



(DEEMED TO BE UNIVERSITY)



**CATEGORY 1
UNIVERSITY**
BY MHRD, Govt. of India

**KL ACCREDITED BY
NAAC WITH A++
GRADE**

nirf
2024
NATIONAL
INSTITUTIONAL
RANKING
FRAMEWORK

**RANKED 22
AMONG ALL
UNIVERSITIES**

**45 YEARS OF
EDUCATIONAL
LEADERSHIP**

DEPARTMENT OF PHYSICS



ADVANCED MATERIALS RESEARCH CENTER

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Overview:

AMRCEstablished in 2012 with aim of developing Novel Glasses, Glass ceramics, Phosphors and Nano Phosphors for Photonic and Bio-imaging Applications.

The prime focus of this group is to synthesize the rare earth doped glasses/glassy ceramics/phosphors/nano-phosphors using various possible techniques and characterizing them for their physical, structural, morphological, absorption and luminescence properties using conventional spectroscopic techniques such as XRD, FE-SEM, UV-Vis-NIR absorption, photoluminescence (PL) and PL decay measurements. XRD and FE-SEM are used to understand the structural and morphological assessment. Absorption, PL and PL decay measurements were used to understand the radiative properties and photo-luminescence properties. Different theoretical models such as Judd-Ofelt, Inokuti-Hirayama and Yokota-Tanimoto were employed in the aforementioned material characterization. Though there are many reports on rare earth doped glasses for laser, fiber amplifiers, photonic devices, still there is a great need for the identification and optimization of efficient host materials. In order to develop/prepare more and more lasers, fiber amplifier materials, photonic devices there is a lot of requirements to investigate/optimize the different glasses/glassy ceramics/phosphors/nano-phosphors doped with certain rare earths for practical device applications.

Vision:

To Establish advanced material research center as that can be recognized for its contributions to science, industry, society and also to adopt a collaborative environment where physicists, chemists, engineers, and material scientists work together to drive breakthroughs.

Mission:

1. To Develop Novel materials with enhanced properties for photonic applications across various industries
2. To establish sophisticated laboratories under the excellence center in all the allied research domains of Glass Science & Phosphors Research to achieve 100% financial reliance through industrial consultancy and collaborations by promoting Quality Research.
3. To enhance Interdisciplinary Collaboration between scientists, engineers, and industrial experts to accelerate material discovery and implementation.
4. To provide technical training for research faculty to bridge the gap between Research and Industry

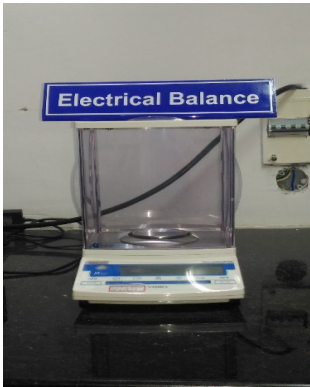
Objectives:

1. To develop novel rare earth doped glasses/glass ceramics for Lasers & Optical fiber amplifiers.
2. To fabricate novel lanthanide ions doped Phosphors for photonic device applications.
3. To synthesize and develop Up-conversion nano-phosphors for photonic & Bio-imaging applications.




Key Research Areas

- Glasses for laser and optical fiber Applications
- Glass ceramics for laser and optical fiber Applications
- Phosphors for Photonic Device applications
- Nano-Phosphors for photonic & bio-imaging applications




RESEARCH EQUIPMENT DETAILS

S.No	Name of the Equipment	Description	Images
1	Electronic Balance with density measurements	<p>For Weighing materials as per their stoichiometric proportions</p> <p>Users: All Students, Scholars, faculty and all departments can use it for weighing the chemicals for research.</p>	

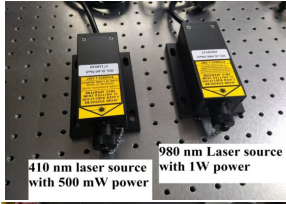

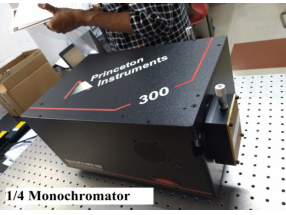

RESEARCH EQUIPMENT DETAILS

S.No	Name of the Equipment	Description	Images
2	High temperature electrical furnace (1700°C)	<p>Synthesis of Materials</p> <p>Users: All students, scholars, faculty of all departments can use it for heating, calcining and sintering of their synthesized materials.</p>	
3	High temperature electrical furnace (1400°C)	<p>Synthesis of Materials</p> <p>Users: All students, scholars, faculty of all departments can use it for heating, calcining and sintering of their synthesized materials.</p>	
4	High temperature electrical furnace (1000°C)	<p>Annealing of prepared materials</p> <p>Users: All students, scholars, faculty of all departments can use it for heating, calcining and sintering of their synthesized materials.</p>	



RESEARCH EQUIPMENT DETAILS

S.No	Name of the Equipment	Description	Images
5	Abbe Refractometer	<p>Measurement of Refractive index</p> <p>Users: All students, scholars, faculty of all departments can use it for measuring refractive index materials.</p>	
6	JASCO VL-670 Absorption spectrophotometer (200-2700nm)	<p>Absorption measurements</p> <p>Users: All scholars, faculty of Physics, Chemistry, BT, ME, ECE departments are using it for measuring absorption of materials.</p>	
7	JASCO FP-8300 PL Spectrofluorometer (200-900nm)	<p>PL and decay measurement in visible region</p> <p>Users: All scholars, faculty of Physics, Chemistry, BT, ME, ECE departments are using it for measuring PL and lifetime of materials.</p>	

RESEARCH EQUIPMENT DETAILS

S.No	Name of the Equipment	Description	Images
8	Lasers (410 nm and 980 nm) with all optical accessories	Excitation sources for NIR and Up-conversion studies PL and decay measurement in visible region	 
9	Princeton Instrument SpectraPro HRS-300 PL Spectrofluorometer (200-1700nm)	Users: All scholars, faculty of Physics, Chemistry, BT, ME, ECE departments are using it for measuring absorption of materials.	
10	Magnetic Stirrer with Hot plate (2500 RPM and 300°C)	For the synthesis of nano materials Users: All Students, Scholars, faculty and all departments can use it for synthesizing the materials for research.	

RESEARCH EQUIPMENT DETAILS

S.No	Name of the Equipment	Description	Images
11	Hot Air Oven	<p>In the synthesis of nano materials, hot air oven is used to dry the material that is obtained after stirring, filtering and washing</p> <p>Users: All students, scholars, faculty of all departments can use it for heating, their synthesized materials.</p>	
12	Vacuum Oven	<p>Vacuum oven is required to free the sample from Moisture</p> <p>Users: All students, scholars, faculty of all departments can use it for heating, their synthesized materials.</p>	

RESEARCH CENTER GROUP MEMBERS

S.No.	Name of the Group Member	Research Credentials
	Dr.K.Swapna Head of the Department & Associate Professor Department of Physics KL University	<ul style="list-style-type: none"> ❖ No. of Publications: 78 ❖ Projects:05 (a) Completed:03 (b) Ongoing:02 ❖ Patents: 03 ❖ PhD Awarded: 04 ❖ Citations: 3092 ❖ h-index: 30 ❖ i10-index: 50
	Dr. Sk. Mahamuda Associate Professor & RPAC Department of Physics KL University	<ul style="list-style-type: none"> ❖ No. of Publications: 81 ❖ Projects: 05 (a) Completed:02 (b) Ongoing: 03 ❖ Patents: 06 ❖ PhD Awarded: 03 ❖ Citations: 3128 ❖ h-index: 31 ❖ i10-index: 58
	Dr. M. Venkateswarlu Assistant Professor Department of Physics KL University	<ul style="list-style-type: none"> ❖ No. of Publications: 60 ❖ Patents: 04 ❖ PhD Awarded: 01 ❖ Citations: 1753 ❖ h-index: 25 ❖ i10-index: 42
	Dr.MVVKS Prasad Assistant Professor Department of Physics KL University	<ul style="list-style-type: none"> ❖ No. of Publications: 33 ❖ Patents: 01 ❖ PhD Awarded: 03 (ongoing) ❖ Citations: 446 ❖ h-index: 10 ❖ i10-index: 12 ❖ No. of Books/chapters: 01

SCHOLARS INFORMATION

Ph.D's Awarded -12

S.No	Name Of the Scholar	ID Number	Name of the Supervisor (s)	Year of Registration	Year of Award
1	Mahamuda Shaik	10322004	Dr.A.Srinivasa Rao	2010	2015
2	Koneru Swapna	10322002	Dr.A Srinivasa Rao	2010	2015
3	M. Venkateswarlu	10322005	Dr.A. Srinivasa Rao	2010	2016
4	Ch.B.Annapurna Devi	12322003	Dr.A.Srinivasa Rao	2012	2018
5	Rupesh Amrut Talewar	173220002	Dr.SK. Mahamuda	2017	2021
6	P. Rekha Rani	163220003	Dr. M.Venkateswarlu	2016	2021
7	Kasu Siva Rama Krishnakrishna Reddy	163220007	Dr. K. Swapna	2017	2022
8	P. Sailaja	163220013	Dr. Sk. Mahamuda	2017	2022
9	Y. Anantha Lakshmi	163220004	Dr. K. Swapna	2016	2022
10	P. Surendra Reddy	14322013	Dr. K. Swapna	2014	2023
11	V. Murali Krishna	15322005	Dr.SK. Mahamuda	2015	2024
12	M. Chandrika	16220009	Dr. K. Swapna	2016	2024

Ongoing Ph.D's : 13

Sno	Regd No	Name of the Scholar	Supervisor
1	173220008	K D Ramesh Kondapalli	Dr. K. Swapna
2	2102520001	Ch Pravallika	Dr. K. Swapna
3	2402520001	P Lakshmi Tirupatamma	Dr.Sk. Mahamuda
4	2002521001	Golla Muralidhar	Dr. Sk. Mahamuda
5	2002521004	Satya Narayana Rao Poram	Dr. Sk. Mahamuda
6	2202520001	G Deddepya	Dr. Sk. Mahamuda
7	173220004	Akinapally Naveen	Dr.M.Venkateswarlu
8	163220005	Sumalatha Chenna	Dr.M.Venkateswarlu
9	14322007	Veerubhotla Rama Linga Murty	Dr.M.Venkateswarlu
10	2302520001	Gollapudi Venkata Rajya Lakshmi Prasad	Dr. M.Venkateswarlu
11	183220001	Gunjan Mahajan	Dr. M.V.V.K Srinivas Prasad
12	183220002	Seshulatha Kodali	Dr. M.V.V.K Srinivas Prasad
13	2002523101	S. Rafeek Ahmed (EMR)	Dr. M V V K.Srinivas Prasad

M.Sc Students Projects:

Sno	Name Of the Student	Branch	Supervisor
1	AHD Praksh	M.Sc Physics	Dr. Sk. Mahamuda
2	G Sneghitha	M.Sc Physics	Dr. M.Venkateswarlu
3	V Balaji	M.Sc Physics	Dr. Sk. Mahamuda
4	G Raji	M.Sc Physics	Dr. K. Swapna
5	Syed Nasreen	M.Sc Physics	Dr. Sk. Mahamuda
6	K. Chandrika	M.Sc Physics	Dr. M.Venkateswarlu

HIGHLIGHTS OF RESEARCH CENTER



Research Achievements

Project Implementation Group Members
Dr.K.Swapna
Dr. Mahamuda Shaik

DST-FIST Level-I (107 Lakhs)

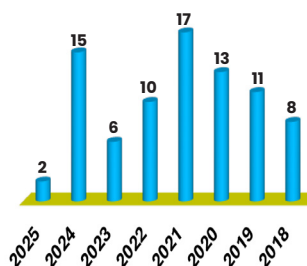
DST-PURSE (10 Crores)



SPONSORED RESEARCH PROJECTS OF GROUP MEMBERS

S. No	Faculty (PI)	Project Title	Funding Agency & Duration	Cost in INR Lakhs
1	Dr. K Swapna	Absorption and Emission Characteristics of rare-earth doped glasses for efficient lasers	DST/WOS-A 2011- 2014	22.70
2	Dr.Sk.Mahamuda	Spectral Studies of Neodymium doped glass and glass ceramics for efficient laser action	DST/WOS-A 2012-2015	14.98
3	Dr.K.Swapna	Spectral Characterization of RE ion doped telluride glasses for opto electronic device applications	DST/SERB –ECR 2016-2019	44.70
4	Dr.Sk.Mahamuda	Preparation and Characterization of Rare Earth ions doped Oxide, Fluoride and Oxy-fluoride Glasses/Glassy Ceramics for Fiber Lasers and Optical Fiber Amplifiers	DST/SERB-ECR 2016-2019	52.03
5	Dr.Sk.Mahamuda (PI) & Dr.K.Swapna (Co-PI)	Fabrication of Rare Earth ions doped Up-Conversion Nano-phosphors - A fluorescent probe for Bio-imaging Applications	DST-SERB/CRG 2023-26	31

PUBLICATION ANALYTICS



TOP 10 PUBLICATIONS BASED ON CITATIONS

S.No	Authors	Title of the Publication	Name of the Journal	Citations
1	Ramesh K.K.D.; Kiran Kumar G.; Swapna K.; Datta D.; Suman Rajest S.	A review of medical image segmentation algorithms	EAI Endorsed Transactions on Pervasive Health and Technology	157
2	Swapna K.; Mahamuda S.; Srinivasa Rao A.; Shakya S.; Sasikala T.; Haranath D.; Vijaya Prakash G.	Optical studies of Sm ³⁺ ions doped Zinc Alumino Bismuth Borate glasses	Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy	137
3	Swapna K.; Mahamuda S.; Rao A.S.; Sasikala T.; Packiyaraj P.; Moorthy L.R.; Prakash G.V.	Luminescence characterization of Eu ³⁺ doped Zinc Alumino Bismuth Borate glasses for visible red emission applications	Journal of Luminescence	137
4	Mahamuda S.; Swapna K.; Venkateswarlu M.; Srinivasa Rao A.; Shakya S.; Vijaya Prakash G.	Spectral characterisation of Sm ³⁺ ions doped Oxy-fluoroborate glasses for visible orange luminescent applications	Journal of Luminescence	134
5	Deopa N.; Rao A.S.; Mahamuda S.; Gupta M.; Jayasimhadri M.; Haranath D.; Prakash G.V.	Spectroscopic studies of Pr ³⁺ doped lithium lead alumino borate glasses for visible reddish orange luminescent device applications	Journal of Alloys and Compounds	111
6	Swapna K.; Mahamuda S.; Srinivasa Rao A.; Jayasimhadri M.; Sasikala T.; Rama Moorthy L.	Optical absorption and luminescence characteristics of Dy ³⁺ doped Zinc Alumino Bismuth Borate glasses for lasing materials and white LEDs	Journal of Luminescence	110
7	Rekha Rani P.; Venkateswarlu M.; Mahamuda S.; Swapna K.; Deopa N.; Rao A.S.	Spectroscopic studies of Dy ³⁺ ions doped barium lead alumino fluoro borate glasses	Journal of Alloys and Compounds	106
8	Mahamuda S.; Swapna K.; Srinivasa Rao A.; Jayasimhadri M.; Sasikala T.; Pavani K.; Rama Moorthy L.	Spectroscopic properties and luminescence behavior of Nd ³⁺ doped zinc alumino bismuth borate glasses	Journal of Physics and Chemistry of Solids	88
9	Rani P.R.; Venkateswarlu M.; Mahamuda S.; Swapna K.; Deopa N.; Rao A.S.; Prakash G.V.	Structural, absorption and photoluminescence studies of Sm ³⁺ ions doped barium lead alumino fluoro borate glasses for optoelectronic device applications	Materials Research Bulletin	86
10	Swapna K.; Mahamuda S.; Rao A.S.; Sasikala T.; Moorthy L.R.	Visible luminescence characteristics of Sm ³⁺ doped Zinc Alumino Bismuth Borate glasses	Journal of Luminescence	83

TOP JOURNALS WITH HIGH IMPACT FACTORS

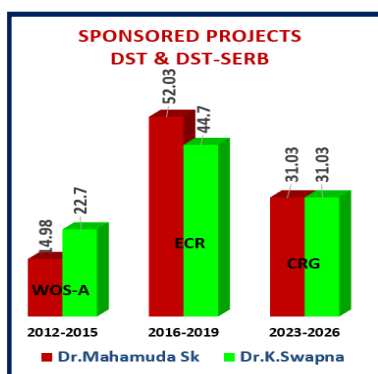
Name of the Journal	Impact factor	Quartile
Journal of Alloys and Compounds	5.8	Q1
Materials Research Bulletin	5.3	Q1
Optics & Laser Technology	4.6	Q1
Spectrochimica Acta A	4.3	Q1
Material Science & Engineering B	3.9	Q2
Optical Materials	3.8	Q1
Solid State Sciences	3.4	Q2
Journal of Luminescence	3.3	Q2
Journal of Non-Crystalline Solids	3.2	Q2
Radiation Physics & Chemistry	2.8	Q1

PUBLICATIONS MEET 6 SDG'S

SUSTAINABLE DEVELOPMENT GOALS



ACHIEVEMENTS



Research Publications : 103

Ph.D's Awarded: 12

Research Scholars: 13

Patents Published: 14

COLLABORATORS



Prof. A.S. Rao
DTU, New Delhi



**Mohammed Sultan
Al-Buriah**



Prof. G.V. Prakash
IIT Delhi



Prof. Haranadh
NIT Warangal



Dr. D. Ramachari
Vietnam

EVENTS & ACHIEVEMENTS

- Women Scientist Fellowships
- Early career Research Awards
- Core Research Grant
- Research Excellence Awards
- Reviewers for International Journals
- Best Teacher Awards

**National Conference
(NAFP-2024)
5th-6th Jan 2024**



NOVEL GLASSES

1. $\text{ZnO-Al}_2\text{O}_3\text{-Bi}_2\text{O}_3\text{-B}_2\text{O}_3$
2. $\text{ZnO-Al}_2\text{O}_3\text{-BaF}_2\text{-CaF}_2\text{-B}_2\text{O}_3$
3. $\text{PbF}_2\text{-WO}_3\text{-TeO}_2$
4. $\text{CaO-MgO-Al}_2\text{O}_3\text{-TiO}_2\text{-B}_2\text{O}_3\text{-TeO}_2$
5. $\text{CaO-SrO-BaCl}_2\text{-B}_2\text{O}_3$
6. $\text{BaF}_2\text{-PbF}_2\text{-Al}_2\text{O}_3\text{-B}_2\text{O}_3$
7. $\text{SrO-CaF}_2\text{-Bi}_2\text{O}_3\text{-B}_2\text{O}_3\text{-TeO}_2$
8. $\text{Na}_2\text{O-5BaF}_2\text{-CaF}_2\text{-B}_2\text{O}_3\text{-TeO}_2$
9. $\text{SrO-Al}_2\text{O}_3\text{-BaCl}_2\text{-B}_2\text{O}_3\text{-TeO}_2$
10. $\text{ZnO-Bi}_2\text{O}_3\text{-BaF}_2\text{-B}_2\text{O}_3\text{-TeO}_2$
11. $\text{TeO}_2\text{-WO}_3\text{-LiF}$
12. $\text{TeO}_2\text{-WO}_3\text{-NaF}$
13. $\text{TeO}_2\text{-WO}_3\text{-KF}$
14. $\text{TeO}_2\text{-WO}_3\text{-LiF-NaF}$
15. $\text{TeO}_2\text{-WO}_3\text{-NaF-KF}$
16. $\text{TeO}_2\text{-WO}_3\text{-LiF-10KF}$

Rare Earth Ions

Dy^{3+}

Sm^{3+}

Pr^{3+}

Eu^{3+}

Tb^{3+}

Ho^{3+}

Tm^{3+}

Er^{3+}

Nd^{3+}

Yb^{3+}

OUTCOME

- Development of novel glass compositions: Research led to the creation of glass with enhanced properties, such as high transparency, chemical resistance, and mechanical strength.
- Development of eco-friendly glass formulations that are more energy-efficient to produce and easier to recycle, reducing environmental impact.
- Research resulted in the discovery of phosphors with high luminescence efficiency for applications in lighting and display technologies (e.g., LEDs, OLEDs).
- To create the awareness about the importance of science through educational programs in schools, colleges, and universities, as well as through print and electronic media.





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