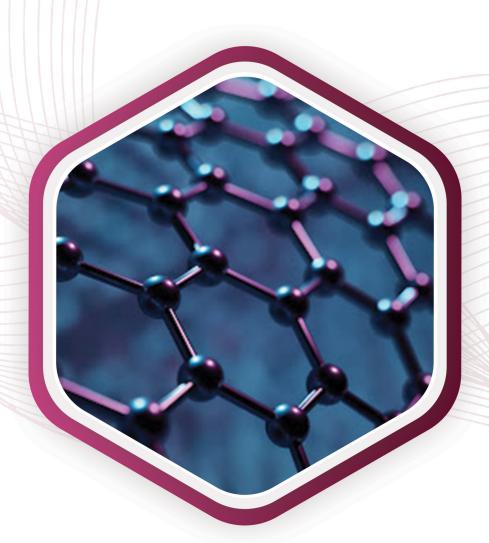








DEPARTMENT OF PHYSICS



ADVANCED FUNCTIONAL MATERIALS RESEARCH CENTRE (AFMRC)

ADVANCED FUNCTIONAL MATERIALS RESEARCH CENTRE



ABOUT THE RESEARCH CENTRE

Advanced Functional Materials Research Centre (AFMRC) was established by Department of Physics with the support of Department of Science and Technology under DST-YS projects with File No. SB/FTP/ETA- 0176/2014, SB/FTP/ETA-0213/2014 worth of Rs.72 Lakhs. Advanced functional instruments, High Temperature Electrical Furnaces (900°C, 1200°C, 1400°C), Electrospinning unit, Electrochemical workstation, Ultra Sonicator, Spin Coating unit, LCR meter and photo luminescence unit were procured in the projects. These facilities are used for materials characterization and offers advanced characterization facilities for academic institutions nearby region. It is maintained by group of faculty members well trained for the instruments.



VISION

To develop new technologies through research and analysis to provide solutions to environmental, industrial and biological problems.



MISSION

To impart quality research standards and to undertake research to next level with emphasis on application and innovation that cater to the emerging industrial & societal needs through all-round development of the researchers



OBJECTIVES

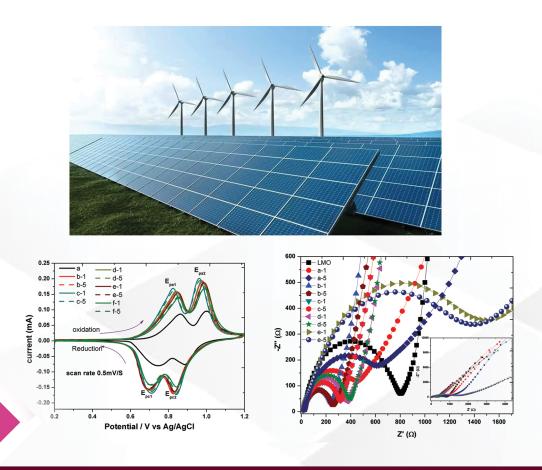
- AFMRC aims to become a National level laboratory through global networking, High standard Q1 publications, conducting International conferences, workshops, Faculty Development Programs.
- AFMRC aims to promote multidisciplinary research in advanced functional materials and solar energy research
- To establish collaborations and networking with industry / Global Institutions (public and private sectors)
- To enable researchers, Scientists, Engineers, Scholars and students to transform science and technology into start-ups, build novel patents and grant.



KEY RESEARCH AREAS

Dr. A. Venkateswara Rao and Dr. S. Shanmugan are along with CNT group faculty working on "Synthesis and studies fabrication of electrodes for energy storage devices and Supercapacitors applications; Design and fabrication of Double slope U shape stepped basin solar still for water purification applications and Solar energy materials. Magnetic nano materials for various applications. Dr. G. Sunita Sundari, Dr. M. Gnana Kiran, Dr. Sonali Biswas and Dr. Hushnud were working on nanomaterials and polymer composites. The prime focus of this group is to synthesize and study metal oxide materials, Solar energy materials and Magnetic nano materials for the real time applications using various possible techniques and characterizing them for their physical, structural, morphological, electrochemical impedance studies. Cyclic Voltammetry Charge-Discharge studies.

- 1. Nanomaterials for advanced energy applications, Electrode materials for batteries, and Supercapacitors, Magnetic nanomaterials
- 2. Advanced Nanocomposite Materials for Solar Thermal Energy Storage Applications
- 3. Polymer Electrolytes Application to batteries, sensors, Energy storage and Nanotechnology
- 4. Polymer electrolytes for battery applications
- 5. Nanomaterials Synthesis, Polymer Composite, and Bioelectronics Devices
- 6. Nuclear and particle physics study.



DETAILS OF THE EQUIPMENT



ELECTROCHEMICAL WORKSTATION MAKE AND MODEL: CHI 660E 2016

Applications: To measure Cyclic Voltammetry, LSV Chronopotentiometry studies, Corrosion studies

Users: All scholars, faculty of Physics, Chemistry, ECE, BT, CE and ME departments are using it for measuring Cyclic Voltammetry, LSV, Chronopotentiometry studies, Corrosion studies of their materials.

> **LCR METER** MAKE AND MODEL: LCR METER IM3536

Applications: Measurement frequency of DC, 4 Hz to 8 MHz.

Users: All scholars, faculty of Physics, Chemistry, ECE, BT, CE and ME departments are using it for measuring the electrical properties of their

materials





HIGH TEMPERATURE ELECTRICAL FURNACE (1200°C) MAKE AND MODEL: Indigenous, VB Ceramics, Chennai-2016

Applications: For heating the samples up to 1200°C

Users: All students, scholars, faculty of all departments are using it for annealing, their synthesized materials.

> SPECTROFLUOROMETER (200-900NM) MAKE AND MODEL: JASCO FP-8300 PL, 2017

Applications: To measure fluorescence properties of some compounds, PL and decay measurement in visible region.

> Users: All students, scholars, faculty of Physics, Chemistry, ECE, BT departments are using it for PL measurements in visible region.





ELECTRO SPINNING UNIT MAKE AND MODEL: SIEMENS ROYAL-2016

Applications: To synthesize nanofiber materials for thin film and nano applications.

Users: All scholars, faculty of Materials Science, Physics, Chemistry, BT and ECE departments are using it for synthesizing nanofiber materials.

SPRAY PYROLYSIS

MAKE AND MODEL: Indigenous, VB Ceramics, Chennai- 2016

Applications: To synthesis thin and thick films nano materials, ceramic coatings, and powders

Users: All scholars, faculty of Physics, Chemistry, BT, ECE departments are using it for synthesis of thin film materials.



TEAM MEMBERS



Dr. A. Venkateswara RaoAssistant Professor, Department of Physics,
K L E F, Vaddeswaram
Advanced functional Nano-materials for energy
storage devices and Nano ferrite materials



Dr. S. ShanmuganAssistant Professor Department of Physics,
K L E F, Vaddeswaram
Advanced Nanocomposite Materials for Solar
Thermal Energy Storage Applications



Dr. G. Sunita SundariAssociate Professor, Department of Physics, K L E F, Vaddeswaram
Polymer Electrolytes Application to batteries, sensors, Energy storage and Nanotechnology



Dr. M.Gnana KiranAssistant Professor, Department of Physics,
K L E F, Vaddeswaram
Polymer electrolytes for battery applications



Dr. Sonali BiswasAssistant Professor, Department of Physics,
K L E F, Vaddeswaram
Nanomaterials Synthesis, Polymer Composite, &
Bioelectronics Devices



Dr. HushnudAssistant Professor, Department of Physics,
K L E F, Vaddeswaram
Nuclear and particle physics

OUR COLLABORATORS



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IIT Guwahati, Guwahati



Dr. Sunita Keshri Birla Institute of Technology, Mesra, Ranchi, India



Ph.D's AWARDED

Regd. No	Scholar Name	Thesis Title	Guide	Awarded Year
13322003	Sk. shahenoor basha	Preparation characterization and electrochemical studies of pvp based ion conducting polymer electrolytes for solid state battery application	Dr. K Vijay Kumar, Dr. G Sunita Sundari	2017
13322013	K sunil babu	Synthesis and characterization, phase transition and optical studies of some 60.0 liquid crystalline compounds		2019
14322003	K. Kamakshi	Photocatalytic activity of Ni ²⁺ and CO ²⁺ doped magnetite decorated on carbonaceous materials towards degradation of methylene blue	Dr. G. Sunita Sundari	2020
13322007	P. Suneeta	Synthesis and characterization of rare earth and transition metal doped CaWo ₄ nanocrystals for light emitting applications	Dr. Ch. Rajesh	2021
15322006	R. Ajay Kumar	Characterization of nanocrystals for light emitting applications	Dr. Ch. Rajesh	2021
14322009	Md.parvez Ahmad	Influence of particle size, hydrogen annealing and carbon doping on the dielectric properties of zinc oxide at low temperatures		2022
14322008	Hema Chandra Rao Bitra	Low temperature dielectric study of carbon and manganese doped copper oxide	Dr. A. Venkateswara Rao	2023
163220012	Investigation of the change in structural, magnetic, electrical and anti-bacterial properties of Neodymium (Nd³+), Gadolinium (Gd³+) and Erbium (Er³+) doped Cobalt Ferrite nanomaterials		2024	



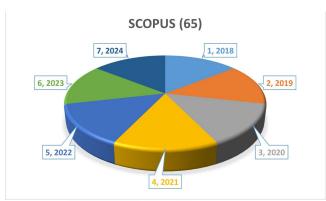
HIGHLIGHTS OF RESEARCH CENTRE

Advanced Functional Materials Research Centre mainly focused on Synthesis, study and fabrication of devices at the nanoscale (1-100 nanometers) to exhibit specific functions and to enhance the properties compared to their bulk counterparts. These unique properties arise from their high surface area-to-volume ratio and quantum effects. Nanomaterials possess distinct sizes and shapes that influence their properties. They can be made of various materials, including metals, ceramics, polymers, and carbon. Their surfaces can be modified with specific molecules to achieve desired functionalities.

Sponsored projects completed	04 (DST SERB, DST-WOS, UGC-DAE, Scheme worth 110.85 Lakhs)		
Sponsored Projects ongoing	01 (DST SERB-EMEQ Scheme worth 26.78 Lakhs)		
Number of Research	176 (Q1:77, Q2:54)		
Publications			
Number of Ph.Ds awarded	08		
Number of Ph.Ds ongoing	07		
Number of Patents Published	11		
International Conference conducted	05		
Awards & Recognition	Top 2% Scientist of the world Award form		
	Standford University (2021, 2022, 2023, 2024),		
	Best Teacher Awards (2022,2024), International		
	Outstanding Research Excellence Award (2024)		
UG, PG Students Publications	11 (Q1 & Q2)		
Prototype developed	Energy Storage Device and Production water		
	prototype		
Number of Book Chapters	05		
Number of Citations	1284		
H-Index	16		
i-10 Index	26		

PUBLICATION ANALYTICS





2015	2016	2017	2018	2019
WoS-3	WoS-5	WoS-5	WoS-12	WoS-13
Scopus-4	Scopus-3	Scopus-4	Scopus-6	Scopus-11
2020	2021	2022	2023	2024
WoS-34	WoS-31	WoS-28	WoS-27	WoS-26
Scopus-9	Scopus-9	Scopus-12	Scopus-9	Scopus-9

SPONSORED RESEARCH PROJECTS

FACULTY (PI)	PROJECT TITLE	FUNDING AGENCY	COST IN INR LAKHS	STATUS
Dr. N Krishna Jyothi	Developmentand characterization of Nano structured conducting polymer electrolyte system for electrochemical cell applications	SR/WOS-A/PS- 52/2011	23.80	Completed
Dr. A. Venkateswara Rao	Synthesis, characterization and evaluation of nanostructured spinel thin film $\operatorname{LiMn_2O_4}$ cathode active materials with heterovalent multi-ion insertion: Application for rechargeable microbatteries	SB/FTP/ETA- 0176/2014	37.54	Completed
Dr.Ch. Rajesh	Electron energy level estimation of diluted magnetic quantum nano hetero structures.		34.51	Completed
Development of Ion Conducting Polymer Electrolyte using thin film Nano Crystalline Composites for the Application towards Batteries		CSR-KN/ CRS- 120/2018- 19/1058	15	Completed
Dr. A. Venkateswara Rao	Fabrication and performance of Supercapacitors employing nano Metal Organic Frame Works	EEQ/2023 /001042	26.78	On going



COLLABORATIVE PUBLICATIONS

- A technical appraisal of solar photovoltaic-integrated single slope single basin solar still for simultaneous energy and water generation, S. Shanmugan, Karrar A. Hammoodi, T. Eswarlal, P. Selvaraju, Samir Bendoukha, Nabil Barhoumi, Mohamed Mansour, H.A. Refaey, M.C. Rao, Abdel-Hamid I. Mourad, Manabu Fujii, Ammar Elsheikh, Case Studies in Thermal Engineering, 54, (2024) 104032.SDG:12
- Thermal investigation of a solar box-type cooker with nanocomposite phase change materials using flexible thermography, G. Palanikumar, S. Shanmugan, V. Chithambaram, Shiva Gorjian, Catalin I. Pruncu, F.A. Essa, A.E. Kabeel, Hitesh Panchal, B. Janarthanan, Hossein Ebadi, Ammar H. Elsheikh, P. Selvaraju, Renewable Energy 178, 2021, Pages 260-282 SDG:7
- 3. Maximizing sustainable hydrogen and ZnO nanoparticles production from Goshala wastes with nanoparticles of ZnSo4 and NaBH4, A. Vijayalakshmi, Radhey Shyam Meena, Vinay Kumar Domakonda, A. Venkateswara Rao, T. Sathish, Ümit Agbulut, M. Rajasimman, Sang-Woo Joo h, Yasser Vasseghian, Fuel 349 (2023) 128625, **SDG:6,11,12**
- 4. Structural, dc electrical resistivity and magnetic investigation of Mg, Ni, and Zn substituted Co-Cu nano spinel ferrites, D. Parajuli, N. Murali, A. Venkateswara Rao, A. Ramakrishna, Yonatan Mulushoa S, K. Samatha South African Journal of Chemical Engineering, 42 (2022) 106-114 SDG:9
- 5. La and Ni Co-doping Effect in LiMn₂O₄ on Structural and Electrochemical Properties for Lithium-Ion Batteries M. Madhu, A. Venkateswara Rao, Sankararao Mutyala Journal of Electronic Materials, 50, (2021) 5141–5149 , **SDG :9**
- 6. Investigation of low temperature dielectric properties of manganese doped copper oxide nanoparticles by coprecipitation method, H. C. Rao Bitra, A. V. Rao, A.G.S. Kumarb, G. N. Rao Digest Journal of Nanomaterials and Biostructures, 16, 3, (2021) 1173. **SDG**:9
- 7. Ion conduction property and electrochemical characteristics of Ag-ion gel polymer electrolyte, V. Parthiban, G. Sunita Sundari, C.V.S. Brahmananda Rao, Harikrishna Erothu, 298, September-October 2023, 117416. **SDG :9**
- Experimental investigation on surface characteristics of Ti6 Al 4 V alloy during abrasive water jet machining process. Waheed Sami Abushanab, Essam B Moustafa, Mooli Harish, S Shanmugan, Ammar H Elsheikh. Alexandria Engineering Journal 61(10) (2022), 7529-7539.
 SDG:8
- 9. Performance assessment of a novel solar distiller with a double slope basin covered by coated wick with lanthanum cobalt oxide nanoparticles. EmadIsmatGhandourah, A Sangeetha, S Shanmugan, Mohamed E Zayed, Essam B Moustafa, Abdelouahed Tounsi, Ammar H Elsheikh. Case Studies in Thermal Engineering 32 (2022), 101859. **SDG**:9
- 10. Experimental enhancement of tubular solar still performance using rotating cylinder, nanoparticles' coating, parabolic solar concentrator, and phase change material. FA Essa, AS Abdullah, Wissam H Alawee, A Alarjani, Umar F Alqsair, S Shanmugan, ZM Omara, MM Younes. Case Studies in Thermal Engineering 29 (2022), 101705. **SDG**:9



PATENTS

PATENT TITLE	NAME OF APPLICANT (S)	PATENT NO.	AWARDED DATE
Entropy based image retrieval method for faster retrieving of images	Mrs.K. Saraswathi, Dr. S. Shanmugan,	202041028523	17/07/2020
Method for facile synthesizing hetero structure Nio- ${\rm SnO_2}$ nanocomposite for selective electrochemical determination cysteine	Dr. G. Murugadoss, Dr. K. Tirupathi, Dr. C. Meganathan, Dr. S. Shanmugan, Dr.V.Chithambaram	202141050557	19/11/2021
A novel High Silica glass composition and method thereof	Dr. Y. Anantha Lakshmi, Dr. S. Shanmugan	202241042300	19/08/2022
Synthesis of Super hydrophobic Silica Nanoparticles and method for preparing Non-stick paint by using same	Dr. Y. Raja Jaya Rao, Dr. S. Shanmugan,	202241047698	23/09/2022
A method for division of lithium battery microstructure strengthened with artificial electrodes by deep learning	Dr.A.Venkateswara Rao	202241063519	11/11/2022
Device to Discharge Ferrite Nanoparticle Medication	Dr. G Sunita Sundari	375030-001	03/12/2022
A novel nanocomposite double slope U shape stepped basin solar still	Dr. S. Shanmugan, A. Sangeetha, Dr. Sunitha Sundari	202341011596	17/03/2023
Green technologies for synthesizing nanomaterials with a focus on metal as well as metal oxide	Dr. A. Venkateswara Rao D. Naga Prasuna	202321032567	16-06-2023
Polyaniline & Polyester Nanocomposites Analysis Device	Dr. G Sunita Sundari	391515-001	29/07/2023
Water Purifying Nano Dipping Device	Dr. G Sunita Sundari	412503-001	04/04/2024



TOP 10 PUBLICATIONS

- Optimizing solar still performance: A study of TiO₂ nanofluid derived from Saccharum officinarum L. Separation and Purification Technology, Durga Prasad Kotla, Venkateswara Rao Anna, Seepana Praveenkumar, Sayed M. Saleh, S. Shanmugan, 359, 22 (2025), 130584. (IF 8.2, SDG: 6)
- 2. Production of oxy-hydrogen with an alkaline electrolyzer, and its impacts on engine behaviors fuelled with diesel/waste fish biodiesel mixtures supported by graphene nanoparticles, A.S. El-Shafay, Ümit Ağbulut, S. Shanmugan, M.S. Gad, Energy Volume 314, 1 January 2025, 133934. (IF 9.0, SDG: 6,11)
- 3. Evaluating the effects of sugarcane juice-mediated ZnO nanofluids on solar light activation for enhancing double-slope solar still performance, Gali Sai, Venkateswara Rao Anna, K. Swapna, M V K Srinivas Prasad, Raghava Prasad Ch, B. Chaitanya Krishna, Venkata Naresh Mandhala, B T P Madhav, Seepana Praveenkumar, Sayed M. Saleh, M.C. Rao, S. Shanmugan, Applied Materials Today, 42 (2025) 102542. (IF 7.2, SDG: 7,11,14)
- 4. Maximizing sustainable hydrogen and ZnO nanoparticles production from Goshala wastes with nanoparticles of ZnSo₄ and NaBH₄, A. Vijayalakshmi, Radhey Shyam Meena, Vinay Kumar Domakonda, A. Venkateswara Rao, T. Sathish, Ümit Agbulut, M. Rajasimman, Sang-Woo Joo h, Yasser Vasseghian, Fuel, 349 (2023) 128625 (IF 6.7, SDG:6,11,12)
- 5. Cr^{3+} Substitution Influence on Structural, Magnetic and Electrical Properties of the $Ni_{0.3}Zn_{0.5}Co_{0.2}Fe_{2-x}CrO_4$ (0.00 \leq x \leq 0.20) nanosized spinel ferrites M.Madhu, A.Venkateswara Rao, D.Parajuli, S.Yonatan Mulushoa, N.Murali. Inroganic chemistry communications, 143 (2022) 109818 (IF 4.4, **SDG:9**)
- Structural, electrical and electrochemical studies on doubly doped LiMn_{2-x}(GdNi)_xO₄ cathode materials for Li-ion batteries, A. Venkateswara Rao, B.Ranjith Kumar, Materials Letters, 227 (2018) 250 (IF 2.7, SDG: 7,11)
- 7. Ion conduction property and electrochemical characteristics of Ag-ion gel polymer electrolyte, V. Parthiban, G. Sunita Sundari, C.V.S. Brahmananda Rao, Harikrishna Erothu, Synthestic Metals, 298, (2023) 117416. (IF 4, **SDG: 7**)
- 8. Modulating ZnO Nanoparticle Photoluminescence through Ce³⁺-Induced Defect Engineering: A Study of Microstructural and Spectroscopic Properties, S. Biswas, A.Venkateswara Rao, Dharani Kolli, Ceramics International. https://doi.org/10.1016/j.ceramint.2024.12.278, 2024 (IF 5.1, SDG: 6,7,11)
- 9. Studies on characteristic properties of superparamagnetic La_{0.67}Sr_{0.33-X}K_xMnO₃ nanoparticles, Sonali Biswas, Sunita Keshri, Piotr Wiśniewski, Journal of Alloys and Compounds, 656, (2016) 245.(IF 5.8, **SDG: 6,11**)
- 10. Enhancing trays solar still performance using wick finned absorber, nano- enhanced PCM. AS Abdullah, ZM Omara, Fadl A Essa, Umar F Alqsair, MutabeAljaghtham, Ibrahim B Mansir,S.Shanmugan, Wissam H Alawee. Alexandria Engineering Journal 61(12) (2022), 12417-12430, (IF=7.188, SDG:7,9,11).



LIST OF PUBLICATIONS

- 1. Influence of Zr⁴⁺ doping on structural, spectroscopic and conductivity studies of Lithium Titanium Phosphate, Venkateswara Rao.A; V.Veeraiah.; A.V.Prasada Rao.; B.Kishore Babu, K.Vijaya Kumar, Ceramics International, 40 (2014) 13911.
- 2. Optimizing solar still performance: A study of TiO² nanofluid derived from Saccharum officinarum L.Separation and Purification Technology, Durga Prasad Kotla, Venkateswara Rao Anna, Seepana Praveenkumar, Sayed M. Saleh, S. Shanmugan, Volume 359, 22 (2025) 130584.
- Structural, electrical and electrochemical studies on doubly doped LiMn_{2-x}(GdNi)_xO₄ cathode materials for Li-ion batteries, A. Venkateswara Rao, B.Ranjith Kumar, Materials Letters, 227 (2018) 250
- 4. Production of oxy-hydrogen with an alkaline electrolyzer, and its impacts on engine behaviors fuelled with diesel/waste fish biodiesel mixtures supported by graphene nanoparticles, A.S. El-Shafay, Ümit Ağbulut, S. Shanmugan, M.S. Gad, Energy 314, (2025) 133934.
- 5. Evaluating the effects of sugarcane juice-mediated ZnO nanofluids on solar light activation for enhancing double-slope solar still performance, Gali Sai, Venkateswara Rao Anna, K. Swapna, M V K Srinivas Prasad, Raghava Prasad Ch, B. Chaitanya Krishna, Venkata Naresh Mandhala, B T P Madhav, Seepana Praveenkumar, Sayed M. Saleh, M.C. Rao, S. Shanmugan, Applied Materials Today, 42, (2025) 102542.
- 6. Ion conduction property and electrochemical characteristics of Ag-ion gel polymer electrolyte, V. Parthiban, G. Sunita Sundari, C.V.S. Brahmananda Rao, Harikrishna Erothu, 298, (2023) 117416
- 7. ZnO/nZVI nanoparticle-enhanced double-slope U-shaped solar distillation: A thermodynamic investigation of cephalexin adsorption, A. Sangeetha, S. Shanmugan, Abdulaziz Alasiri, Materials Today Sustainability 28, (2024) 100983.
- 8. Enhancing desalination performance of a stepped solar still using nano-enhanced phase change material and condenser integration. Bahaa Sale, Mohamed H. Ahmed, S. Shanmugan, Ammar H. Elsheikh, Mahmoud S. El-Sebaey, Mogaji Taye Stephen, Sunday O. Oyedepo, Vijayanandh Raja, Fadl A. Essa, Solar Energy Materials and Solar Cells, 277, (2024) 113141.
- 9. Improving thermal efficiency of solar stills: Bioactive nano-PCM and Cramer's rule analysis, Mohammed Almeshaal, S. Shanmugan, Separation and Purification Technology 343, (2024) 127119.
- 10. Cr^{3+} Substitution Influence on Structural, Magnetic and Electrical Properties of the $Ni_{0.3}Zn_{0.5}Co_{0.2}Fe_{2-x}CrO_4$ (0.00 \leq x \leq 0.20) nanosized spinel ferrites M.Madhu, A.Venkateswara Rao, D.Parajuli, S.Yonatan Mulushoa, N.Murali. Inroganic chemistry communications, 143 (2022) 109818

ACHIEVEMENTS

- ▶ Dr.S.Shanmugan, Received Top 2% scientist of the world from K L University in the association of Standford University for A.Y 2021-22, A.Y 2022-23, A.Y 2023-2024.
- > Dr.A.Venkateswara Rao, Received Best Teacher award from K L University in for A.Y 2014-15.
- Dr.A.Venkateswara Rao Received BEST RESEARCHER award from INSO, 2022.
- Dr.A.Venkateswara Rao Received Best Teacher award from K L University in for A.Y 021-22
- Dr.G.Sunita Sundari, Received Associate fellow award from Govt of Andhra Pradesh in 2022.
- > Dr.S.Shanmugan, Received Best Teacher award from K L University in for A.Y 2021-22.



Top 2% scientist of the world



Best Teacher Award



Associate fellow award from Govt of A.P.



Double Slope-U-Shaped Solar Still Prototype Making

ACHIEVEMENTS





- Students and the faculty from Maris Stella College, Vijayawada, had the valuable opportunity to visit the KL (Deemed to be) University, Vaddeswaram and Guntur, explored its state—of-the-art materials in Glass and Nanoscience (AFMRC) research laboratories.
- Krishna University students of M. Sc Physics have completed their 6 weeks internship from the AFMRC, L601 on Nano materials for environmental applications.

NAME OF INTERNATIONAL CONFERENCE	DATE	WEB LINK OF EVENT
International virtual conference on Smart Advanced Material Science & Engineering Applications - 2020 (IVCSAMSEA-2020)	03 rd - 05 th December, 2020	https://www.kluniversity.in/ physics/ IVCSAMSEA-2020/ contact.aspx
International virtual conference on Advanced Functional Materials (ICAFM-2021)	13 th -15 th December, 2021	https://www.kluniversity.in/ physics/ icafm-2021/
International virtual conference on Advanced Functional Materials	1 st -3 rd December, 2022	https://www.kluniversity.in/ physics/ ICAFM%202022/
International conference on Advanced Functional Materials for Sustainable Energy Applications (ICAFMSA-2023)	6 th - 8 th December, 2023	https://www.kluniversity.in/ physics/ icafmsa-2023/
International Conference on Advanced Nanomaterials for Energy Storage Applications (ICANEA-2024)	19 th - 21 st December, 2024	https://www.kluniversity.in/ physics/icanea-2024/





















