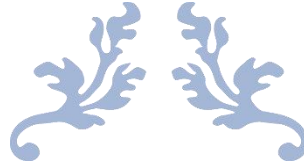




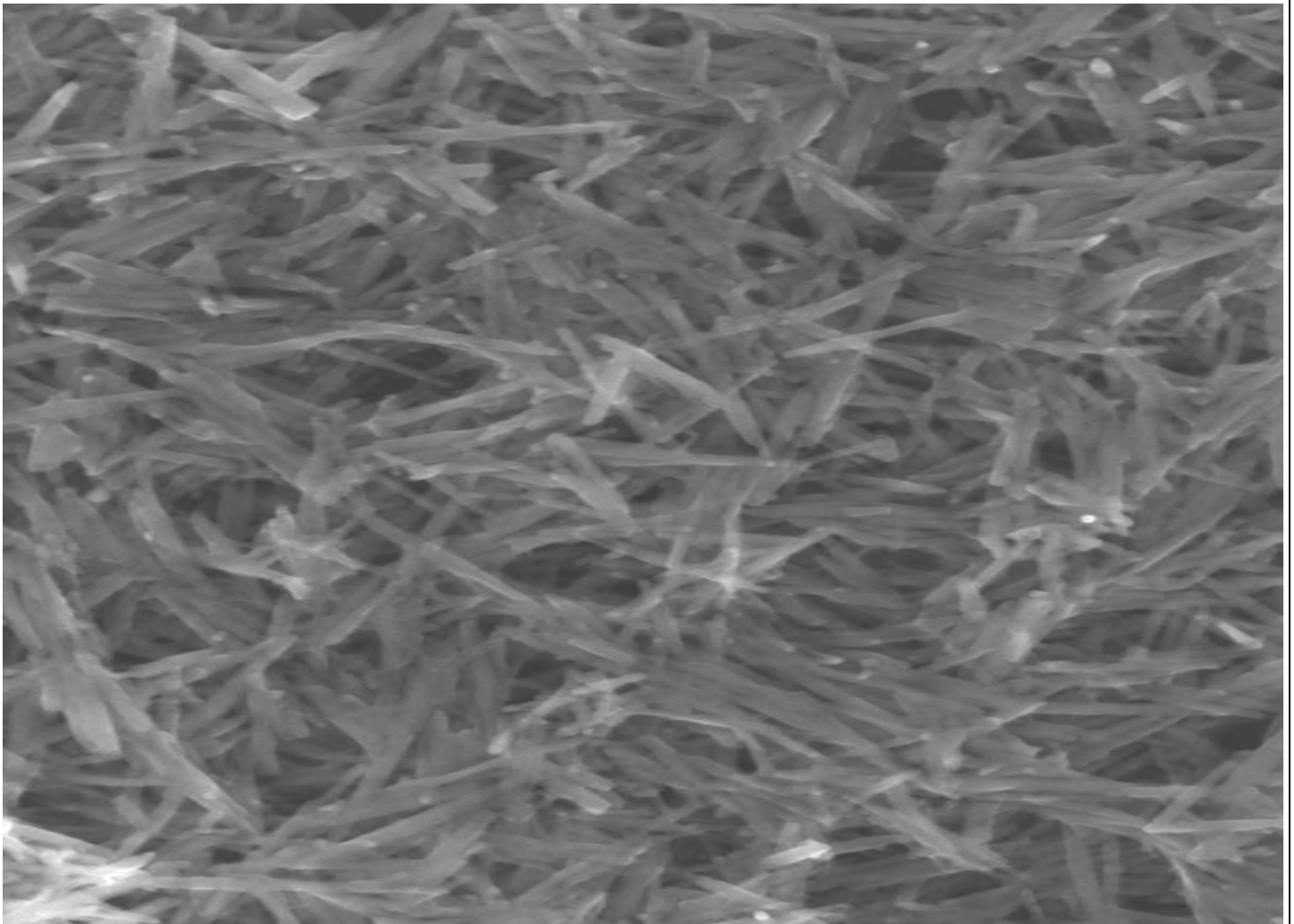
Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*



CENTRE FOR NEW MATERIALS (2020-23)

Centurion University of Technology and Management



FOREWORD FROM OUR PRESIDENT

Dear Members of the Research Centre for New Materials,

It gives me great pleasure to acknowledge the contributions and achievements of the Research Centre for New Materials (RCNM). The Centre has been at the forefront of promoting research and innovation in the field of materials science, with a focus on new energy sources, healthcare and biomedical applications, and the development of new materials and technologies.



I am proud of the Centre's commitment to interdisciplinary research and collaborations with industry and government agencies, which has resulted in numerous publications, projects, and collaborations with leading institutions and industries. The RCNM's efforts have the potential to create a significant impact in addressing some of the most pressing challenges facing society today, and its research initiatives are truly inspiring.

The RCNM's dedication to education and outreach is particularly noteworthy and has led to the development of a talented and motivated community of researchers and scientists. I am impressed with the Centre's focus on training the next generation of researchers and scientists, and its efforts to promote sustainable development and social responsibility.

As the President of our university, I fully support the RCNM's research initiatives and its mission to promote innovation and sustainable development. I believe that the Centre's efforts will continue to make a positive impact on society, and I would like to commend everyone involved for their contributions and achievements.

I wish the RCNM continued success in all its future endeavors, and I look forward to the Centre's continued leadership in promoting cutting-edge research and development in the field of materials science.

Prof. Mukti Kanta Mishra, The President, CUTM

MESSAGE FROM OUR VICE-PRESIDENT

Dear Members of the Research Centre for New Materials,

As the Vice President of our university, it gives me great pleasure to acknowledge the achievements and contributions of the Research Centre for New Materials (RCNM). I expect this Centre will move in its future direction with the motto “Material is Immaterial” very soon. The Centre has been instrumental in promoting cutting-edge research and development in the field of materials science, with a focus on new energy sources, healthcare, and biomedical applications, and the development of new materials and technologies using various computational tools and experiments.



The RCNM's research initiatives have been truly remarkable, and have the potential to create significant impact in addressing some of the most pressing challenges facing society today. The Centre's commitment to interdisciplinary research and collaborations with industry and government agencies is particularly noteworthy and has led to numerous publications, projects, and collaborations with leading institutions and industries.

I am impressed with the Centre's dedication to education and outreach, and its efforts to inspire and train the next generation of researchers and scientists. The RCNM's success is a testament to the hard work, dedication, and passion of its members, and I would like to commend everyone involved for their contributions and achievements.

As the Vice President of our university, I would like to express my support for the RCNM's research initiatives and its mission to promote innovation and sustainable development. I believe that the Centre's efforts will continue to have a significant impact on society, and I wish the RCNM continued success in all its future endeavors.

Prof. D N Rao, The Vice President, CUTM Odisha

MESSAGE FROM OUR VICE CHANCELLOR

Dear Students, Faculty, and Staff,

It is with great pleasure that I extend my warmest congratulations to the Research Centre for New Materials (RCNM) on the publication of their book. This publication is a testament to the dedication and hard work of the RCNM team and showcases the innovative research being carried out at our university.



The RCNM has been instrumental in promoting the development of novel materials with enhanced performance and functionality. Their research has had a profound impact on various fields such as energy, agriculture, and healthcare. The Centre's efforts have not only contributed to the advancement of knowledge in materials science but have also led to the development of practical solutions to real-world problems.

The RCNM's collaborations with national research organizations have also played a crucial role in advancing the field of materials science and promoting knowledge exchange. The launch of skill courses by the Centre is a commendable effort toward promoting skill-building and career development opportunities for students and researchers.

As the Vice-Chancellor of our university, I am proud to see the RCNM making significant contributions towards advancing knowledge and promoting innovation. I would like to express my sincere appreciation to the RCNM team for their hard work and dedication towards this noble cause. I would also like to encourage them to continue their efforts towards promoting the development of innovative solutions to address pressing societal challenges.

I extend my heartfelt congratulations once again to the RCNM team on this remarkable achievement, and wish them all the best in their future endeavors.

Prof. Supriya Pattanayak, Vice-Chancellor, CUTM Odisha

MESSAGE FROM OUR REGISTRAR

On behalf of the university, I would like to express my sincere appreciation for the tremendous work that has been done by the Research Centre for New Materials (RCNM) since three years. The RCNM has been instrumental in advancing research in the field of materials science, and its contributions have been invaluable in promoting innovation and sustainable development.



The RCNM's focus on new energy sources, healthcare and biomedical applications, and the development of new materials and technologies has the potential to create significant impact in addressing some of the most pressing challenges facing society. I am pleased to note that the Centre's research efforts have led to numerous publications, projects, and collaborations with leading institutions and industries, which is a testament to the RCNM's commitment to excellence and quality.

As the university's registrar, I am proud of the RCNM's dedication to education and outreach, as well as its efforts to promote interdisciplinary research and collaborations across different departments and faculties. The Centre's success is a reflection of the hard work, dedication, and passion of its members, and I would like to commend everyone involved for their contributions and achievements. I would like to take this opportunity to extend my best wishes to the RCNM for its future endeavors. May the Centre continue to grow from strength to strength, and may its research efforts lead to the development of new and innovative materials and technologies that will benefit society.

Prof. Anita Patra, The Registrar, CUTM Odisha

MESSAGE FROM OUR PRO-VC

It is with great pleasure that I introduce this book, which highlights the achievements and contributions of the Research Centre for New Materials (RCNM) at our university. As the Pro Vice-Chancellor, I am proud of the RCNM's commitment to conducting cutting-edge research on NEW MATERIALS and their applications in various fields, and its dedication to promoting innovation and sustainability.

The RCNM's research activities and initiatives have the potential to make significant contributions to addressing some of the most pressing challenges facing society today. By focusing on new energy sources, healthcare and biomedical applications, and the development of new materials and technologies, the Centre is helping to drive innovation and promote sustainable development.

The RCNM's commitment to collaborations and partnerships with industry and government agencies is also particularly noteworthy, as it helps to facilitate technology transfer and commercialization of new materials and technologies, leading to the creation of new jobs and economic opportunities.

I would like to commend the RCNM for its outstanding achievements to date, which include numerous publications as well as awards and collaborations with leading institutions and industries. The Centre's dedication to education and outreach is also laudable, as it helps to inspire and train the next generation of researchers and scientists. I would like to congratulate the RCNM on the publication of this book, and I wish the Centre continued success in its research activities and initiatives.

Pro Vice-Chancellor

MESSAGE FROM RCNM COORDINATOR

Dear colleagues, It is my pleasure to share with you this book on the Research Centre for New Materials (RCNM). As the coordinator of the Centre, I am immensely proud of the work that has been done by our team of researchers and scientists over the years. Our focus on new energy sources, healthcare, and biomedical applications, and the development of new materials and technologies has resulted in numerous publications, projects, and collaborations with leading institutions and industries. Our commitment to interdisciplinary research and collaborations with industry and government agencies has allowed us to make significant contributions to addressing some of the most pressing challenges facing society today. I am particularly impressed with the dedication and passion of our members, and their efforts to inspire and train the next generation of researchers and scientists. Our Centre's success is a testament to their hard work, and I would like to express my gratitude to everyone involved in our research initiatives. This book is a testament to our collective achievements, and I hope that it serves as a source of inspiration for those interested in the field of materials science. I am confident that the RCNM will continue to make significant contributions to society, and I look forward to our continued success in the future. Thank you for your continued support and dedication.

Sincerely, Dr. Satyanarayan Dhal; Coordinator, Research Centre for New Materials (RCNM)



*Dr. PSV Ramana
Rao*



*Dr. MNL
Acharyalu*



Dr. Susant Biswal



Dr. G K Sahu



*Dr. Saubhagya
Laxmi Behera*



Dr. Nibedita Nayak



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Dr. Nilay Mohanty



*Dr. Srikanta
Moharana*



*Dr. Satyanarayan
Dhal*



Dr. Shraban K Sahu



Dr. Ashish Kr Sahu



Dr. Suchismita Sahu



*Dr. Rabindra Nath
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Mishra*



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Ms. Arpita Patro

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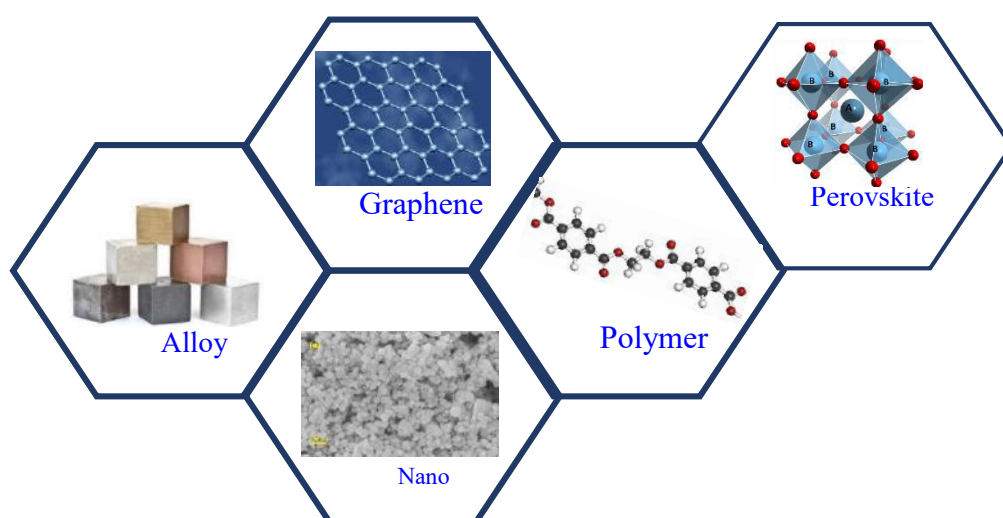
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Chapter 1: Aim and Objective of the Research Centre

1.1 Introduction

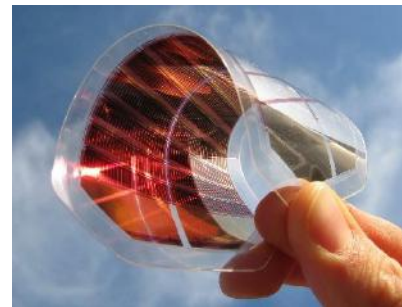
The Research Centre for New Materials (RCNM) is an interdisciplinary research Centre dedicated to the study of new materials and their applications in various fields, including energy, healthcare, and transportation. The Centre brings together scientists, engineers, and researchers from different disciplines, including materials science, chemistry, physics, and engineering, to advance the understanding of new materials and develop innovative solutions that can address some of the most pressing challenges facing society today. The Centre is committed to excellence in research, education, and outreach and aims to promote sustainable development and improve the quality of life for people around the world. This chapter provides an overview of the aim and objectives of the RCNM, which serve as the foundation for the Centre's research activities and initiatives.



1.2 Aim of the Research Centre

If the focus of the Research Centre for New Materials is on new energy sources, then the Centre is committed to advancing the understanding of various materials and their applications in this field. Some of the key areas of focus for the Centre may include photovoltaic cells, graphene applications, fiber-reinforced composites, hydrophobic nanomaterials, simulation for composites using BIOVIA, and nano curcumin.

Photovoltaic cells are a promising technology for converting solar energy into electricity, and the Centre is exploring new materials and processes that can improve the efficiency and cost-effectiveness of these cells. Graphene is another material with potential applications in energy storage and conversion, and the Centre is investigating the properties and behavior of graphene and its derivatives in various energy-related applications.

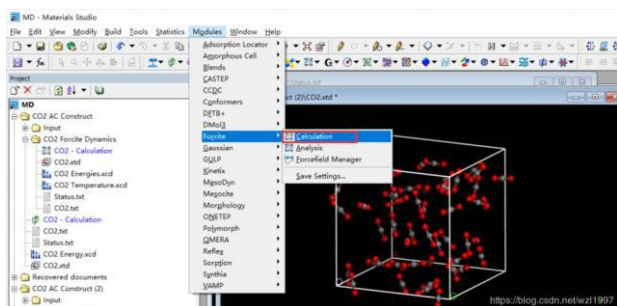


Fiber-reinforced composites are materials that can provide high strength and stiffness while remaining lightweight, making them ideal for use in various energy-related applications such as wind turbines, electric vehicles, and aerospace components. The Centre is studying the behavior and properties of these materials, as well as developing new composites that can provide even better performance.

Hydrophobic nanomaterials are materials that can repel water, and they have potential applications in areas such as energy harvesting and water purification. The Centre is also exploring the use of these materials in various energy-related applications and developing new ways to synthesize and modify these materials.



Simulation for composites using BIOVIA Material Studio is a software platform



that can simulate the behavior of composite materials, which can be valuable for optimizing their design and performance. The Centre is also using this software to develop new composite materials and investigate

their behavior in various energy-related applications.

Finally, nanocurcumin is a derivative of spice turmeric that has potential applications in cancer therapy. The Centre is investigating the properties and behavior of this material and exploring its potential applications in the biomedical field.

Overall, the focus of the Centre on new energy sources is an important and timely area of research that can have significant implications for the future of energy production and consumption.

The Centre's work in this area can help to advance the field and contribute to the development of sustainable and efficient energy solutions.



1.3 Objectives of the Research Centre

The Research Centre for New Materials (RCNM) has several objectives that serve as the foundation for its research activities and initiatives. Some of the key objectives of the RCNM are:

- To conduct cutting-edge research in new materials and their applications in various fields, including electronics, energy, healthcare, and transportation.
- To develop new materials that are sustainable, cost-effective, and have desirable properties that can meet the demands of these fields.
- To contribute to the advancement of science and technology and promote sustainable development.

- To foster collaborations and partnerships with other research institutions, industries, and government agencies to achieve the Centre's aims.
- To promote education and outreach activities that can help to disseminate knowledge and raise awareness about the importance of new materials and their potential applications.
- To develop and promote the use of advanced computational and experimental tools that can aid in the design and development of new materials.
- To publish and disseminate research findings through high-quality publications, , and other channels.
- To attract and retain talented researchers and students from diverse backgrounds and disciplines and provide them with the resources and support needed to succeed in their research and academic pursuits.
- Overall, the objectives of the RCNM reflect its commitment to advancing the understanding of new materials and developing innovative solutions that can address some of the most pressing challenges facing society today. The Centre is dedicated to excellence in research, education, and outreach and aims to make a positive impact on the world through its activities and initiatives.

1.4 Conclusion

In conclusion, the Research Centre for New Materials is dedicated to advancing the understanding of new materials and their applications in various fields, with a particular focus on new energy sources. The Centre's objectives, which include conducting cutting-edge research, developing sustainable and cost-effective materials, fostering collaborations and partnerships, promoting education and outreach, and attracting talented researchers and students, reflect its commitment to excellence in research, education, and outreach. By pursuing these objectives and collaborating with other institutions, industries, and government agencies, the RCNM aims to make a positive impact on society by developing innovative solutions that can address some of the most pressing challenges facing the world today. The Centre's work has the potential to contribute to the development of sustainable and efficient energy solutions, as well as

other areas of science and technology, and can help to promote sustainable development and the advancement of society as a whole.

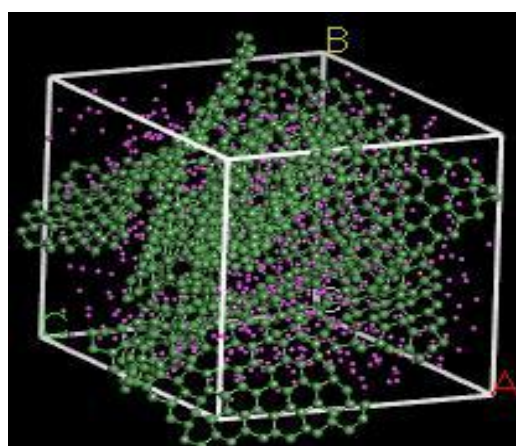
Chapter 2: Expected Outcomes

Introduction

The Research Centre for New Materials (RCNM) is dedicated to conducting cutting-edge research on new materials and their applications in various fields, with a particular focus on composites and new energy sources. Through its research activities, the Centre aims to make significant contributions to the development of new materials, technologies, and solutions that can address some of the most pressing challenges facing society today. This chapter discusses the expected outcomes of the RCNM's research activities and initiatives, highlighting some of the potential impacts of the Centre's work.

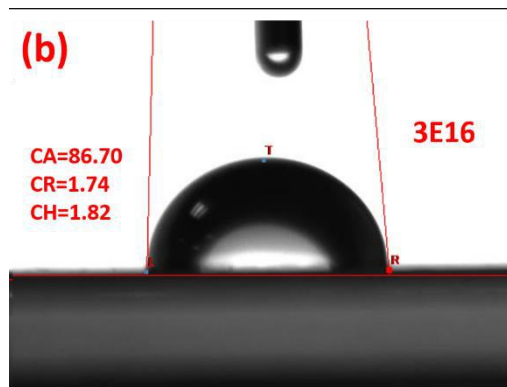
2.1 Development of Novel Composite Materials

The development of novel composites is one of the major expected outcomes of the Research Centre for New Materials (RCNM). These composites have the potential to revolutionize the field of materials science, particularly in terms of their use in high-performance applications. The Centre's interdisciplinary approach to research and development has allowed for the exploration of a wide range of composite materials, including fiber-reinforced composites, nanocomposites, and bio-composites. These materials can be tailored to meet specific performance requirements, making them ideal for a wide range of applications, such as in the aerospace, automotive, and construction industries. The Centre's expertise in simulation and modeling also enables the development of composites with optimized properties, leading to improved strength, durability, and resistance to wear and tear. Overall, the development of novel composites is a key focus of the RCNM, and the expected outcomes have the potential to make significant contributions to the field of materials science.



2.2 Development of Sustainable and Efficient Energy Solutions

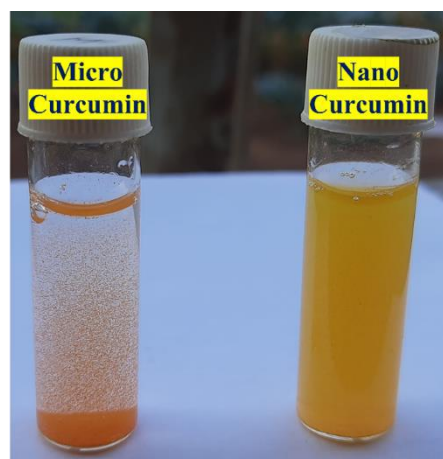
One of the key expected outcomes of the RCNM's research is the development of sustainable and efficient energy solutions. The Centre's focus on new energy sources, including photovoltaic cells and hydrophobic nanomaterials, has the potential to contribute to the development of cost-effective and environmentally sustainable energy technologies and novel coating materials. By developing new materials and technologies that can increase efficiency and reduce the cost of energy production, the RCNM can help to promote sustainable development and reduce reliance on non-renewable energy sources. The research Centre has the following expected outcomes:



2.3 Advancements in Healthcare and Biomedical Applications

Another expected outcome of the RCNM's research is the development of new materials for healthcare and biomedical applications. The Centre's research on nano curcumin and other materials has the potential to lead to the development of new treatments and therapies for a range of health conditions, including cancer, Alzheimer's disease, and cardiovascular disease.

By developing materials that are biocompatible, durable, and effective, the RCNM can contribute to the advancement of healthcare and improve the quality of life for people around the world.



2.4 Creation of New Business Opportunities

The RCNM's research activities have the potential to create new business opportunities and stimulate economic growth. By developing new materials and technologies, the Centre can help to create new markets and industries, including in the areas of energy, healthcare, and transportation. The Centre's focus on collaborations and

partnerships with industry and government agencies can help to facilitate technology transfer and commercialization of new materials and technologies, leading to the creation of new jobs and economic opportunities.

2.5 Advancements in Science and Technology

Finally, the RCNM's research activities can contribute to advancements in science and technology and help to shape the future of materials research. By conducting cutting-edge research and developing innovative materials and technologies, the Centre can help to advance the field of materials science and contribute to the development of new areas of research and discovery. The Centre's commitment to education and outreach can also help to inspire and train the next generation of researchers and scientists, ensuring that the legacy of the Centre's work continues.



Overall, the expected outcomes of the RCNM's research activities are significant and far-reaching, with the potential to make a positive impact on society and the environment. By pursuing its objectives and collaborating with other institutions and industries, the Centre can contribute to the development of sustainable and innovative solutions to some of the world's most pressing challenges.

2.6 Capacity Building

The research Centre aims to build capacity by providing training and mentorship to researchers, particularly early-career researchers. This capacity-building initiative is designed to develop a new generation of researchers who can continue to advance knowledge and develop innovative solutions.

2.7 Economic and Social Impact

The research Centre's research activities have the potential to have a significant economic and social impact. The Centre's solutions are designed to address critical challenges facing society, such as climate change, health, and sustainability, and have the potential to improve the lives of people around the world.

2.8 Conclusion

In conclusion, the research Centre has a set of expected outcomes that it aims to achieve through its research activities. These outcomes are aligned with the Centre's aim and objectives and are designed to have a significant impact on society. By achieving these outcomes, the research Centre will contribute to the development of a more sustainable and prosperous society.

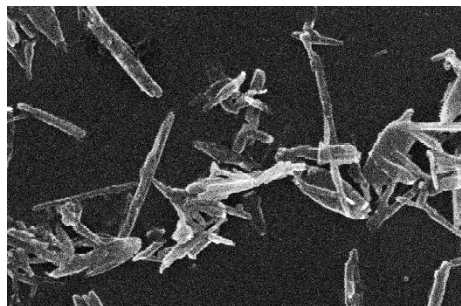
Chapter 3: Activities being carried out

3.1 Introduction

The research Centre conducts various activities to achieve its aim and objectives. These activities include research projects, capacity building initiatives, and knowledge dissemination activities. This chapter provides an overview of the activities being carried out by the research Centre.

3.2 synthesis of novel nanomaterials

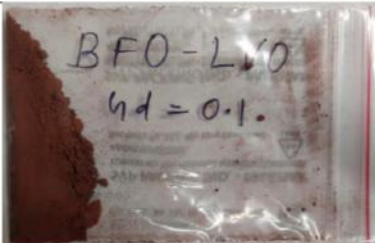


The synthesis of novel nanomaterials is another major area of focus for the Research Centre for New Materials (RCNM). These materials have unique properties and potential applications in a variety of fields, including electronics, energy, and medicine. The Centre's interdisciplinary approach to research and development allows for the exploration of various methods of synthesizing nanomaterials, including chemical and physical methods, as well as their characterization and analysis. These methods include solution-phase synthesis, vapor-phase synthesis, and solid-state synthesis. The Centre's expertise in nanomaterials synthesis and characterization allows for the production of high-quality and high-purity nanomaterials with precise control over their size, shape, and composition. These novel nanomaterials have the potential to revolutionize the field of materials science and contribute to the development of new technologies and applications.


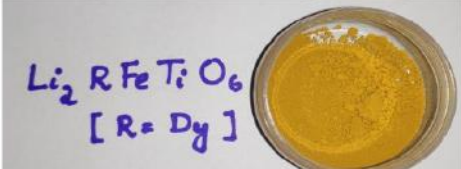


Mn₃O₄ Nanorods



Iron Oxide Nano cluster

S.L No	Composition Name	Image	Applications (Materials can be used in)
1	Gd doped BiFeO ₃ -LiVO ₃		PV Cells, Thermistor, Energy storage devices
2	La doped BiFeO ₃ -LiVO ₃		PV Cells, Thermistor, Energy storage devices
3	CFO (Cobalt Ferrite)		PV Cells, Thermistor, Energy storage devices

S.L No	Material(Ceramic Oxide)	Image	Applications (Materials can be used in)
1	$\text{Li}_2\text{NdFeTiO}_6$		Capacitor, MLCC, Solar cell, NTC Thermistor
2	$\text{Li}_2\text{DyFeTiO}_6$		

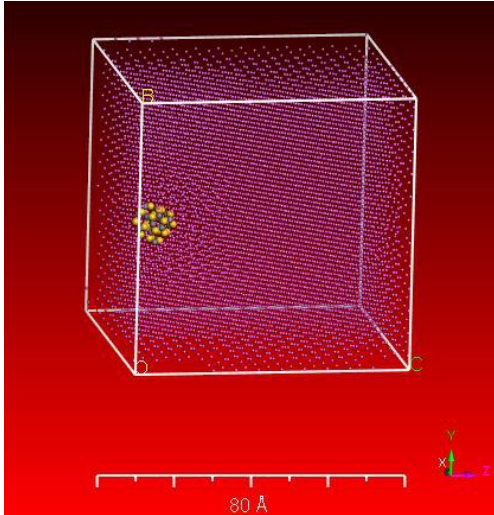
The research Centre conducts research projects in various fields, including environmental science, health, and engineering. The Centre's interdisciplinary approach enables it to address complex problems and develop innovative solutions. The research projects are funded by various sources, including government agencies, industry partners, and philanthropic organizations.

3.3 Use of nanomaterials in Agriculture

The use of nano curcumin in agriculture is an exciting area of research that the Research Centre for New Materials (RCNM) is actively pursuing. Curcumin is a natural compound found in turmeric that has been shown to have numerous health benefits, including anti-inflammatory and antioxidant properties. However, its use in agriculture has been limited due to its low solubility and bioavailability. By using nanotechnology to synthesize nano curcumin particles, the RCNM can increase its solubility and bioavailability, making it a promising solution for improving plant growth and protecting against various diseases. The Centre's interdisciplinary approach to research allows for the exploration of various applications of nano curcumin in agriculture, including its use as a plant growth regulator and its potential as a natural pesticide. These innovative approaches to agriculture have the potential to revolutionize the way we grow crops and improve the sustainability of our food systems.



3.4 Development of composites



The simulation of composites using BIOVIA is an essential area of research being undertaken by the Research Centre for New Materials (RCNM). BIOVIA is a simulation and modeling software suite that enables researchers to simulate the behavior of materials at the molecular level. The Centre's interdisciplinary approach to research and development allows for the use of BIOVIA to simulate the behavior of composites and predict their performance in

various applications. This approach enables the optimization of the composite properties and performance by designing and engineering the materials at the molecular level. The simulation of composites using BIOVIA helps to reduce the time and cost of experimental testing and provides insights into the mechanisms underlying the performance of composites. The RCNM's expertise in this area of research is expected to lead to the development of advanced composite materials with optimized properties, leading to enhanced performance and durability in a wide range of applications.

The development of composites is a significant area of research being pursued by the Research Centre for New Materials (RCNM). Composites are materials that are made up of two or more distinct materials with different properties, combined in a way that enhances their overall performance. The Centre's interdisciplinary approach to research and development allows for the



exploration of a wide range of composite materials, including fiber-reinforced composites, nanocomposites, and bio-composites.

These materials can be tailored to meet specific performance requirements, making them ideal for a wide range of applications, such as in the aerospace, automotive, and construction industries. The Centre's expertise in simulation and modeling also enables the development of composites with optimized properties, leading to improved strength, durability, and resistance to wear and tear.



Overall, the development of composites is a key focus of the RCNM, and the expected outcomes have the potential to make significant contributions to the field of materials science.

3.5 Collaboration with national research organizations

The research Centre disseminates its research findings through various channels, including academic publications, conferences, and public forums. The Centre also collaborates with industry partners to transfer knowledge and technology to the private sector. The knowledge dissemination activities enable the research Centre to have a broader impact on society and contribute to the development of new technologies and solutions.

The Research Centre for New Materials (RCNM) recognizes the importance of collaboration with national research organizations in advancing the field of materials science.

The Centre actively collaborates with national research organizations such as the IMMT, BHU, IIT Dhanbad, UQAC (Canada), IIT Bbsr, IIT Kanpur, IIT Guwahati, IIT Roorkee, NIT Rourkela, SRM, OUAT Bbsr, Pondicherry



Gamma Irradiation in Pondicherry University

University, Sathyabama Institute of Science and Technology, Veer Surendra Sai University of Technology, GIET Gunupur to share knowledge, expertise, and resources. Through these collaborations, the Centre has been able to access state-of-the-art equipment and facilities, as well as collaborate with leading researchers in the field. This has enabled the Centre to accelerate its research and development efforts, leading to the development of novel materials with enhanced performance and functionality. The collaborations have also led to the dissemination of research findings through joint publications and presentations at national and international conferences. The RCNM's collaborations with national research organizations are expected to continue to play a critical role in advancing the field of materials science and developing innovative solutions to pressing societal challenges.

3.6 Collaboration with Industry Partners

The research Centre collaborates with industry partners to develop solutions that are practical, effective, and scalable. These partnerships enable the Centre to transfer knowledge and technology to the private sector and contribute to the development of new products and services. The collaboration with industry partners like Tirupati Graphene & Mintech Research Centre, Wipro-3D, Mechem India Private Limited, etc. also enables the research Centre to have a broader impact on society.

3.7 Launch of Skill Courses

The Research Centre for New Materials (RCNM) recognizes the importance of providing training and skill-building opportunities to students and researchers interested in materials science. As part of its commitment to promoting the development of the next generation of materials scientists, the Centre has launched several skill courses that provide hands-on training in various aspects of materials science. These skill courses cover topics such as the synthesis and characterization of new materials, the use of advanced analytical techniques, and the simulation of material properties using software such as BIOVIA. The courses are designed to provide participants with practical skills and knowledge that can be applied in both academic and industrial settings. The launch of these skill courses demonstrates the Centre's commitment to promoting the development of highly skilled materials scientists and fostering innovation in the field of materials science.

3.8 Conclusion

In conclusion, the research Centre conducts various activities to achieve its aim and objectives. These activities include research projects, capacity building initiatives, knowledge dissemination activities, and collaboration with industry partners. By carrying out these activities, the research Centre is making significant contributions to knowledge, developing innovative solutions, and building capacity in the research community.

Chapter 4: Achievements to date

4.1 Introduction

The research Centre has achieved significant milestones in its aim to contribute to the development of new knowledge and innovative solutions. This chapter provides an

overview of the Centre's achievements till date, including products, , publications, projects, awards, , collaborations, and other notable accomplishments.

4.2 Publications

The research Centre has published several research papers in high-impact journals. These papers cover various fields, including environmental science, health, and engineering. The Centre's research findings have contributed to the development of new knowledge and have had a significant impact on society.

- **Publications**

- S. Dhal, et al. Augmented electrochemical properties of Manganese Oxide nanorods on low energy nitrogen ion irradiation, *Journal of Alloys and Compounds* (2023), 170441.
- Cluster formation by the precise joining of iron oxide nanoparticles on low energy nitrogen ion irradiation, Arpita Patro, Smruti Ranjan Nayak, Manoj Rajbhar, Shyamal Chatterjee, Satyanarayan Dhal; 2023/4/5, *Radiation Effects and Defects in Solids*, Taylor and Francis
- Dibyasingh Mohanta, **N.K. Mohanty** and Banarji Behera, Effect of Gd on structural, dielectric and electrical transport properties of multiferroic ceramic composite $\text{BiFeO}_3\text{-NaNbO}_3$, *Composites Part C: Open Access* 2 100024 (2020). <https://doi.org/10.1016/j.jcomc.2020.100024>
- Gyanendra Kumar Mishra, **N.K. Mohanty**, Banarji Behera, Analysis of Dielectric and Electrical Transport properties of NdFeAsO Ceramic, *Ceramica* 68 (386) 181-187 (2022). <http://dx.doi.org/10.1590/0366-69132022683863168>
- Dibyasingh Mohanta, **N.K. Mohanty**, Khusboo Agrawal and Banarji Behera, Effect of Gd on impedance, modulus and ferroelectric properties of multiferroic ceramic composite $\text{BiFeO}_3\text{-NaNbO}_3$, *MRS Advances*, 7(15) 316-325 2022. <https://doi.org/10.1557/s43580-022-00264-9>
- Dibyasingh Mohanta, **N.K. Mohanty**, Khusboo Agrawal and Banarji Behera, Electrical transport properties of La doped $\text{BiFeO}_3\text{-NaNbO}_3$ composite, *Advances in Applied Ceramics: Structural, Functional and Bioceramics*, 121 (3) 109-118, (2022). <https://doi.org/10.1080/17436753.2022.2086427>
- Mohanty, Debabrata, et al. "Dielectric and frequency dependent transport properties in magnesium doped CuFe_2O_4 composite." *Materials Today: Proceedings* 33 (2020): 5226-5231.
- Mohanty, Debabrata, et al. "Investigation of structural, dielectric and electrical properties of ZnFe_2O_4 composite." *Materials Today: Proceedings* 33 (2020): 4971-4975.
- Sahu, A. K., et al. "Dielectric and frequency dependent transport properties of gadolinium doped bismuth ferrite." *Transactions on Electrical and Electronic Materials* 21 (2020): 217-226.

- Barik, Rajanigandha, et al. "Synthesis and spectral characterizations of nano-sized lithium niobate (LiNbO₃) ceramic." *Micro and Nanosystems* 12.2 (2020): 81-86.
- Mohanty, D., et al. "Structural and Electrical Properties of Magnesium-Doped CoFe₂O₄." *Powder Metallurgy and Metal Ceramics* 59 (2021): 507-514.
- Mallick, Priyambada, and S. K. Satpathy. "Synthesis and characterization of Zinc doped Strontium Titanate." *Int. J. Anesth Pain Med* 7 (2021): 37.
- K Sahu, A., et al. "Effect on structural, electrical and temperature sensing behavior of neodymium doped bismuth ferrite." *Advanced Materials Letters* 12.7 (2021): 1-7.
- Satpathy, Santosh K., Nilaya K. Mohanty, and Srikanta Moharana. "Progress of Perovskite Materials with Surface Additives." *Chemical Modification of Solid Surfaces by the Use of Additives* (2021): 209.
- Sahu, Meena Kumari, et al. "Structural, dielectric, and electrical study of bismuth ferrite-lithium vanadate." *The European Physical Journal Applied Physics* 97 (2022): 72.
- Naik, Ananga U., Santosh K. Satpathy, and Banarji Behera. "Synthesis and Transport Properties of Cobalt Ferrite: A Systematic Overview." *Micro and Nanosystems* 14.2 (2022): 101-109.
- Mallick, Priyambada, et al. "Development and characterization of copper doped perovskite-polymer composite through high-temperature technique." *Sādhanā* 47.3 (2022): 134.
- Patra, Rashmiranjan, et al. "Studies on Structural, Dielectric, and Electrical Properties of the PMMA-BNT Ceramics Polymer Composites." *Polymer Science, Series B* 64.4 (2022): 539-545.
- Mallick, Priyambada, et al. "Investigation on structural, dielectric, thermistor parameters and negative temperature coefficient behaviour of Nd, Gd, and La-doped bismuth ferrite." *Transactions on Electrical and Electronic Materials* 23.5 (2022): 522-534.
- Mallick, Priyambada, et al. "Experimental Investigation on Structural, Dielectric, and Transport Properties of Copper Doped SrTiO₃." *Integrated Ferroelectrics* 230.1 (2022): 156-162.
- Mallick, Priyambada, Santosh Kumar Satpathy, and Banarji Behera. "Investigation on the structural, electrical and thermistor parameters of La-doped BiFeO₃-PbZrO₃ for energy storage devices." *Bulletin of Materials Science* 45.4 (2022): 198.
- Mallick, Priyambada, Santosh Ku Satpathy, and Banarji Behera. "Study of structural, dielectric, electrical, and magnetic properties of samarium-doped double perovskite material for thermistor applications." *Brazilian Journal of Physics* 52.6 (2022): 187.
- Mallick, Priyambada, et al. "Structural, electrical and thermistor behavior of BiFeO₃-PbZrO₃ for energy-storage devices." *Emerging Materials Research* 12.1 (2023): 3-11.
- Mohanty, Debabrata, et al. "STUDY OF STRUCTURAL AND TRANSPORT PROPERTIES OF CuFe₂O₄ SYNTHESISED VIA LOW COST SOLID STATE REACTION ROUTE." *Advances in Materials and Processing Technologies* (2023): 1-13.
- Mallick, Priyambada, et al. "Carbon-Metal Hybrid Nanomaterials for High Technologies." *Nanoparticles Reinforced Metal Nanocomposites: Mechanical*

- Performance and Durability*. Singapore: Springer Nature Singapore, 2023. 273-295.
- Mallick, Priyambada, Santosh Ku Satpathy, and Srikanta Moharana. "Nanomaterials for Fabrication of Thermomechanical Robust Composite." *Nanoparticles Reinforced Metal Nanocomposites: Mechanical Performance and Durability*. Singapore: Springer Nature Singapore, 2023. 297-315.
 - Mallick, Priyambada, et al. "Synthesis and analysis of Structural, Dielectric, and thermistor behaviour of Zinc Ferrite." *Chemical Physics Impact* (2023): 100217.
 - S. Devi ,S.Saparjya S. Behera* Crystal structure, dielectric and impedance studies of a new lead free tungsten bronze ferroelectric oxide, *Ferroelectrics*, 587, 104-117 ,2022.
 - S.Saparjya, P.R. Das, S. Behera, S.Devi Structure, Dielectric Properties and Conduction Mechanism of BCZT Ceramics , *Sambodhi* ,43 405-414 2020.
 - S. Behera, B. N. Parida R. K. Parida R. Padhee, Synthesis and characterization of lead-free double perovskite Mg₂LaVO₆, *J. Mat. Sci; Mat. Elect.*, 33 7691-7700 2022.
 - S. Mohanty, S. Behera*, S. Sen, B.N. Parida, R. Singh., Dielectric, Optical, and Magnetic Behaviors of Magnesium Iron-Based Double Perovskite, *ECS Journal of Solid State Science and Technology*, 11, 113003, 2022.
 - S. Mohanty, S. Behera*, S. Sen, B.N. Parida, Multiferroic and optical characteristics of Mg₂(Fe_{0.85}Ni_{0.15})NbO₆ for possible energy storage application, *J. of Mat Sci: Materials in Electronics Letters*, 33, 23770-23780, 2022.
 - G. K. Sahu S. Behera *, V. Senthil, T. Badapanda, Investigation of Dielectric, Ferroelectric and Conduction Behavior of Dy³⁺ Substituted SrBi₂Ta₂O₉ Bismuth Layer Structured Ceramics,, *ECS Journal of Solid State Science and Technology*, 11, 083011, 2022.
 - S Saparjya, S. Behera, T.Badapanda B. Behera., R Padhee, P.R.Das, Understanding the impact of Gd³⁺ substitutions on the enhancement of dielectric and electrical behaviour of lead-free Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O₃ ceramics, *Ferroelectrics*, 598, 79-95, 2022.
 - S.Swain, S.Behera, B.Ojha , Effect of rare earth orthoferrite GdFeO₃ on the band gap modulation and magnetic switching in Bi_{0.5}Na_{0.5}TiO₃ ceramics, *Phase Transitions*, 94 , 77-92, 2021 .
 - S.Swain, S. Behera, B.Ojha Optical, Electrical and magnetic properties of ((Bi_{0.5}Na_{0.5})_{0.7}La_{0.3}) (Ti_{0.7}Fe_{0.3}) O₃) ferroelectric ceramic, *Chemical Physics Letters*, 773, 138580-138588 , 2021.
 - B. N. Parida , S. Behera*, R. Padhee & Piyush R. Das Revived tungsten bronze ceramic for thermistor and RAM devices, *Phase Transitions*, 93, 1157-1170, 2020.
 - S. Saparjya , S. Behera, T.Badapanda, R. Padhee; P.R. Das Effects of La³⁺ addition on the phase transition, microstructure, and electrical properties of Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O₃ ceramics, *J. Mat. Sci; Mat. Elect.*, 31 , 8116-8126, 2020.
 - Nirmal Rout, S.Behera ,B.N. Parida, R. K. Parida, R. Padhee, Effect of substitution of alkaline earth metal ion on structural and dielectric properties of double perovskite, *Phase Transitions*, 93, 509-527, 2020.

- B. N. Parida, Priyabadini Biswal, S. Behera, R. K. Parida R. Padhee, Multifunctional behavior of Ca-doped niobium-based double perovskite for photovoltaic/solar cell devices, *J. Mat. Sci; Mat. Elect.*, 31, 6097-6108, 2020.
- S. Sapatrjya, S. Behera, T. Badapanda. B. Behera, P. R. Das., Effect of Gadolinium on the structural and dielectric properties of BCZT ceramics. *Phase Transitions*, 93, 245-262, 2020.
- S Prusty, P Somu, J K Sahoo, D Panda, S K Sahoo, **S K Sahoo**, Y R Lee, K S Rao, Adsorptive Sequestration of Noxious Uranium (VI) from Water Resources: An Comprehensive review, *Chemosphere*, 318 (2022): 136278 (**Elsevier, Impact Factor: 8.943**)
- **S K Sahoo***, G K Panigrahi, J P Dhal, J K Sahoo, A K Behera, P C Panda, P Patel, S K Mund, S M Muduli, L Panda, Co-axial electrospun hollow MgO nanofibers for efficient removal of fluoride ions from water, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 652 (2022): 129877 (**Elsevier, Impact Factor: 5.518**)
- A Sahoo, J Sethi, K B Satapathy, **S K Sahoo***, G K Panigrahi, Nanotechnology for precision and sustainable agriculture: recent advances, challenges and future implications, *Nanotechnology for Environmental Engineering*, (2022) Accepted (**Springer Nature**)
- **S K Sahoo***, G K Panigrahi, M K Sahu, A Arzoo, J K Sahoo, A Sahoo, A K Pradhan, A Dalbehera, Biological synthesis of GO-MgO nanomaterial using *Azadirachta indica* leaf extract: A potential bio-adsorbent for removing Cr(VI) ions from aqueous media, *Biochemical Engineering Journal*, 177 (2022): 108272 (**Elsevier, Impact Factor: 4.446**)
- G Dharmendra, J K Sahoo, A Hota, **S K Sahoo**, Adsorptive sequestration of Toxic Congo Red Dye from Aqueous Solution Using Fe₃O₄/Sugarcane Bagasse Biochar Nanocomposite, *ECS Transactions*, 107 (2022): 5127 (**IOP Publishing**)
- **S. K. Sahoo***, G. K. Panigrahi, A. Sahoo, A. K. Pradhan, A. Dalbehera, Bio hydrothermal synthesis of ZnO–ZnFe₂O₄ nanoparticles using *Psidium guajava* leaf extract: Role in waste water remediation and plant immunity, *Journal of Cleaner Production*, 318 (2021): 128522 (**Elsevier, Impact Factor: 11.072**)
- J K Sahoo, A Hota, C Singh, S Barik, N Sahu, S K Sahoo, M K Sahu, H Sahoo, Rice husk and rice straw based materials for toxic metals and dyes removal: a comprehensive and critical review, *International journal of environmental analytical chemistry*, (2021): 1-23 (**Taylor & Francis, Impact Factor: 2.731**)

- **S. K. Sahoo***, G. K. Panigrahi, J. K. Sahoo, A. K. Pradhan, A. K. Purohit and J. P. Dhal, Electrospun magnetic polyacrylonitrile-GO hybrid nanofibers for removing Cr(VI) from water, *Journal of Molecular Liquids*, 326 (2021): 115364 (**Elsevier, Impact Factor: 6.633**)
- G K Panigrahi, **S K Sahoo**, A Sahoo, S Behera, S Sahu, A Dash and K B Satapathy, Bioactive molecules from plants: a prospective approach to combat SARS-CoV-2, *Advances in Traditional Medicine*, (2021): 1-14, (**Springer nature**)
- **S K Sahoo***, G K Panigrahi, A Purohit, J K Sahoo, Adsorption of Methylene blue on Graphene oxide synthesized from Bio-Soot waste, *Physics and Chemistry of Liquids*, 59 (2020): 872-882 (**Taylor & Francis, Impact Factor: 1.838**)
- A Nayak, J K Sahoo, **S K Sahoo**, D Sahu, Removal of Congored dye from aqueous solution using zinc oxide nanoparticles synthesised from *Ocimum sanctum*(Tulsi leaf): a green approach, *International journal of environmental analytical chemistry*, (2020): 1841826 (**Taylor & Francis, Impact Factor: 2.731**)
- S K Biswal, G K Panighahi and **S K. Sahoo***, Green synthesis of Fe₂O₃-Ag nanocomposite using *Psidium guajava* leaf extract: An eco-friendly and recyclable adsorbent for remediation of Cr(VI) from aqueous media *Biophysical chemistry*, 263 (2020): 106392 (**Elsevier, Impact Factor: 3.628**)
- **S. K. Sahoo**, S. Padhiari, S. K. Biswal, B. B. Panda and G. Hota*, Fe₃O₄ nanoparticles functionalized GO/g-C₃N₄ 2D/2D nanocomposite: An efficient magnetic nanoadsorbent for adsorptive removal of organic pollutants, *Materials Chemistry and Physics*, 244 (2020): 122710 (**Elsevier, Impact Factor: 4.778**)
- **S. K. Sahoo***, J. P. Dhal and G. K. Panigrahi, Magnesium oxide nanoparticles decorated iron oxide nanorods: Synthesis, characterization and remediation of Congo red dye from aqueous media, *Composite Communications*, 22 (2020): 100496 (**Elsevier, Impact Factor: 7.685**)
- **S. K. Sahoo***, J. K. Sahoo, G. K. Panigrahi, D. K. Pattanayak, A. S. Rout and A. Lenka, Preparation of Graphene Oxide from Bio-soot wastes: As an efficient adsorbent for highly noxious Congo red dye, *FlatChem*, 24 (2020): 100198 (**Elsevier, Impact Factor: 5.829**)
- Acharya S., et al. "Dependence of Cu doping on structure, morphology, magnetic and biomedical properties of ZnO nanostructures." *Materials Today Communications* 31 (2022): 103803.
-
- R. K. Sahu, T. Dash et al. "Spheroidal growth of graphite in arc plasma treatment", *Chemical Physics Letters*, V.739, P.1-5, 2020.

- Tapan Dash, Susanta Kumar Biswal et al. “Synthesis of α -Al₂O₃–graphene composite: a novel product to provide multi-functionalities on steel strip surface”, SN Applied Sciences, V.2, P. 1-9, 2020.
- Jyoti Prakash Dhal, Tapan Dash and Garudadhvaj Hota, “Iron oxide impregnated mesoporous MCM-41: synthesis, characterization and adsorption studies”, Journal of Porous Materials, V. 27, P. 205-216, 2020.
- Dhar, T.Dash, B.B.Palei, T.K.Rout, S.K.Biswal, A.Mitra, A.K.Sahu and S.K.Biswal, “Silicon-graphene composite synthesis: Microstructural, spectroscopic and electrical conductivity characterizations”, Materials Today: Proceedings, Online Published, 2020.
- Soumen Dash, Tapan Dash and Tapan Kumar Rout, “Preparation of graphene oxide by dry planetary ball milling technique under oxygen atmosphere”, IOP Conf. Series: Materials Science and Engineering, V. 872, I. 012180, P.1-6, 2020.
- Binod Bihari Palei, Tapan Dash and Susanta Kumar Biswal, “Reduced graphene oxide synthesis by dry planetary ball milling technique under hydrogen atmosphere”, IOP Conf. Series: Materials Science and Engineering, V. 872, I. 012158, P.1-6, 2020.
- T. Dash, R. K. Sahu, S. Dash, B.B. Palei, T.K.Rout, S.K. Biswal, B.B. Nayak, “Improvement of Mechanical and Microstructural Behaviour of Graphite Disc After Plasma Treatment”, International Journal of Control and Automation, V. 13, P.272-280, 2020.
- Binod Bihari Palei, Tapan Dash and Susanta Kumar Biswal, “Successful Synthesis of Graphene-Aluminum Composite with Improved Microhardness”, International Journal of Engineering and Advanced Technology (IJEAT), V.9, P. 2218-2221, 2020.
- S. Sapatrya, T.Badpanda, S.Behera, B.Behera, P. R. Das, “Effect of Gadolinium on the structural and dielectric properties of BCZT ceramics”, Phase Transitions, V. 93, P.245, 2020.
- B. N. Parida, Priyabadini Biswal, S. Behera, R. K. Parida & R. Padhee, “Relaxor type ferroelectric phase transition of poly crystalline ceramic Pb_{1.5}Ca_{0.5}BiNdO₆,” S Material Science; Mat. Elect, V. 31, P. 8116, 2020.

- S. Sapatrya, S. Behera, T. Badapanda, R. Padhi, P. R. Das., "Effect of La³⁺ addition on the phase transition, microstructure and electrical properties of BCZT ceramics," *Journal of Material Science; Mat. Elect.*, V. 31, P.6697, 2020.
- Nirmal Rout, S. Behera, B. N. Parida, R. K. Parida, R. Padhee, "Effect of substitution of alkaline earth metal ion on structural and dielectric properties of double perovskite", *Phase Transitions*, V.93, P.501, 2020.
- P. Jayaranga Rao, M. L. N. Acharyulu, Aruna Kumari Nakkella, "NANOTECHNOLOGY A REVIVAL APPROACH FOR SCIENTIFIC DEVELOPMENT – MATERIAL SCIENCE", *Journal of Information and Computational Science*, V.10.P.60-70, 2020.
- P. V. S. R. Mohana Rao, Raghu Babu K, M. L. N. Acharyulu, I. S. Ramakoti, "VALIDATION OF DARUNAVIR IN PHARMACEUTICAL FORMULATIONS USING MBTH REAGENT Pharmaceutical Formulations using MBTH Reagent", *International Journal of Engineering, Science and Mathematics*, V.20.P.42-49, 2020
- M. L. N. Acharyulu, P. V. S. R. Mohana Rao, I. Siva Ramakoti, "Determination of Eletriptan Hydro Bromide in pure and Pharmaceutical Formulations Using Cobalt Thiocyanide and Citric Anhydride by Spectrophotometric Method", *Journal of Applicable Chemistry*, V.9,P.567-574, 2020
- M. L. N. Acharyulu, CH. Nooka Raju, Threats To Vizag-Lessons to Learn, *Journal of Information and Computational Science*, V.10,P.673-676, 2020
- K. Sahu, Santosh K. Satpathy, B. Behera, Dielectric and frequency dependent transport properties of Gadolinium doped Bismuth Ferrite, *Transaction of Electrical and Electronic Materials*, 42341(170), 1-10, 2020.
- Rajanigandha Barik, Santosh K. Satpathy, Banarji Behera, Susanta K. Biswal and Ranjan K. Mohapatra, Synthesis and Spectral Characterizations of Nano-Sized Lithium Niobate (LiNbO₃) Ceramic, *Micro and Nanosystems*, , 12, 000-000, 2020.
- Debabrata Mohanty, P. Mallick, S. K. Biswal, Banarji Behera, Ranjan K. Mohapatra, Adiraj Behera, Santosh K. Satpathy, Investigation of structural, dielectric and electrical properties of ZnFe₂O₄ composite, *Materials Today: Proceedings*, online published, 2020.

- Debabrata Mohanty, Banarji Behera, Ranjan K. Mohapatra, Santosh K. Satpathy, Dielectric and frequency dependent transport properties in magnesium doped CuFe₂O₄ composite, *Materials Today: Proceedings*, online published, 2020
- Dibyasingh Mohanta, N.K. Mohanty and Banarji Behera, Effect of Gd on structural, dielectric and electrical transport properties of multiferroic ceramic composite BiFeO₃-NaNbO₃, *Composites Part C: Open Access* (2020) Accepted.
- S K Biswal, G K Panighahi and S K. Sahoo (corresponding author), “Green synthesis of Fe₂O₃-Ag nanocomposite using Psidium guajava leaf extract: An eco-friendly and recyclable adsorbent for remediation of Cr(VI) from aqueous media”, *Biophysical chemistry*, V.263,P.106392,2020
- S. K. Sahoo, S. Padhiari, S. K. Biswal, B. B. Panda and G. Hota, “Fe₃O₄ nanoparticles functionalized GO/g-C₃N₄ 2D/2D nanocomposite: An efficient magnetic nanoadsorbent for adsorptive removal of organic pollutants”, *Materials Chemistry and Physics*, V.244, P.122710 ,2020
- J.R. Swain, S.K. Biswal and S.Lenka, “Studies on synthesis, characterization and thermal properties of resins derived from diazotized cardanol - formaldehyde - organic compounds", *Polymer Plastic Technology and. Engineering*, V.39 (5), P.927-936, 2000.
- Susanta Kumar Biswal, Ashok Kumar Nayak, Umesh Kumar Parida and P.L. Nayak, “Applications of Nanotechnology in Agriculture and Food Sciences”, *International Journal of Science Innovations and Discoveries*, V. 2(1), P.21-36, 2012.
- S.K. Biswal and P.L. Nayak ,”Gelatin Blended with Cloisite 30B (MMT) for control release of Anti-Cancer Drug Curcumin “, *International Journal of Pharmascholars*,V.1(1), P.24-32,2012.
- Susanta Kumar Biswal, “Anti-Microbial activities of Soya Protein Isolate (SPI)/Cloisite C30B(MMT) Nanocomposite Film”, *Journal of Asian Scientific Research* ,V.11(9), P.539-546, 2012.
- B.K. Bindhani, U.K. Parida, S.K. Biswal,R.K. Panigrahi, and P.L. Nayak, “Review of Gold Nanoparticles Featuring Recent Advances toward Biomedical Applications: Opportunity and Challenges”, *Reviews in Nano scienceandNanotechnology*,V.2, P.247-260,2013.

- M. Behera, S.K. Biswal, Bhabani S Panda and Mohammed A Ahemed, “Study of Optical, Structural, Thermal and Dielectric Properties of Poly (vinylidene difluoride)/Cuprous Oxide Polymer Nano Composites”, Asian Journal of Chemistry, V.32(1), P.106-110, 2020.
- Surjya Narayan Panda, Susanta Kumar Biswal, “De-Inking of ONP Paper by using Different Surfactants: In Dissolved Air Flotation Process”, International Journal of Recent Technology and Engineering, V.8(5), P.4609-4613, 2020.
- Binod Bihari Palei, Tapan Dash, Susanta Kumar Biswal, “Successful Synthesis of Graphene-Aluminium Composite with Improved Microhardness”, International Journal of Engineering and Advanced Technology, V.9(3), P.2218-2221, 2020.
- Debapriya Pradhan, Susanta K. Biswal and Ranjan K. Mohapatra, “Design, Spectral and Antibacterial Investigations of Some Mixed Ligand Metal Complexes”, Oriental Journal of Chemistry, V.36(2), P.339-343, 2020.
- Jayasmita Beura and Susanta Kumar Biswal, “Investigation of Dielectric and Electrical Properties of BiFeO₃-PbZrTiO₃ (BFO-PZT)-Polyvinyl Alcohol (PVA) Composites”, Gedrag & Organisatie Review, V.33(2), P.831-840, 2020.
- S. Dhar, T. Dash, B.B. Palei, T.K. Rout, S.K. Biswal, A. Mitra, A.K. Sahu, S.K. Biswal, “Silicon-Graphene Composite Synthesis: Microstructural, Spectroscopic and Electrical Conductivity Characterizations”, Materials Today: Proceedings, March 2020.
- Debabrata Mohanty, P. Mallick, S.K. Biswal, Banarji Behera, Ranjan K. Mohapatra, Adiraj Behera, Santosh K. Satpathy, “Investigation of structural, dielectric and electrical properties of ZnFe₂O₄ composite” , Materials Today: Proceedings, 2020.
- Subrata Narayan Das, Susanta K. Biswal, Ranjan K. Mohapatra, “Recent advances on stabilization and rheological behaviour of iron ore slurry for economic pipeline transportation”, Materials Today: Proceedings, 2020.
- Ansuman Jena, Manoranjan Behera, Chittaranjan Routray and Susanta Kumar Biswal, “Fabrication, Characterization and Antibacterial Study of Poly (Vinyl Alcohol)PVA/Cuprous Oxide (Cu₂O) Nanofluids and Polymer Nanocomposite Films”, Oriental Journal of Chemistry, V.36, 2020.

- T. Dash, R. K. Sahu, S. Dash, B.B. Palei, T.K. Rout, S.K. Biswal, B.B. Nayak, “Improvement of Mechanical and Microstructural Behaviour of Graphite Disc After Plasma Treatment”, *International Journal of Control and Automation*, V.13(2), P.272-280, 2020.
- Tapan Dash, Tapan Kumar Rout, Binod Bihari Palei, Shubhra Bajpai, Saurabh Kundu, Amar N. Bhagat, Bijoy Kumar, Satpathy, Susanta Kumar Biswal, Abhinay Rajput, Ashok Kumar Sahu, Surendra Kumar Biswal, “Synthesis of α -Al₂O₃–graphene composite: a novel product to provide multi-functionalities on steel strip surface”, *SN Applied Sciences*, V.2, P.1147, 2020.
- Susanta Kumar Biswal, Gagan Kumar Panigrahi, Shraban Kumar Sahoo, “Green synthesis of Fe₂O₃-Ag nanocomposite using Psidium guajava leaf extract: An eco-friendly and recyclable adsorbent for remediation of Cr (VI) from aqueous media”, *Biophysical Chemistry*, V.263 106392, P.01-08. 202
- Pratap K. Chhotaray, Susanta Kumar Biswal, Siddharth Pandey, “Development of novel hybrid ionic fluids for efficient CO₂ capture and cellulose dissolution”, *Journal of Molecular Liquids*, V.312, 2020
- Shraban Ku Sahoo, Sandip Padhiari, S.K. Biswal, B.B. Panda, G. Hota, “Fe₃O₄ nanoparticles functionalized GO/g-C₃N₄ nanocomposite: An efficient magnetic nano adsorbent for adsorptive removal of organic pollutants”, *Materials Chemistry and Physics*, V. 244, 122710, P.01-03, 2020.
- Srikanta Moharana*, Manoj Kumar Chopkar, Ram Naresh Mahaling, Treatments of Hydroxylated BaTiO₃ particles by Bis (2-ethylhexyl) sulfosuccinate Sodium salt (AOT) for improve the Dielectric and Electrical Properties of BaTiO₃-Poly (vinylidene fluoride) Composites". *J. Electronic Materials* (2020), 49, 4272-4281.
- Srikanta Moharana, Anjali Kujur, Sudhir Minz, R. N. Mahaling, Banarji Behera, Effects of Silica Modified NiFe₂O₄ on the Dielectric and Electrical Properties of NiFe₂O₄ filled Poly (methyl methacrylate) Composites". *Adv. Mater. Lett.*, (2020), 11(6), 19-0075.
- Srikanta Moharana*, Sushree Kalyani Kar, Mukesh Kumar Mishra, R.N Mahaling, Synthesis and properties of Graphene and Graphene Oxide based polymer Composites Chapter-7, *Carbon Nanostructures, Surface Engineering of*

Graphene, Springer International Publishing, ISSN-2191-3013, ISBN: 978-3-030-30207-8

- A K Pradhan, Sethy TR , Biswalb SK and Sahoo PK* , “New Simultaneous Strategies for Pressure Sensitive Adhesion and Drug Delivery Action by Dynamic Chitosan-Snail Shell based Bio nanocomposite Thin-Film Nano gel”, Austin Journal of Nanomedicine & Nanotechnology, V.8, P.1057, 2020.
- Dr PSVRamanaRao, “A Review On Mechanical And Physical Performance Of Natural Fiber Reinforced Polymer Composites” International Journal Of Management, Technology And Engineering V- X, Issue Iii, March/2020 ISSN: 2249-7455.
- N. Sarkar, G. Sahoo, S. K. Swain, “Nanoclay sandwiched reduced graphene oxide filled macroporous polyacrylamide-agar hybrid hydrogel as an adsorbent for dye decontamination” Nano-Structures & Nano-Objects V.23, P. 100507, 2020
- Dojalisa Sahu, Degradation Of Industrial Phenolic Wastewater Using Dielectric Barrier Discharge Plasma Technique ,ISSN 1070-4272, Russian Journal Of Applied Chemistry, 2020, Vol. 93, No. 6, Pp. 905–915(IF-0.34)
- Dojalisa Sahu, N R. Panda, D Dash , ZnO Nanosheets Exhibiting High UV Blocking Efficiency For Effective Application In Sunscreen, Asian Journal Of Chemistry; Vol. 32, No. 7 (2020), 1809-1814(IF-0.24)
- S Palatsingh, A Mohanta, N R Panda, Dojalisa Sahu, "Evaluation Of Antibacterial Activity, Biodegradability And Mechanical Properties Of Chitosan Blended Zno Biofilm For Food Packaging", Oriental Journal Of Chemistry 2020, Vol. 36, No.(3):Pp1-6
- Ghadei and Dojalisa Sahu,"Synthesis, spectral characterization and antibacterial evaluation of 14-memebered tetra-aza- N4 macrocyclic complex", IJRAR 7(1)2020,PP.260
- Shraban Kumar Sahoo, Gagan Kumar Panigrahi, Jitendra Kumar Sahoo, Arun Kumar Pradhan, Aditya Kumar Purohit , Jyoti Prakash Dhal, “Electrospun magnetic polyacrylonitrile-GO hybrid nanofibers for removing Cr(VI) from water”, Journal of Molecular Liquids, V.326, P.115364-115378, 2021.
- Shraban Kumar Sahoo, Jyoti Prakash Dhal, Gagan Kumar Panigrahi, “Magnesium oxide nanoparticles decorated iron oxide nanorods: Synthesis, characterization

and remediation of Congo red dye from aqueous media", *Composites Communications*, V.22, P.100496-100501, 2020.

- Shraban Kumar Sahoo, Jitendra Kumar Sahoo, Gagan Kumar Panigrahi, Dillip Kumar Pattanayak, Aninda Sundar Rout, Animesh Lenka, "Preparation of graphene oxide from Bio-soot wastes: As an efficient adsorbent for highly noxious Congo red dye", *FlatChem*, V.24, P.100198-100205, 2020
- Shraban Kumar Sahoo, Aditya Kumar Purohit, Gagan Kumar Panigrahi, Jitendra Kumar Sahoo, "Adsorption of methylene blue from aqueous media using graphene oxide Synthesised from bio-soot wastes", *Physics and Chemistry of Liquids*, V.10, P. 1-11, 2020
- Debasrita Dash, Dojalisa Sahu, Sm³⁺ driven enhancement in photocatalytic degradation of hazardous dyes and photoluminescence properties of hexagonal-ZnO nanocolumns, *Nano Express* 2 (2021) 010007
- Satyanarayan Dhal, Das, P., Patro, A., Swain, M., Hota, S.R., Sahu, D. and Chatterjee, S., 2021. Tuning surface wettability of Molybdenum Oxide nanorod mesh by low energy ion beam irradiation. *Radiation Physics and Chemistry*, p.109649.
- Srikanta Moharana*, Tarun Yadav, Amit Pathak, Parvez Ahmad Alvi, RN Mahaling, Enhanced dielectric & electrical properties and percolation behavior of PVDF-BiFeO₃-Carbon Black (CB) Tri-Phase Composite film. *Journal of Materials Science: Materials in Electronics*, 32(5), (2021) 6038-6046.
- Srikanta Moharana and Ram Naresh Mahaling, Preparation and properties of Benzoxazine (BA) based BiFeO₃-Poly (vinylidene fluoride) (PVDF) Composites: Enhanced Dielectric Constant and Suppressed Loss. *Polymer-Plastics Technology and Materials*, 60 (10), (2021), 1122-1134.
- Srikanta Moharana and RN Mahaling, Enhancement investigations on Dielectric and Electrical properties of Niobium pentoxide (Nb₂O₅) reinforced Poly(vinylidene fluoride) (PVDF)- Graphene Oxide (GO) Nanocomposite Films. *Journal of Asian Ceramic Societies* (Accepted), (2021).

4.8 Conclusion

In conclusion, the research Centre has achieved significant milestones in its aim to contribute to the development of new knowledge and innovative solutions. The

Centre's achievements to date include products, publications, projects, awards, collaborations, and other notable accomplishments. By achieving these milestones, the research Centre has made a significant impact on society and has contributed to the development of a more sustainable and prosperous world.



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