



CHEMSTREET

The Newsletter of Chemistry Department

Issue no 4 | December 2021

Materials of the Millennium



Celebrating the '1st International Symposium on Materials of the Millennium:Emerging Trends and Future Prospects'!

Special Section on MMETFP-2021

Articles!



Linking Materials to Environment:Role of Chemists



Graphene: The Material of New Millennium



The Art of Snowfalkes

Quiz!

Interview!

Fun Facts!

Achievements!



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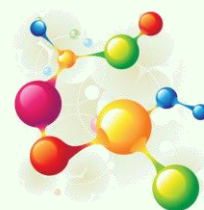
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FROM EDITORS' DESK

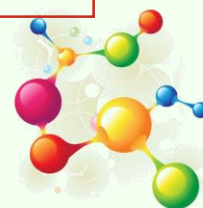
Warm greetings to the readers of Newsletter!!

We are pleased to share with you the fourth issue of the newsletter. In this edition, we are commemorating “Forging New Avatars of Material Science”. Scientifically speaking, with rampant advancement in medicine, architecture, technology and communication has augmented the demand for material science experts in shaping the form of human civilization. Innovative materials have overseen major technological advancement in the span of last fifty years. A diverse array of materials like polymers, ceramics, glass, rubber, plastic, chemicals, minerals and even textiles in newfangled avatars has been sought after by chemical engineers, polymer scientists, applied chemists, physicists, geologist, ceramics/glass and structural engineers. Therefore, the materials technology is truly an enabling technology and there are no signs dying up the quest for forging “new avatar” materials in the future. Moreover, these advanced materials will be the rate determining step in introducing the tomorrow’s technologies and industries.

However, the seminal contributions made by the novel materials has not received the recognition they deserve. Therefore, to celebrate the seminal contributions of “new avatar” materials in contemporaneous science and engineering, the Chemistry Department at PDEU corroborated with the Department of Physics to organize MMETFP-2021 from November 19-21, 2021. The symposium brought together multi-disciplinary group of scientists and engineers from all over the world to present and exchange break-through ideas relating to the material science and engineering. The symposium promoted top level researchers to globalize the quality research in general, thus making discussions, presentations more internationally competitive and focusing attention on the recent outstanding achievements in the field of material science, and future trends and needs. The symposium covered very global aspects on chemistry material science very fundamental issue to practical application of the diverse functional material in future progress of material science.

We would like to thank organizing committee for assembling together great scientists from different countries around the world and sharing new and exciting results in materials of the millennium. Moreover, we would also like to take this opportunity to thank the contributors of the newsletter for their constant support in making this newsletter a success.

Editorial Team





Message from Head of Department

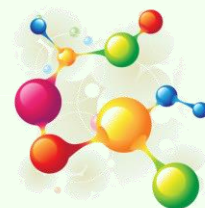
Dear Colleagues and Students,



I am extremely delighted to share the 4th issue of our departmental Newsletter. The current theme of “Materials of the Millennium” is very appropriate as we are just through with the international symposium bearing the same name. The symposium has been a huge success with over 400 participants engaged in presentation and interaction for two days. Our departmental colleagues and the research scholars, in particular, have made this possible through their perseverance. This issue of the newsletter would encompass various aspects of the symposium in addition to the regular activities covered by the department. I wish all the best to the editorial team for bringing out such a good theme out of this issue.



**Prof. Rajib Bandyopadhyay at the
Concluding Session of MMETFP 2021**





Linking Materials to Environment: Role of chemists

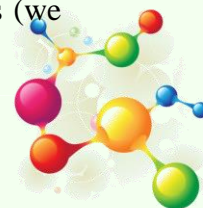
-Dr. Anirban Das



Preface: This quarterly issue of ‘Chemstreet’ appears barely a month after the International conference (MMETFP-21) jointly organized by the chemistry and physics departments during 19-20 November 2021. After the editors asked me to contribute an article for this issue, I thought it would be appropriate to connect the write-up to the conference theme *Material Science*. Here I attempted linking materials and their suitable applications to finding solutions to environmental issues pertaining to groundwater (de)contamination (e.g., here I focused on a classical contaminant such as fluoride). Fluoride is the common class of groundwater contaminants across many states of India, and unfortunately, that includes the state we currently reside in.

Understanding groundwater contamination: Contamination of groundwater is one of the major environmental issues in the world today—at local and/or at regional scales. Since groundwater is used as a primary source of drinking water thus it is obligatory that we are concerned about its quality. Deterioration of water quality (e.g., due to high salt, arsenic, fluoride, heavy metals, pesticides, organic chemicals, etc.) occurs by natural and/or anthropogenic sources. Therefore it is necessary that we understand better the nature, causes, sources, and extent of the contamination. Since many of these contaminants stay in the groundwater (in dissolved form) for a longer amount of time (high residence times) before they are removed by natural processes we need appropriate methods and technologies to remove (or lower down) the high concentrations of these contaminants to their respective safe-limits before we can consume the water. A purist’s approach would be not to contaminate the groundwater by human interventions which goes with the saying “*Prevention is better than cure*” but that does not happen in practice. In comparison, the realistic incentive for us would be ‘*the less we contaminate the better off we are*’. Again for natural contaminations (notably As, F, Fe, Cr, etc.), we can do very little to prevent them. Hence the bottom line is “*we need to find appropriate, cost-effective, novel, benign, high efficient techniques to decontaminate groundwater contaminants*” with a few words of caution: (i) *there is almost no blanket solution to decontaminate all contaminants in one go, and (ii) any of the decontamination techniques may not have all the advantages of equally being benign, efficient, cost-effective, etc.*

What is the case with Fluoride? Fluoride, possibly next to Arsenic, has been known to be one of the common contaminants in groundwater. Long-term consumption of drinking water with fluoride $>1.5 \text{ mg L}^{-1}$ is known to cause a common health problem what is known as fluorosis—notably, young children from several states are severely affected by the problem which causes deformities in teeth and bones. In recent studies, other health issues such as neurological effects, genetic effects, insulin resistance, urinary tract diseases, thyroid hormone issues, and respiratory problems, have also been linked to the excess fluoride in drinking water. Therefore this connection between human health and high fluoride probably triggers us (we

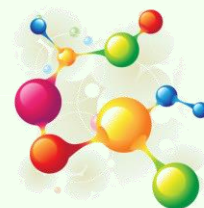




chemists and chemical engineers) to understand better the problem of fluoride in drinking water and to work on efficient methods/processes and look for novel materials to defluoridate drinking water. A very brief overview on defluoridation methods are presented in an attempt to introduce the challenging field of developing newer materials for their use in the decontamination of water, to the young researchers.

On defluoridation: Precipitation (by Ca and Al salts) and adsorption are two of the classical methods to remove fluoride from water. Adsorption, e.g., a solid carbon-based material, use several principles such as ion exchange, complexation, coordination, chelation, physical adsorption, and micro-precipitation. Fluoride removal methods such as membrane separation and ion exchange processes though efficient have some limitations of high installation cost and operative maintenance. Adsorption-based removal is normally economical, works over a broad pH range, and is efficient compared to precipitation-based removal. Activated alumina (and its modifications included) is one of the generally used sorbents though a slow adsorption rate prevents it from treating large quantities of water. Graphite-based materials are a newer class and are drawing attention in water purification (in general) because of their better physical properties such as surface area, flexibility, and high mechanical strength. There are other natural materials such as red mud and clay that have also been tested for the removal of pollutants. Zeolites are also an interesting class because of their porous nature. Recently (within the last decade), new adsorbent materials such as Al impregnated carbon, Zr impregnated collagen fiber, rare earth ions, chitosan-coated silica, nanostructured diatom-ZrO₂ composites made from algal biomass, Ca-Zn(OH)₂CO₃, chitosan-Pr complex, carboxymethyl cellulose loaded with Zr, CeO₂-ZrO₂ nanocages, hydroxyapatite nanowires all have shown to offer promising and interesting results. Thus there is a tremendous scope to work on these recent novel materials.

And finally: The management of groundwater resources is an important challenge. Ensuring the public health safety of consumers in regions where groundwater is contaminated in some or the other form becomes the topmost priority of stakeholders. Therefore, the science and technology involved with the development of materials for the decontamination of water is an exciting academic challenge that needs to be taken up. Perhaps it is also gratifying in a sense— as one can contribute towards a sustainable society.





Graphene: The Material of New Millennium

-Krunal Baria (M.Sc. Chemistry Semester 1)

Scientists have not unanimously settled on a precise definition of nanomaterials but agree that they are partially characterized by their tiny size, measured in nanometres. A nanometre is one-millionth of a millimeter - approximately 100,000 times smaller than the diameter of a human hair.



Nano-sized particles exist in nature and can be created from various products, such as carbon or minerals like silver. Still, by definition, nanomaterials must have at least one dimension that is less than approximately 100 nanometres. Most nanoscale materials are too small to be seen with the naked eye and even with conventional lab microscopes.

Materials engineered to such a small scale are often called engineered nanomaterials (ENMs), which can take on unique optical, magnetic, electrical, and other properties. These emergent properties have the potential for significant impacts in electronics, medicine, and other fields. Their size makes them extremely useful in electronics, and they can also be used in environmental remediation or clean-up to bind with and neutralize toxins.

Graphene has emerged as one of the most promising nanomaterials because of its unique combination of exceptional properties.

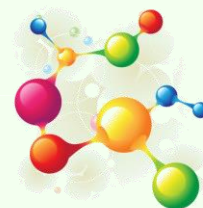
Graphene was first demonstrated in 2004 by Andre Geim and Konstantin Novoselov, two physicists from the University of Manchester, for which they received the Nobel Prize in 2010. Scientists argued that 2D crystalline materials were thermodynamically unstable and could not exist.

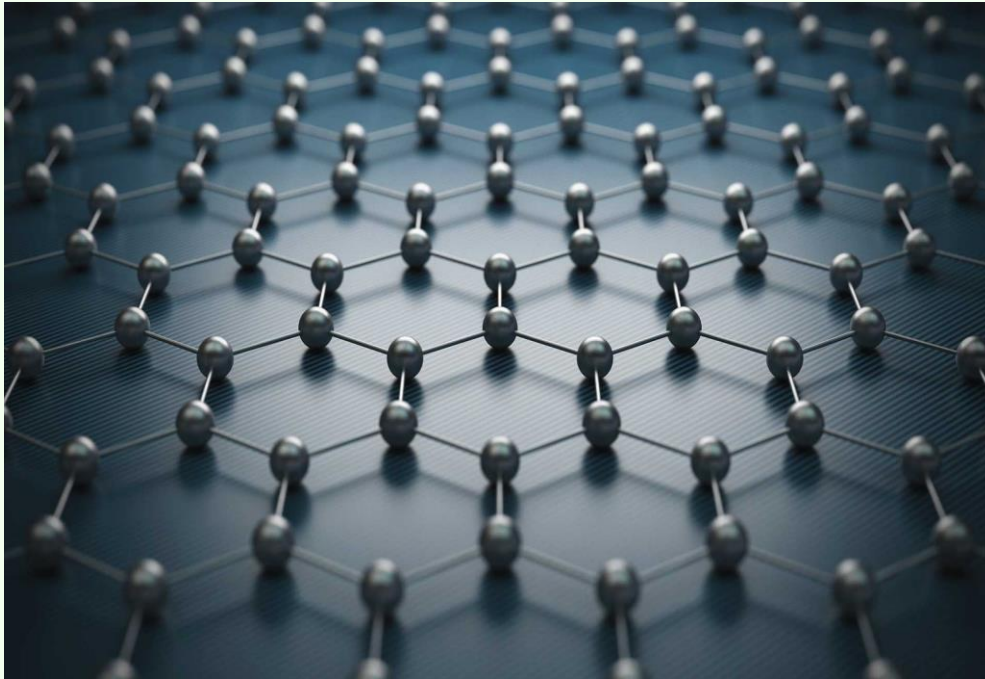
Graphene had already been studied theoretically in 1947 P.R. Wallace as a textbook example for calculations in solid-state physics. He predicted the electronic structure and noted the linear dispersion relation. The wave equation for excitations was written down by J.W. McClure already in 1956, and G.W. Semenoff discussed the similarity to the Dirac equation in 1984.

In 2002, Geim became interested in graphene and was challenged by a Ph.D. student to polish a hunk of graphite to as few layers as possible. He managed to produce a flake of graphite roughly 1,000 layers thick - a little short of the mark.

Graphene is the name for a monolayer sheet of carbon atoms bonded together in a repeating pattern of hexagons. This sheet is only one atom thick. Monolayers of graphene stacked on top of each other form graphite. Since a typical carbon atom has a diameter of about 0.33 nanometres, there are about 3 million graphene layers in a 1 mm thick graphite sheet.

Graphene represents a conceptually new class of materials with only one atom thick, so-called two-dimensional materials. They are called 2D because they extend in only two dimensions: length and width; as the material is only one atom thick, the third dimension, height, is considered zero. And it is only at this single- or few-layer state that graphene's remarkable properties appear.





In graphene, each carbon has an odd electron and each one is a triangular planar sp^2 hybridized 2d plane. These carbon atoms form a Honeycomb lattice-like structure.

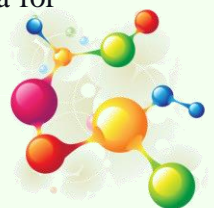
It is not only the thinnest but also one of the strongest materials; it conducts heat better than all other materials; it is an excellent conductor of electricity; it is optically transparent, yet so dense that it is impermeable to gases – not even helium, the smallest gas atom, can pass through it. Harder than diamond, more elastic than rubber, tougher than steel, and lighter than aluminum, graphene is the most robust known material.

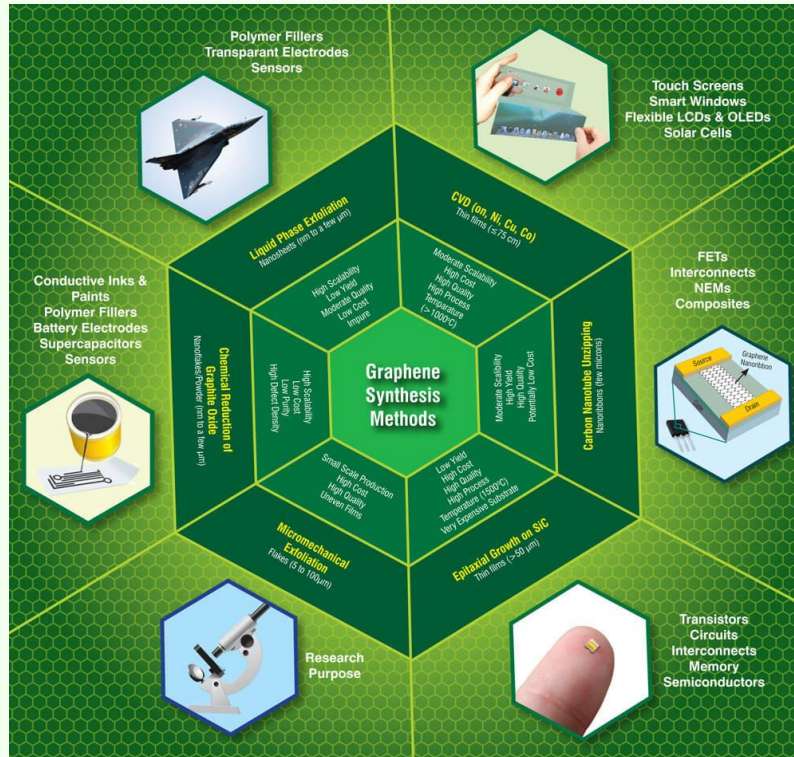
In scientific terms, graphene's extraordinary characteristics originate from the 2p orbitals, which form the π state bands that delocalize over the sheet of carbons that constitute graphene.

To put this in perspective: if a sheet of cling film (like kitchen wrap film) had the same strength as a pristine single layer of graphene, it would require the force exerted by a mass of 2,000 kg, or a large car, to puncture it with a pencil.

Thanks to the unique structure of graphene, it possesses other remarkable characteristics:

- Its high electron mobility is 100x faster than silicon.
- It conducts heat 2x better than diamond.
- Its electrical conductivity is 13x better than copper.
- It absorbs only 2.3% of reflecting light.
- It is impervious so that even the smallest atom (helium) can't pass through a defect-free monolayer graphene sheet, and its high surface area of 2,630 square meters per gram means that with less than 3 grams, you could cover an entire soccer field. (Well, practically speaking you would need 6 grams since 2,630 m^2/g is the surface area for both sides of a graphene sheet).



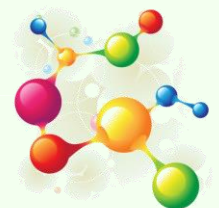


There are a few methods of Graphene synthesis shown above.
(Image Source: CKMNT)

Graphene-based nanomaterials have many promising applications in numerous technological areas. Here are some of the Uses of graphene nano-material.

- Energy storage and solar cells
- Graphene-based biological and chemical sensors
- Graphene Membranes
- In Stem cells therapies as a biocompatible scaffold
- As Transistors and Photodetectors
- Graphene Coatings
- Radiation shielding and Thermal Management

Reference: <https://www.nanowerk.com/>





Dialogue with the Convener, MMETFP

-by Shikha Shah (B.Sc. Chemistry Semester 5)



The recent international symposium on “Materials of Millennium” was a huge success and a highly talked about event. Check out this interview with Dr. Kalisadhan Mukherjee to know about behind the scene information.

- ❖ After a period of a very long time, such a big conference was being held, what were your feelings and how did the planning of the whole symposium come about?
 - I joined the institute in 2019, and the planning started in 2020 January, and since my background is from Material science, and I did my Ph.D. from the Material science department in IIT Kharagpur, I got this opportunity. I thought that there is a good opportunity to grow the material science field not only in PDEU but also in nearby regions. This is the reason why we wanted to conduct this symposium and then we got help from the Material Research Society of India, Gujarat sector. When we got the association of MRSI, we started thinking about a bigger event. I met the Secretary of MRSI of Gujarat sector, Prof. Jani and slowly we started our planning. Initially, we were planning for 200 participants on the campus as the symposium was planned for 2020 January. But then the pandemic happened and it got postponed to November of this year. As the planning proceeded, we started to get sponsorships and also publication opportunities. All these things inspired us a lot. It was beyond our expectations and we were very joyed to get such a huge response. In the end, we had around 410 participants. I don't know much but as far as I have come to know this was the first time this many people had participated. We also got a lot of support from every member of the team at the right thing and at the right time and I also appreciate the support from the administration and college.
 - ❖ You were the convener for this symposium. Do you enjoy this type of leadership role?
 - Being a convener was a big challenge but I am pleased with the results. By definition, I don't know if I am a leader or not but the thing is that yes in small events, I got opportunities to play such roles like if you can consider this, I was captain of my team in my school as well as in my university. In small events, I got opportunities to take such a role and [one thing I learned from such opportunities is that if you give enough time for the planning and execution, you can achieve any task. You should have a clear](#)



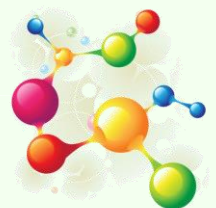


objective in mind and planning should be done according to that, after that execution must follow that path to get the best results.

- ❖ One of the features of this symposium was that it was conducted in hybrid mode. Can you tell us about your thoughts regarding hybrid mode?
 - Carrying out a hybrid event was very difficult. There are two different platforms one is online and then one is on-site, so the participants have different demands for online and offline mode. For on-site, we had to take care of logistics, food, accommodation, sitting arrangement, and so on. For online participants, we had to make sure they are involved by using the audio-visual method so that they can also enjoy the sessions. Since our participants were also in a very large number we had to go for, four parallel sessions that were also a little challenging but as I told you before this wouldn't have been possible without team members, volunteers, and also panel members. They made things a little easier for me but still, if you ask me whether this hybrid event is useful or not then I will tell you that yes, a **hybrid event is very important because it gives the opportunity to bring all the people together, even from various international forums. Everyone can enjoy, learn and exchange ideas, through this mode.**

- ❖ Apart from many eminent researchers a lot of young researchers also presented at the event. How do you feel about that, and how important is it for them to participate in such events?
 - When we started this journey, we thought if we make it like any other general conference, we may not be able to attract people from all the age groups like students, early career researchers, mid-career researchers. So, we thought to put some kind of platform to represent all age groups. We invited established researchers who are renowned across the globe, and also established women researchers in the field of material science, we also had a young researchers' colloquium. It was a platform for the students who are doing research but haven't got their Ph.D. yet. It gave them the opportunity to learn. We also had special sessions for the emerging area of material science and also a career fair for UG, PG, and Ph.D. students. We brought many people to participate in this career fair, starting from small industries, startups, and also international fellowship holders. All altogether we have tried to give an opportunity to researchers of all age groups and all stages in their research life. The audience enjoyed the sessions a lot and we received positive feedback from many people.

- ❖ There were many profound sessions over the course of two days. Do you recall any session or lecture that you particularly enjoyed?



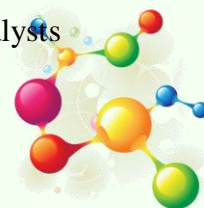


- As a convener, I can say that starting from the inaugural session, all sessions are important and that every session has its own impact. There are some advantages for each session because if you see the invited speakers, they are renowned researchers. Young researchers also shared their thoughts, if you consider a career fair then it was another opportunity for students. Through women researchers' session we tried to convey a message. But if you ask me then I would say that yes, sessions like the career fair are very important as they provide insight and guidance about their potential career growth and opportunities.

- ❖ You talked about MRSI in the beginning, so can tell us a little about MRSI and what role did it play?
 - MRSI or Material Research Society of India is a society dedicated to the field of materials science and engineering in India. It integrates research in the field of materials for rapid industrial progress in the country. It Supported a lot, also monetarily. But not only that if you keep your conference name in association with MRSI it means you are involving a lot of people who are renowned in the field of materials research science. That is a big thing as you are directly getting exposure to many renowned researchers. Collaboration with MRSI adds weight to the event and it attracts many people.

- ❖ What is your key takeaway from this symposium and anything you would like to keep in mind for the next one?
 - One thing we were not able to do was to extend the deadline for the submission of the abstract. We got many requests from the renowned institutes, and also from renowned researchers to consider their abstract but we could not do that and we are extremely sorry. Personally, I would like to concentrate more on the exhibition aspect of the materials research conference. For the exhibition, you can bring various industries and it will be helpful for students, who are actually searching for jobs in material science.

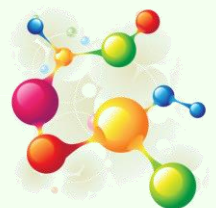
- ❖ This issue highlights “Materials of Millennium”. Can you tell us about any materials that have changed the society for better?
 - There are a lot of opportunities, in a different direction you can use different materials and you can improve a lot. But being in an energy institute, I'll be a little selective here, if you talk about energy, we use fossil fuels, they are depleting rapidly and also emit toxic agents like greenhouse gases. As a result, nowadays hydrogen is being considered as a source of green fuel. Researchers are trying to develop methods for using hydrogen as a green energy source. People are also trying to develop solar cells which can utilize the entire spectra of solar energy. Researchers nowadays are using different catalysts





for hydrogen production and also perovskite solar cells are being used. This can happen only because of the evolution in material science and due to the invention of certain kinds of materials. If we can bring novelty in materials, then we can use that to improve the environment and can also address many other challenges.

- ❖ Lastly, what message would you like to convey to the readers of the Newsletter?
 - If you ask me then I think, the only thing that is very important is to be interdisciplinary and open in nature. I always ask my student to be very open not only for their subject but also for other disciplines. Obviously, it is important to be an expert on your subject but in order to solve the demands of society and laymen, one needs to keep his eye open and needs to have some knowledge about other disciplines as well. **It is very important that students and researchers nowadays have a problem-solving attitude.** This conference really helps in bringing people of different mind-set and different disciplines together on one forum and that will help to grow your horizons and knowledge. This can further help in solving problems.





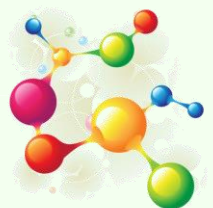
The art of Snowflakes

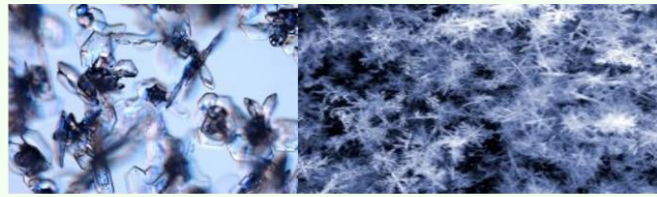
-Bhooma Bhagat (Ph.D. Scholar)



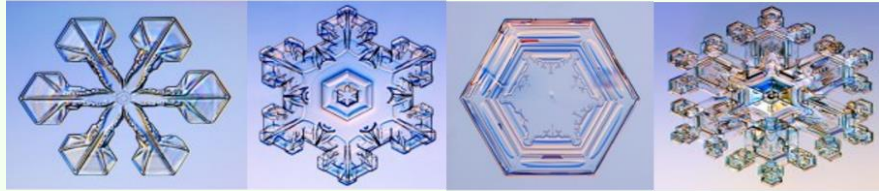
With the onset of winter, the best thing is to embrace cold weather, mountaintop views, and the snowflakes sparkling on the grounds. Ever wondered if sparkling snowflakes are all similar or different! Snowflakes are all the same on an atomic level (they are all made of the same hydrogen and oxygen atoms), but structurally no two snowflakes are similar. It is almost impossible for snowflakes to form complicated designs in the same way. A natural snowflake starts when water freezes into a crystal around a speck of dust. It begins when a tiny dust or pollen particle comes into contact with water vapor high in Earth's atmosphere. The water vapor coats the tiny particle and freezes into a tiny crystal of ice. This tiny crystal will be the "seed" from which a snowflake will grow.

The newly-formed ice crystal (snowflake) is heavier than the surrounding air and it begins falling. As it falls towards Earth through the humid air, more water vapor freezes onto the surface of the tiny crystal. This freezing process is very systematic. The water molecules of the vapor arrange themselves so that the hexagonal crystal structure of ice is repeated. The snowflake grows larger and larger as it falls, enlarging the hexagonal pattern. Although all snowflakes have a hexagonal shape, other details of their geometry can vary. These variations are produced by different temperature and humidity conditions through which the snowflake falls. Some temperature/humidity combinations produce flakes with long needle-like arms. Other conditions produce flakes with wide flat arms. Other conditions produce thin, branching arms. These different shapes have an unlimited number of variations, each representing the conditions of temperature and humidity, and water vapor the snowflake encountered during its fall. The formation of snowflakes high in Earth's atmosphere does not guarantee snowfall on Earth's surface. That will only happen if air temperatures are below freezing to the ground, as shown in the accompanying illustration. If the snowflakes pass through a layer of warm air that is thick enough to melt them completely, then land on a cold Earth surface, the result could be freezing rain. The International Commission on Snow and Ice system defines the seven principal snow crystal types as plates, stellar crystals, columns, needles, spatial dendrites, capped columns, and irregular forms.





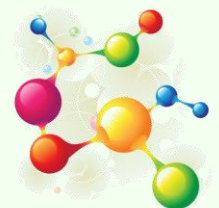
Irregular Crystals Fernlike Stellar Dendrites



Sectored Plates Stellar Plates Simple Prisms Stellar Dendrites

References

1. <https://www.its.caltech.edu/~atomic/snowcrystals/class/class-old.htm>
2. <https://www.scientificamerican.com/article/snowflake-structure-still-mystifies-physicists/>





The Chemistry of Christmas

Christmas turkey

The Maillard reaction between amino acids and reducing sugars gives the Christmas turkey its distinctive flavor and taste!



Christmas tree

The aroma of natural Christmas trees is due to α - and β -pinene and bornyl acetate!

Christmas Tree Preservative

You can preserve your Christmas tree by using common household ingredients like water, corn syrup, chlorine bleach, and lemon juice or vinegar.



Coloured Fire Pinecones

Want to add some colors to your Christmas?? Soak the pine cones in different salt solutions, then take them out and dry. They will burn with colored flame when put on a coal fire. Yellow flame for common salt, turquoise for copper sulphate.

Snow appears white when water & ice are clear!

Snowflakes have so many light-reflecting surfaces they scatter the light into all of its colors, so snow appears white.

Fake Snow

You can make fake snow from a common polymer known as sodium acrylate, a water-absorbing polymer. Fake snow feels like a real one, cool to touch and non-toxic.



Snowflake Chemistry

Snowflakes are made up of ice crystals which have hexagonal structures. Snowflakes have various shapes depending upon temperature.



Dr. Megha Balha

Dr. Nandini Mukherjee



https://www.chemistryviews.org/details/azine/10702101/The_Chemistry_of_Christmas.html

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Revisiting MMETFP-2021



Well organized and executed symposium!

It was an absolute privilege to be part of the conference. Working with a tireless group of students and colleagues would remain in memory for a long time.



It was really well managed.



Good

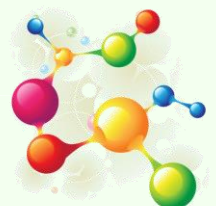


Excellent

Good



It was a pleasant experience to attend MMETFP-2021 conference organized at PDEU Gandhinagar. I wish to express my deep appreciation to the wonderful organizing committee at Pandit Deendayal Energy University (PDEU) for organizing this symposium, embracing the successful orchestration of myriad details they have so capably overseen. Our gathering would be impossible without their talent and support that has brought us together.





Revisiting MMETFP-2021



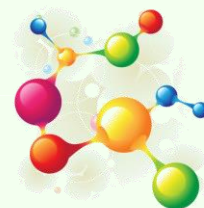
The symposium was organized in a very systematic manner. The expert talks were very informative and helpful. The posters presented by the scholars were really great. The young researchers session was a new idea and was very inspiring. Overall, the symposium was well organized and full of diverse scientific knowledge.

Materials of Millenium (MMETFP-2021) being the first symposium organized by Department of Chemistry will always remain special. MMETFP-2021 served as a great opportunity for learning and exposure to research community for the young researchers. It was a great experience being a part of the organizing team. The enthusiasm and zeal of the student volunteers was unmatched. The teamwork coordination and co-operation of the all involved in the symposium was commendable. I congratulate the Convener Dr. Kalisadhan Mukherjee for the great success of the symposium.



As an organizing team member, it was a great experience--hectic and challenging at times, but extremely enriching. It was a wonderful opportunity for an early career researcher like me to be involved in the process almost from the beginning. We had an overwhelming response from the participants and pulling off such a hybrid mode conference was not easy. But as a team we made it. It goes without saying that we are all thankful to the convener Dr. Kalisadhan Mukherjee who ensured that we give our best to the respective task assigned. Hope to have more of this in the future, a 5 days one maybe (a banquet dinner and a heritage tour included hopefully)!!

Indeed, Materials of Millenium (MMETFP-2021) was a great success. I am so elated to be a part of the organizing committee. Organizing is much harder than we could imagine, but everything went as planned with the tremendous efforts of all the organizing committee members and student volunteers. I would like to congratulate the conference convener, Dr. Kalisadhan Mukherjee, for his thoughtful and effective organization. It was surely an academic feast. I hope to see many such symposiums in the near future.





Revisiting MMETFP-2021



MMETFP-2021 was my first ever off-site international symposium since I have joined PDEU as a faculty and of my life hitherto. Planning and execution of any event takes lots of efforts and dedication, and you can realise this only when you, yourself are in organising committee. I observed the extent of dedication from different teams devoted to different activities throughout the event. I found the faculties and students at the same page in understanding each other which leads to smooth organisation of the international event. The cooperation was incredible from the day 1 to the last day of the symposium, within the students and faculties from involved departments as well (Physics and Chemistry). The valedictory function of the MMETFP-2021 was the captivating one. Most of the participants were present at the valedictory function, and their full of beans' clapping's which resonates the whole event to the next level of success. Finally, I must congratulate the Convener "Dr. Kalisadhan Mukherjee" for initiating and successfully completing the international symposium at a positive note.

**Aayushi
Joshi**

Good conference!

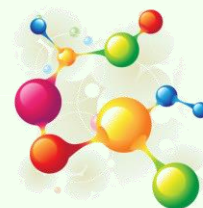
The lectures from invited speakers and presentation sessions covered a wide range of topics in material field and yet were all connected by our common research interests.

It's my first conference and I feel very good and energetic.

**Rohit
Prajapati**

**Nikunj
Vagadiya**

My whole mindset drastically changed: A symposium for publishing paper to feel like your own occasion. I enjoyed the symposium by learning to anchor and manage so many things. I met new big shots to my guide and discussed their Ph.D. journey with them without hesitating. I think these were precious moments of my life.





QUIZ

1) The largest component of Coal gas is__?

- [A]Methane
- [B]Hydrogen
- [C]CarbonDioxide
- [D] Carbon Monoxide

2) With reference to the Radioactivity, which among the following is called an isomeric transition?

- [A] Alpha emission
- [B] Gamma emission
- [C] Beta emission
- [D] X-Ray emission

3) How can we prepare Hydrogen at our home?

1. Immersing alkali metals in water at room temperature
2. Pouring Sulphuric acid on a copper plate
3. Boiling zinc with caustic soda
4. Passing an electric current through rainwater

Select the correct option from the codes given below:

- [A] Only 1 & 2
- [B] Only 1, 3 & 4
- [C] Only 2, 3 & 4
- [D] 1, 2, 3 & 4

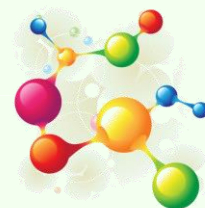
4) One of the essential minerals in the human body is salt. How much salt (NaCl) is in the average adult human body?

- [A] 1 kg
- [B] 250 g
- [C] 500 g
- [D] None of the above

5) If you fill a glass to the brim with ice water and the ice melts, what will happen?

- [A] The glass will overflow as the ice turns to water.
- [B] The level of water in the glass will remain unchanged as the ice melts.
- [C] The water level will drop slightly as the ice melts.
- [D]I'll never find out because I'll drink the water or walk away before anything happens.

See page 61 for answers.





DEPARTMENTAL EVENTS & ACTIVITIES

Workshops/Webinars Organized

- ❖ **Dr. Anu Manhas** conducted a Special Session on Career Fair (Career Opportunity for UG/PG/Ph.D. Students) at the '1st International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP 2021)' on 20th November 2021.
- ❖ **Dr. Kalisadhan Mukherjee** conducted the International Symposium “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects” 19-21 November 2021.
- ❖ **Dr. Megha Balha** conducted a Special Session on Career Fair (Career Opportunity for UG/PG/Ph.D. Students) at the '1st International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP 2021)' on 20th November 2021.
- ❖ **Dr. Nandini Mukherjee** conducted a Special Session on Career Fair (Career Opportunity for UG/PG/Ph.D. Students) at the '1st International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP 2021)' on 20th November 2021.
- ❖ **Dr. Rama Gaur** conducted a National webinar on Intellectual Property Rights and Career Opportunities in IPR to be held on 25th September 2021.
- ❖ **Dr. Rama Gaur** conducted a Special Session on Career Fair (Career Opportunity for UG/PG/Ph.D. Students) at the '1st International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP 2021)' on 20th November 2021.
- ❖ Department of Chemistry, Pandit Deendayal Energy University (PDEU) in collaboration with Metrohm India Ltd. organised a training webinar on Electrochemical workstation and Nova software at 2:30 PM on 9th October, 2021 (Speaker- Mr. Bhavin Koladia, Co-ordinator- **Dr. Rama Gaur**)

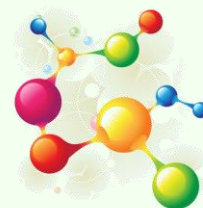
RESEARCH PUBLICATIONS

Dr. Anu Manhas

- Siddhi Kediya, **Anu Manhas**, Prakash C. Jha, “DFT/TD-DFT study to decipher the fluoride induced ring opening process of spiropyran”, Journal of Molecular Graphics & Modelling 2021, DOI: 10.1016/j.jmgm.2021.108049.
- Siddhi Kediya, **Anu Manhas**, Prakash C. Jha, “Benzothiazole-based chemosensor: a quick dip into its anion sensing mechanism”, Journal of Physical Organic Chemistry 2021, DOI:10.1002/poc.4283

Dr. Rajib Bandyopadhyay

- Dolly Gandhi, **Rajib Bandyopadhyay**, Bhavna Soni, “Zeolite Y from kaolin clay of Kachchh, India: Synthesis, characterization and catalytic application”, Journal of the Indian Chemical Society 98 (2021) 100246.





Dr. Prakash Chandra

- **Prakash Chandra**, "Recent Advancement in the Copper Mediated Synthesis of Heterocyclic Amides as Important Pharmaceutical and Agrochemicals" *ChemistrySelect* 6 (38), 10274-10322.

Dr. Ranjan Pati

- "Inorganic Solid-State Electrolytes: Insights on Current and Future Scope", *Journal of The Electrochemical Society*, 168, 8, 080536 (2021)

Dr. Syed Shahabuddin

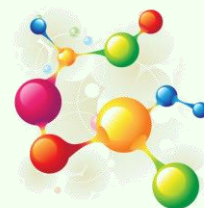
- Deepika, K., R. Shankar, Adarsh Kumar Pandey, **Syed Shahabuddin**, Richa Kothari, and Priyank Agarwal. "Reduction of Emission Gas Concentration from Coal Based Thermal Power Plant using Full Combustion and Partial Oxidation System." *Journal of Engineering Research* (2021).
- Abdelnaser, Sumayah, Mohammad Ridwane Mungroo, **Syed Shahabuddin**, Ruqaiyyah Siddiqui, Naveed Ahmed Khan, and Ayaz Anwar. "Polyaniline-Conjugated Boron Nitride Nanoparticles Exhibiting Potent Effects against Pathogenic Brain-Eating Amoebae." *ACS chemical neuroscience* 12, no. 19 (2021): 3579-3587.
- Rashidi, Ladan, Hamid Rashidi Nodeh, and **Syed Shahabuddin**. "Determination of Vitamin D3 in the Fortified Sunflower Oil: Comparison of Two Developed Methods." *Food Analytical Methods* (2021): 1-8.
- Sofiah, A. G. N., M. Samykano, **S. Shahabuddin**, K. Kadirgama, and A. K. Pandey. "An experimental study on characterization and properties of eco-friendly nanolubricant containing polyaniline (PANI) nanotubes blended in RBD palm olein oil." *Journal of Thermal Analysis and Calorimetry* 145, no. 6 (2021): 2967-2981.
- Kalidasan, B., A. K. Pandey, **Syed Shahabuddin**, Mathew George, Kamal Sharma, M. Samykano, V. V. Tyagi, and R. Saidur. "Synthesis and characterization of conducting Polyaniline@ cobalt-Paraffin wax nanocomposite as nano-phase change material: Enhanced thermophysical properties." *Renewable Energy* 173 (2021): 1057-1069.
- Baharin, Siti Nor Atika, Nurul Hafawati Hashim, Izyan Najwa Mohd Norsham, **Syed Shahabuddin**, and Kavirajaa Pandian Sambasevam. "Optimization of Tungsten Disulfide/Polypyrrole Composite as Photocatalyst in Sunlight-Assisted Photodegradation of Methylene Blue in Aqueous Solution." (2021).

BOOK CHAPTERS

Dr. Syed Shahabuddin published the following book chapters

- *Dye-Sensitized Solar Cells: Emerging Trends and Advanced Applications* (Book in Elsevier)

RESEARCH GRANT





Dr. Tapan Pal was awarded Teachers Associateship for Research Excellence (TARE) under Science and Engineering Research Board

- **Project Title:** Detection of Biomarkers through Nanoscale Metal-Organic Frameworks (MOFs)
- **Duration:** 3 Years

Dr. Anu Manhas was awarded Teachers Associateship for Research Excellence (TARE) under Science and Engineering Research Board

- **Project Title:** A hybrid structure-based modelling technique in exploring the effectiveness of natural compounds against the potential anticancer druggable target cyclin-dependent kinase protein
- **Duration:** 3 Years

EXPERT TALK DELIVERED/ORAL PRESENTATION IN CONFERENCE-WEBINAR-SYMPOSIUM

Dr. Anirban Das

- Expert talk delivered during the special session on career Fair for UG/PG/Ph.D. student in the International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021) during November 19-21, 2021

Dr. Anu Manhas

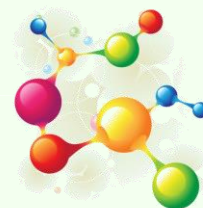
- Poster Presentation in DAE Symposium on Current Trend in Theoretical Chemistry (CTTC-2021) organized by BARC, September 25, 2021.
- Oral Presentation in 1st International Conference on Additive Manufacturing and Advanced Materials (AM2) organized by PDEU,
- Deliver a series of lectures on Computer-aided drug designing in Central University of Gujarat, October 12-13, 2021.
- Deliver lecture in Short-term course: Research interests in Pure and Applied Sciences organized by Sabarmati University, November 15-19, 2021.

Dr. Kalisadhan Mukherjee

- Expert talk delivered during a special session on career Fair for UG/PG/Ph.D. student in International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021) during November 19-21, 2021.

Dr. Megha Balha

- Oral Presentation: “Strategies for the Organocatalytic Asymmetric Synthesis of Bridged Acetal” 1st International Conference on Additive Manufacturing and Advanced Materials (AM2) held from 4-6 October 2021.





Dr. Nandini Mukherjee

- Oral presentation: "Recent Progress in Lysosome-Targetable Fluorescent BODIPY Probes for Bioimaging Applications" at the 1st International Conference on Additive Manufacturing and Advanced Materials (AM2) held from 4-6 October 2021

Dr. Prakash Chandra

- Oral presentation: "The Consequence of 3D-Orination of Cu/TEMPO/Imidazole Sequence on Selective Alcohol Oxidation" at the 1st International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021) held from 19-21 November 2021

Dr. Rama Gaur

- Oral presentation: "Recent advances in nano-structured transition metal sulfide-based sensors for environmental applications" at the 1st International Conference on Additive Manufacturing and Advanced Materials (AM2-2021) is to be held at Pandit Deendayal Energy University (PDEU) during 4-6 October 2021.
- Poster Presentation: "Facile synthesis of Type II ZnO-CdS nanostructures for applications in waste water treatment" at International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects. Pandit Deendayal Energy University, Gandhinagar during 19-20 November 2021.

Prof. Rajib Bandyopadhyay

- Expert talk delivered during a special session on career Fair for UG/PG/Ph.D. student in International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021) during November 19-21, 2021.

Dr. Syed Shahabuddin

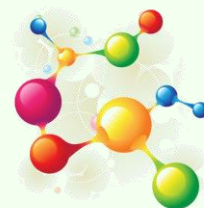
- Oral Presentation: "Conducting Polymers-Based Nanocomposites: Innovative Materials for Waste Water Treatment and Energy Storage" at the 1st International Conference on Additive Manufacturing and Advanced Materials (AM2) held from 4-6 October 2021.

PARTICIPATION IN FDP

Dr. Nandini Mukherjee participated in the 'National Webinar on Intellectual Property Rights and Career Opportunities in IPR' organized by the Department of Chemistry, PDEU on September 25, 2021.

HONOURS/AWARDS/RECOGNITION

Nitin Chaudhari





- Young Associate of Maharashtra Academy of Sciences for his significant contributions in the field of Chemical Sciences in the year 2021

Dr. Rama Gaur

- Awarded with a certificate of appreciation for exceptional contribution as a Primary Evaluator in 'Toycathon, 2021'

Prof. Rajib Bandyopadhyay

- Chaired a session in the 'International Conference on Condensed Matter and Device Physics (ICCMDP)-2021 during September 9-11, 2021'

DEPARTMENTAL ACTIVITIES

SOT SCHOOL OF TECHNOLOGY

NATIONAL WEBINAR ON INTELLECTUAL PROPERTY RIGHTS AND CAREER OPPORTUNITIES IN IPR
SEPTEMBER 25, 2021

INVITED SPEAKERS

 MS. DIPTI SACHDEVA Principal Training Coordinator, Patent Facilitating Centre, TIFAC New Delhi	 MRS. POOJA MAULIKAR Examiner of Patents and Designs, RGNIIPM, Govt. of India	 DR. ANURAG GUPTA Senior Mentor, Pandit Deendayal Energy University	 MS. SHIVA MEHTA Managing Associate Y J Trivedi & Company	 DR. RACHNA SHARMA Ph.D. Women Scientist (WoS-C) KIRAN IPR Scheme
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TITLE OF THE TALKS

- * Introduction & Overview of Intellectual Property Rights by Ms. Dipti Sachdeva
- * Intellectual Property Rights (IPR) & Patent process by Mrs. Pooja Maulikar
- * Understanding Process & Design Patents through Case Studies by Dr. Anurag Gupta
- * Patent Grant Process: Key concepts and case studies by Ms. Gopi Trivedi
- * Career Opportunities in IPR by Dr. Rachna Sharma

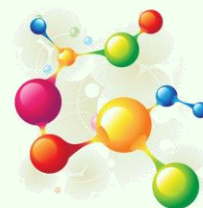
TIME : 11:00 AM- 2:30 PM

LINK FOR REGISTRATION <https://rb.gy/seebjr>

ORGANIZED BY
DEPARTMENT OF CHEMISTRY, SCHOOL OF TECHNOLOGY,
PANDIT DEENDAYAL ENERGY UNIVERSITY
GANDHINAGAR, GUJARAT-382426 INDIA

COORDINATOR
DR. RAMA GAUR
For any queries contact:
+079-2327 5356
rama.gaur@sot.pdpu.ac.in

No Registration fees
For Ph.D. M.Sc./M.Tech.
and B.Sc. Students
E-certificates will be provided





International Symposium on
**Materials of the Millennium:
Emerging Trends and
Future Prospects**

(MMETFP-2021)

 **International Symposium on
MATERIALS OF THE MILLENNIUM:
Emerging Trends and Future Prospects (MMETFP-2021)** 
NOVEMBER 19-21, 2021

 **EXCITING FEATURES:**

- ★ Hybrid mode (on site and online)
- ★ Lectures by Eminent Researchers
- ★ Young Researcher's Colloquium
- ★ Special Session on Women in Materials Research
- ★ Virtual Career Fair
- ★ Opportunity to Host Special Session
- ★ Publication in Scopus indexed **Journal Materials Today: Proceedings** and **Book Series of Springer Proceedings in Materials** (after review process)

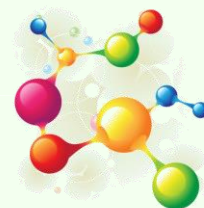
REGISTRATION FEES
National Delegates:
UG & PG: INR 1000/-
Ph.D and Postdoc: INR 2000/-
Faculty/Scientist: INR 3000/-
International Delegates:
Full delegates: USD 50
Student delegates: USD 30



LAST DATE FOR ABSTRACT SUBMISSION: SEPTEMBER 24, 2021
For more detail, click on link <http://sot.pdpu.ac.in/mmetfp.html> 

ORGANIZED BY
School of Technology,
Pandit Deendayal Energy University, Gandhinagar, Gujarat, India 







 **INTERNATIONAL SYMPOSIUM ON MATERIALS OF THE MILLENNIUM:
EMERGING TRENDS AND FUTURE PROSPECTS (MMETFP-2021)** 

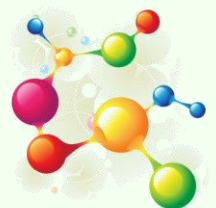
CAREER FAIR
20 November 2021

An excellent networking opportunity with other industry partners, experienced researchers and young minds
The career fair will be held in hybrid mode

Scan the QR code 

COORDINATORS: DR. RAMA GAUR, DR. NANDINI MUKHERJEE, DR. ANU MANHAS & DR. MEGHA BALHA

For more details visit: <http://sot.pdpu.ac.in/mmetfp.html> 





INTELLECTUAL PROPERTY RIGHTS



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Ministry of Commerce and Industry

उद्योग सतर्धन और आंतरिक व्यापार विभाग
Department for Promotion of Industry and Internal Trade

महानियंत्रक एकरव, अभिकल्प एवं व्यापार चिह्न का कार्यालय
Office of the Controller General of Patents, Designs & Trademarks



Rajiv Gandhi National Institute of Intellectual Property Management, Civil Lines, Nagpur. 440 001 (INDIA)

CERTIFICATE

This is to certify that the organization **Department of Chemistry, School of Technology, Pandit Deendayal Energy University, Gandhinagar, Gujarat** has successfully conducted online workshop on IPR on 25th September 2021 in association with RGNIIIPM, Nagpur, which was attended by faculty members and students.

We wish the above organization can conduct more programs with us to spread the IPR awareness amongst the faculty, students, Incubation centers, SMEs, Start-ups in their jurisdiction to fulfill our objective of National IPR policy 2016.

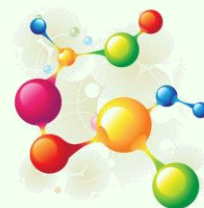
All the Best.

With regards,

BHARAT N.S
Assistant Controller of Patents & Designs/
Training Co-ordinator, RGNIIIPM

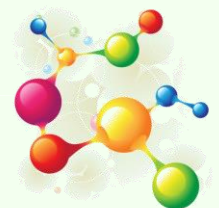
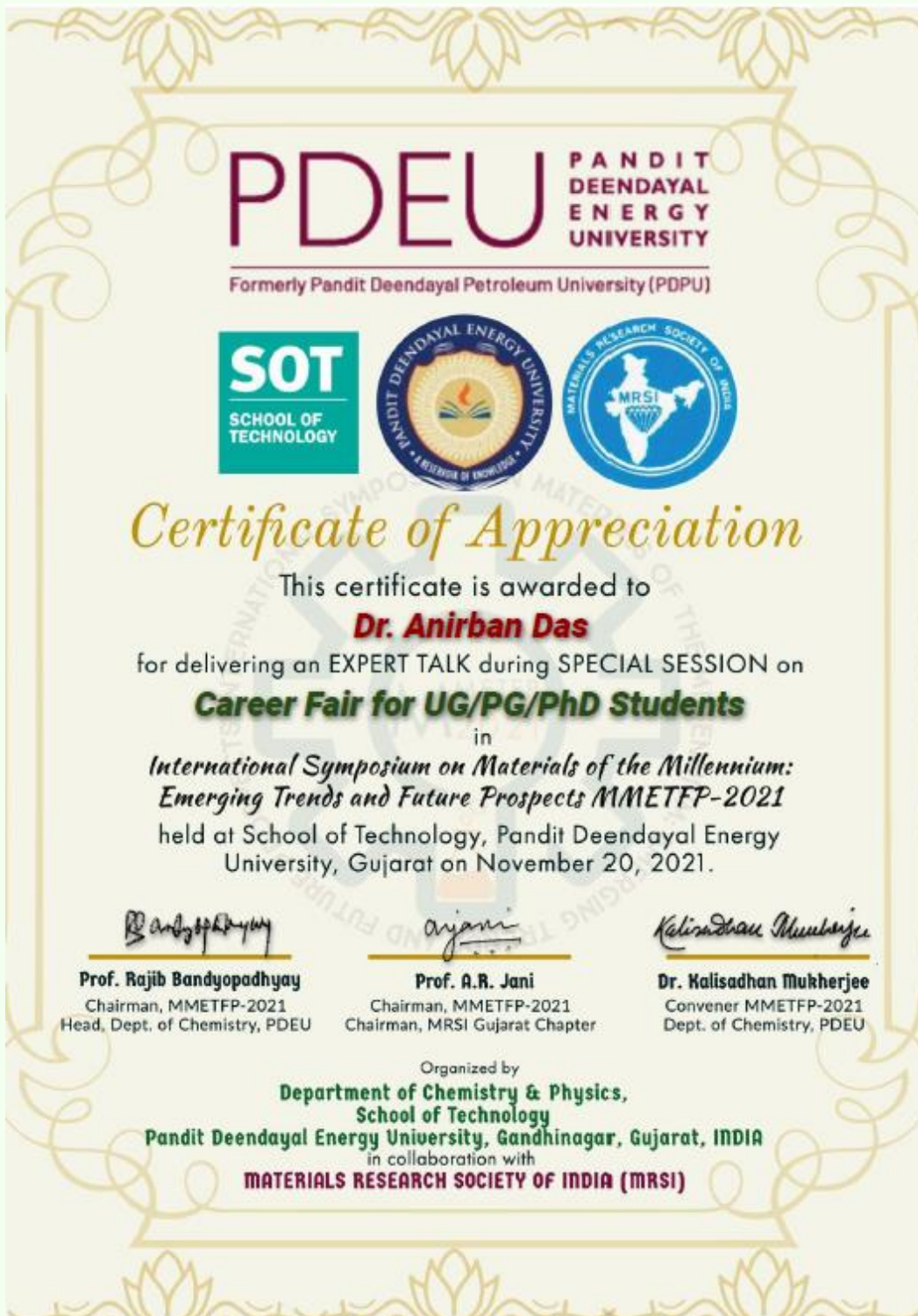
PANKAJ BORKAR
Deputy Controller of Patents & Designs
Head, RGNIIIPM

21st September 2021
RGNIIIPM/Trg.2021/8288





EXPERT TALK DURING CAREER FAIR @MMETFP-2021





PDEU PANDIT
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ENERGY
UNIVERSITY

Formerly Pandit Deendayal Petroleum University (PDPU)



Certificate of Appreciation

This certificate is awarded to

Dr. Kalisadhan Mukherjee

for delivering an EXPERT TALK during SPECIAL SESSION on

Career Fair for UG/PG/PhD Students

in

*International Symposium on Materials of the Millennium:
Emerging Trends and Future Prospects MMETFP-2021*

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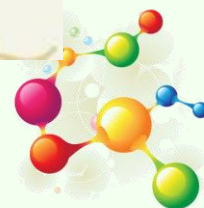
Prof. Rajib Bandyopadhyay
Chairman, MMETFP-2021
Head, Dept. of Chemistry, PDEU

Prof. A.R. Jani
Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter

Dr. Kalisadhan Mukherjee
Convener MMETFP-2021
Dept. of Chemistry, PDEU

Organized by

**Department of Chemistry & Physics,
School of Technology
Pandit Deendayal Energy University, Gandhinagar, Gujarat, INDIA**
in collaboration with
MATERIALS RESEARCH SOCIETY OF INDIA (MRSI)





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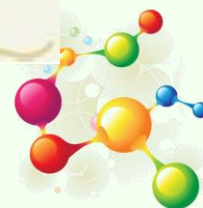
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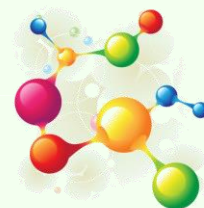
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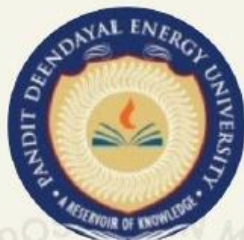
SPECIAL SESSION COORDINATED ON CAREER FAIR @MMETFP-2021





PDEU PANDIT DEENDAYAL ENERGY UNIVERSITY

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Certificate of Appreciation

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Prof. A.R. Jani

Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter

Dr. Kalisadhan Mukherjee

Convener MMETFP-2021
Dept. of Chemistry, PDEU

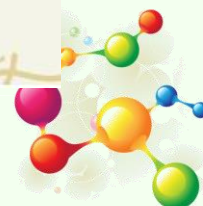
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Pandit Deendayal Energy University, Gandhinagar, Gujarat, INDIA

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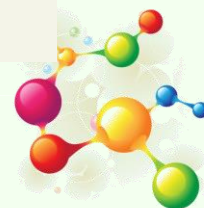
Prof. Rajib Bandyopadhyay
Chairman, MMETFP-2021
Head, Dept. of Chemistry, PDEU

Prof. A.R. Jani
Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter

Dr. Kalisadhan Mukherjee
Convener MMETFP-2021
Dept. of Chemistry, PDEU

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**Department of Chemistry & Physics,
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in collaboration with
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Certificate of Appreciation

This certificate is awarded to

Dr. Rama Gaur

for coordinating a SPECIAL SESSION on
Career Fair for UG/PG/PhD Students

in

*International Symposium on Materials of the Millennium:
Emerging Trends and Future Prospects MMETFP-2021*

held at School of Technology, Pandit Deendayal Energy
University, Gujarat on November 20, 2021.

Prof. Rajib Bandyopadhyay
Chairman, MMETFP-2021
Head, Dept. of Chemistry, PDEU

Prof. A.R. Jani
Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter

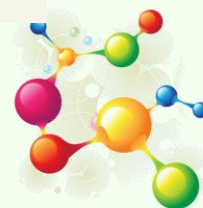
Dr. Kalisadhan Mukherjee
Convener MMETFP-2021
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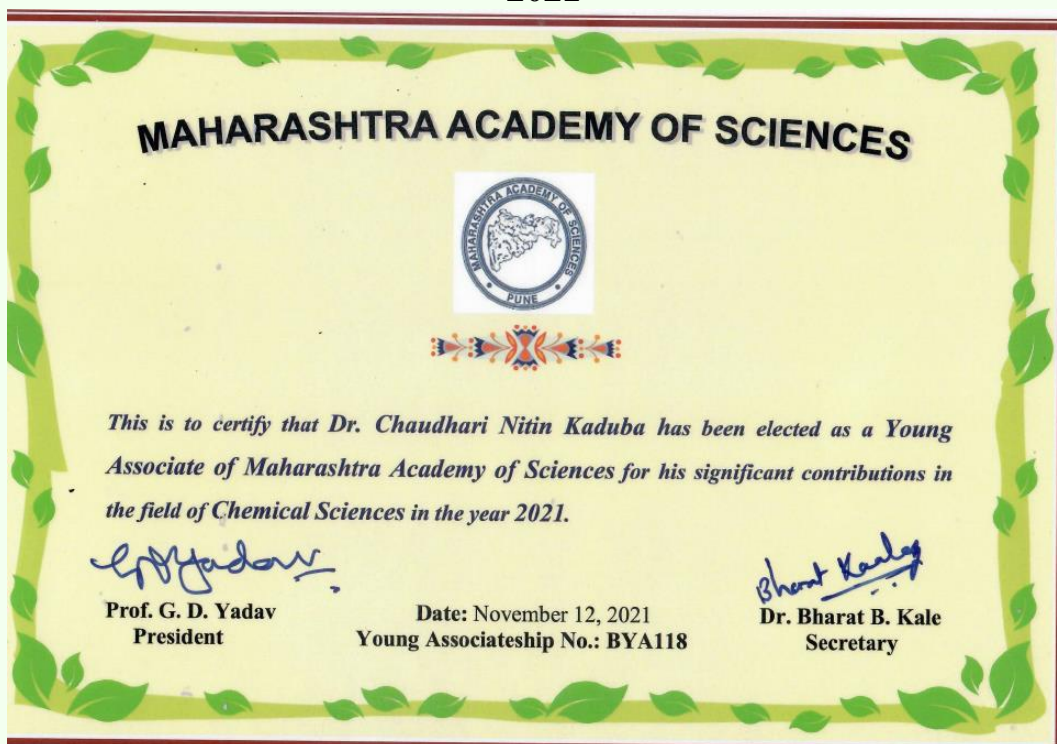
Pandit Deendayal Energy University, Gandhinagar, Gujarat, INDIA
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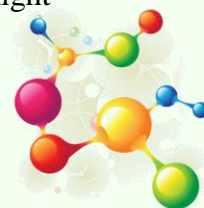




YOUNG ASSOCIATE OF MAHARASHTRA ACADEMY OF SCIENCE 2021



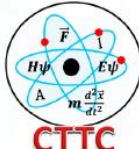

Extreme left- Director of Centre for Materials for Electronics Technology (C-MET), Pune, Middle- Padma Shri Dr. G. D. Yadav, President of Maharashtra Academy of Sciences and former vice-chancellor of Institute of Chemical Technology (ICT), Mumbai, Extreme Right- Dr. Nitin Chaudhari.





POSTER PRESENTATION

DAE Symposium on Current Trends in Theoretical Chemistry

 **CTTC-2020** 

**POSTER PRESENTATION
CERTIFICATE**

Organising committee hereby certifies that

abstract number MS-L-121 entitled "*Exploration of novel natural compound inhibitors against PfDXR: A computational approach*"
authored by "Anu Manhas, Prakash C. Jha"

has been presented as a poster in
the DAE Symposium on Current Trends in Theoretical Chemistry (CTTC-2020),
organised by Chemistry Division, Bhabha Atomic Research Centre, Mumbai-400085, INDIA
held via online mode during 23-25 September, 2021.

A. K. Tyagi Chairman	T. Bandyopadhyay Chairman, LOC	N. Choudhury Convener	KRS Chandrakumar Co-Convener
A. K. Pathak Secretary		K. Srinivasu Jt-Secretary	

25/09/2021

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CERTIFICATE OF PARTICIPATION

This certificate is awarded to
Dr. Rama Gaur
for poster presentation at
"INTERNATIONAL SYMPOSIUM ON MATERIALS OF THE MILLENNIUM: EMERGING TRENDS AND FUTURE PROSPECTS (MMETFP-2021)"
held at
School of Technology, Pandit Deendayal Energy University, Gujarat on November 19-21, 2021.

 Prof. Rajib Bandyopadhyay Chairman, MMETFP-2021 Head, Dept. of Chemistry, PDEU	 Prof. A.R. Jani Chairman, MMETFP-2021 Chairman, MRSI Gujarat Chapter	 Dr. Kalisadhan Mukherjee Convener MMETFP-2021 Dept. of Chemistry, PDEU
--	--	--

Organized by
**DEPARTMENT OF CHEMISTRY & PHYSICS, SCHOOL OF TECHNOLOGY
PANDIT DEENDAYAL ENERGY UNIVERSITY, GANDHINAGAR, GUJARAT, INDIA**
in collaboration with
MATERIALS RESEARCH SOCIETY OF INDIA [MRSI]





FIRST INTERNATIONAL SYMPOSIUM ON ADDITIVE MANUFACTURING AND ADVANCED MATERIALS (AM²)

1st International Conference on Additive Manufacturing and Advanced Materials

Organized by

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Certificate of Participation

This is to certify that **Mr./Ms./Dr. ANU MANHAS** of PDEU has presented a paper at the "1st International Conference on Additive Manufacturing and Advanced Materials (AM²)" held from 4-6 October 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.

Title of the Paper: QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIP STUDY OF SKIN SENSITIZATION OF MICHAEL ACCEPTORS BASED ON QUANTUM CHEMICAL DESCRIPTORS

Authors: *Anu Manhas, Mohsin Yousuf Lone, Prakash Chandra Jha*

Prof. S. Sundar Manoharan
Director General
PDEU

Prof. Anirbid Sircar
Dean
R&D Cell

Prof. Vishvesh Badheka
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This is to certify that **Mr./Ms./Dr. MEGHA BALHA** of PDEU has presented a paper at the "1st International Conference on Additive Manufacturing and Advanced Materials (AM²)" held from 4-6 October 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.

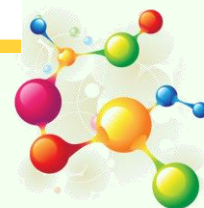
Title of the Paper: STRATEGIES FOR THE ORGANOCATALYTIC ASYMMETRIC SYNTHESIS OF BRIDGED ACETAL

Authors: *Megha Balha, Anu Manhas, Nikunj Kumar Vagadiya*

Prof. S. Sundar Manoharan
Director General
PDEU

Prof. Anirbid Sircar
Dean
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This is to certify that **Mr./Ms./Dr. NANDINI MUKHERJEE** of PDEU has presented a paper at the “1st International Conference on Additive Manufacturing and Advanced Materials (AM²)” held from 4-6 October 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.

Title of the Paper: **RECENT PROGRESS IN LYSOSOME-TARGETABLE FLUORESCENT BODIPY PROBES FOR BIOIMAGING APPLICATIONS**
 Authors: **Nandini Mukherjee, Rama Gaur, Syed Shahabuddin, Prakash Chandra**


Prof. S. Sundar Manoharan
 Director General
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Prof. Anirbid Sircar
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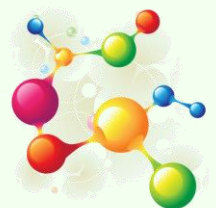
This is to certify that **Mr./Ms./Dr. PRAKASH CHANDRA** of PDEU has presented a paper at the “1st International Conference on Additive Manufacturing and Advanced Materials (AM²)” held from 4-6 October 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.

Title of the Paper: **ADVANCED MOS 2 NANOCOMPOSITE MATERIALS FOR THE SYNTHESIS OF VALUABLE PHARMACEUTICALS**
 Authors: **Prakash Chandra, Rama Gaur, Nandini Mukherjee, Syed Shahabuddin**


 Type text here
Prof. S. Sundar Manoharan
 Director General
 PDEU


Prof. Anirbid Sircar
 Dean
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This is to certify that *Mr./Ms./Dr. RAMA GAUR* of PDEU has presented a paper at the “1st International Conference on Additive Manufacturing and Advanced Materials (AM²)” held from 4-6 October 2021 at Pandit Deendayal Energy University, Gandhinagar, Gujarat, India.

Title of the Paper: RECENT ADVANCES IN NANOSTRUCTURED TRANSITION METAL SULFIDE BASED SENSORS FOR ENVIRONMENTAL APPLICATIONS

Authors: *Rama Gaur, Syed Shahabuddin, Nandini Mukherjee, Prakash Chandra*

Prof. S. Sundar Manoharan
Director General
PDEU

Prof. Anirbid Sircar
Dean
R&D Cell

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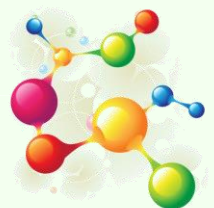
Title of the Paper: CONDUCTING POLYMERS-BASED NANOCOMPOSITES: INNOVATIVE MATERIALS FOR WASTE WATER TREATMENT AND ENERGY STORAGE

Authors: *Syed Shahabuddin, Rama, Gaur, Nandini Mukherjee, Prakash Chandra, Rashmin Khanam*

Prof. S. Sundar Manoharan
Director General
PDEU

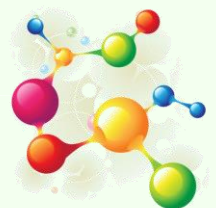
Prof. Anirbid Sircar
Dean
R&D Cell

Prof. Vishvesh Badheka
Conference
Convener



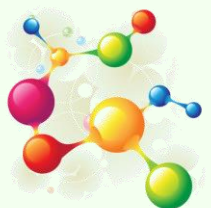


Lectures by Dr. Anu Manhas on Computer-aided drug designing in Central University of Gujarat, October 12-13, 2021





Visit of Dr. Peter Doerner, Chair Professor, University of Edinburgh at PDEU





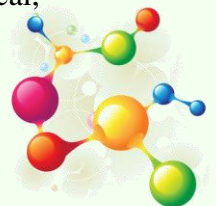
PDBL (PANDIT DEENDAYAL BADMINTON LEAGUE)
Our department bags three trophies in PDBL



Dr. Anu Manhas (Left), Dr. Pavan Kumar Gurrala, Assistant Professor, Mechanical, School of Technology (Right)

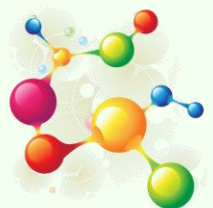


Dr. Nandini Mukherjee (Left), Dr. Pavan Kumar Gurrala, Assistant Professor, Mechanical, School of Technology (Right)





Dr. Prakash Chandra (Left), Dr. Pavan Kumar Gurrala, Assistant Professor, Mechanical, School of Technology (Right)

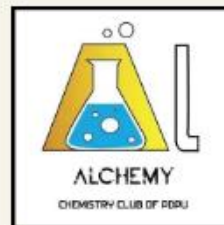




Alchemy Club on Chemstreet!

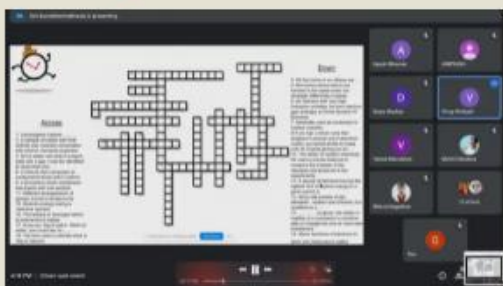
Alchemy Club

The Chemistry Club of PDEU



Our club's motto is to promote and enhance the knowledge of deep chemistry used in everyday works and activities. Also, we help students learn and take advantage of different concepts of chemistry and the latest development in chemistry fields through engaging and interesting talks, webinars, and events. Also on regular basis, the club tries every which way possible to help and make people aware of the importance of chemistry and how is it so much related to our life and can be called the diamond in the crown of life challenges!

Glimpses of Activities



Chem Rush Event



Parla Tech 2.0

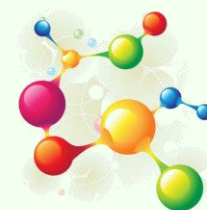


Alchemy club coordinated a Special Session on "AI in Materials Engineering" in International Symposium of Materials of the Millennium: Emerging Trends & Future Prospects MMETFP-2021 on 20th November, 2021.



Alchemy club is open for sub committee recruitment. Interested students from pure science field who wants to join us can contact: Om (Alchemy Club President) on 7567926566

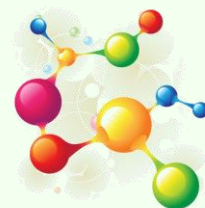
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STUDENTS' CORNER ACHIEVEMENTS

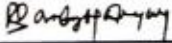
1. **Bhooma Bhagat**, Ph.D. Scholar presented a poster and took part in young researchers colloquium at “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021)” – hybrid mode, organized by the Department of Chemistry and Physics, School of Technology, Pandit Deendayal Energy University, Gujarat during November 19-21, 2021.
2. **Monikaben Patel**, Ph.D. Scholar presented a poster at the “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021)” – hybrid mode, organized by the Department of Chemistry and Physics, School of Technology, Pandit Deendayal Energy University, Gujarat during November 19-21, 2021.
3. **Nikunj Vagadiya** from M.Sc. Sem. 3 participated at “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021)” – hybrid mode, organized by the Department of Chemistry and Physics, School of Technology, Pandit Deendayal Energy University, Gujarat during November 19-21, 2021.
4. **Rushik Radadiya** from M.Sc. Sem. 3 participated at “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021)” – hybrid mode, organized by the Department of Chemistry and Physics, School of Technology, Pandit Deendayal Energy University, Gujarat during November 19-21, 2021.
5. **Jeny D Gosai** from M.Sc. Sem. 3 participated at “International Symposium on Materials of the Millennium: Emerging Trends and Future Prospects (MMETFP-2021)” – hybrid mode, organized by the Department of Chemistry and Physics, School of Technology, Pandit Deendayal Energy University, Gujarat during November 19-21, 2021.
6. **Jeny D Gosai** from M.Sc. Sem. 3 participated at 1st advanced taekwondo training seminar in Gujarat - 2021 at “Sabar Gramseva Mahavidhyalaya” Sonasan, Dist. Sabarkantha Organised by Mr. Pragnesh Mesariya on October 29-31st, 2021.
7. **Jeny D Gosai** from M.Sc. Sem. 3 received 2nd place in kyorugi, 1st Gujarat state taekwondo ranking tournament held at Sachivalaya Gymkhana, Gandhinagar, Gujarat on November 28th, 2021.
8. **Jeny D Gosai** from M.Sc. Sem. 3 received the gold medal in 12th National Taekwondo Championship 2021, Uttarakhand held at Maharana Pratap Sports College, Dehradun, Uttarakhand from December 19th to 20th, 2021.





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CERTIFICATE OF PARTICIPATION
This certificate is awarded to
Mr. Rushik Rameshbhai Radadiya
for poster presentation at
"INTERNATIONAL SYMPOSIUM ON MATERIALS OF THE MILLENNIUM: EMERGING TRENDS AND FUTURE PROSPECTS (MMETFP-2021)"
held at
School of Technology, Pandit Deendayal Energy University, Gujarat on November 19-21, 2021.


Prof. Rajib Bandyopadhyay
Chairman, MMETFP-2021
Head, Dept. of Chemistry, PDEU


Prof. A.R. Jani
Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter


Dr. Kalisadhan Mukherjee
Convener MMETFP-2021
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CERTIFICATE OF PARTICIPATION
This certificate is awarded to
Mr. Nikunj Kumar Vagadiya,
for poster presentation at
"INTERNATIONAL SYMPOSIUM ON MATERIALS OF THE MILLENNIUM: EMERGING TRENDS AND FUTURE PROSPECTS (MMETFP-2021)"
held at
School of Technology, Pandit Deendayal Energy University, Gujarat on November 19-21, 2021.

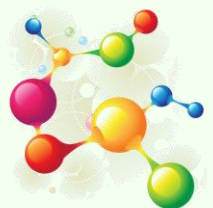

Prof. Rajib Bandyopadhyay
Chairman, MMETFP-2021
Head, Dept. of Chemistry, PDEU


Prof. A.R. Jani
Chairman, MMETFP-2021
Chairman, MRSI Gujarat Chapter

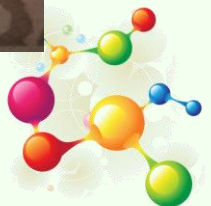

Dr. Kalisadhan Mukherjee
Convener MMETFP-2021
Dept. of Chemistry, PDEU

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12th NATIONAL TAEKWONDO CHAMPIONSHIP 2021



(Kyorugi & Poomsae)



Organized by - Uttarakhand Sports Taekwondo Association (Regd.)

Under the aegis of National Taekwondo Committee, India (Regd.)

Maharana Pratap Sports College, Dehradun, Uttarakhand
19th & 20th Dec. 2021

Merit & Participation Certificate

Serial No. – NTC/2021/321

This is to certify that **JENY D GOSAI** of **GUJARAT** has secured **GOLD MEDAL** in the category **Kyorugi 18+ years F +73.1kg** in this championship held from 19th to 20th December, 2021 at Maharana Pratap Sports College, Dehradun, Uttarakhand.

Shri Arvind Pandey

Hon'ble Minister for Sports
Uttarakhand Government
President Org. Committee

Dr. S. Farooq

Chairman
Uttarakhand Sports
Taekwondo Association

Raunak Jain

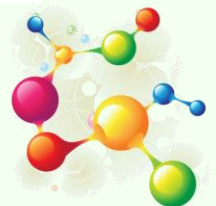
Managing Director
Tula's Group &
Vice President NTC

Javed Khan

Organising Secretary &
Secretary General
National Taekwondo Committee (Regd.)

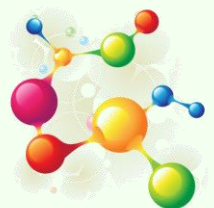


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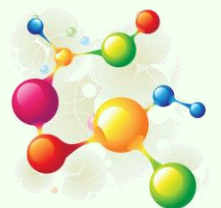
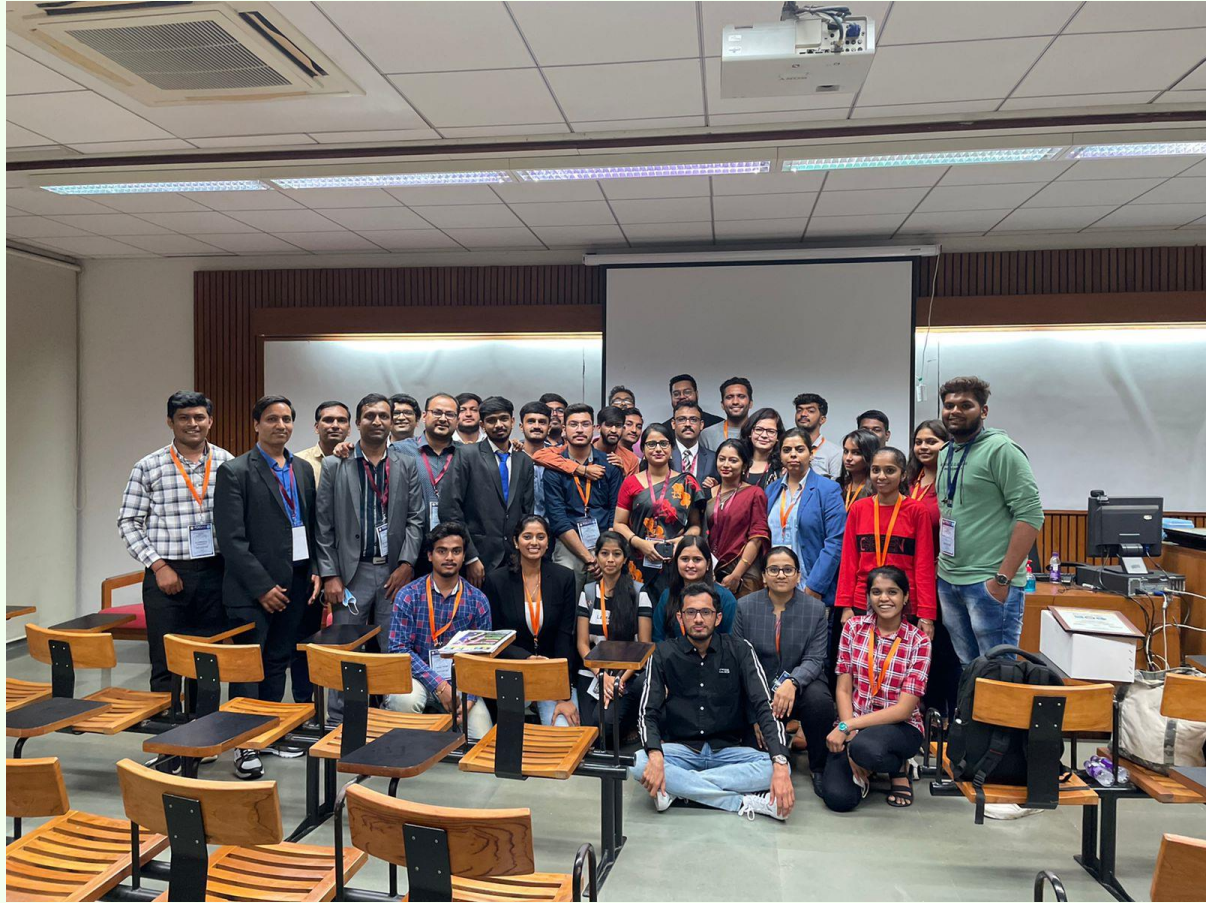


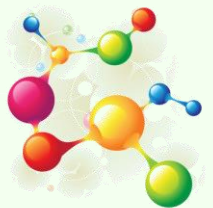
Jeny D Gosai received gold medal in 12th National Taekwondo Championship 2021, Uttarakhand. From left: Coach Master Pragnesh Mesariya, Jeny D. Gosai, Trainer Raj Parmar.

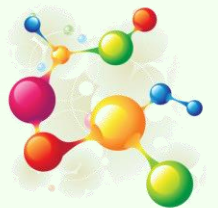


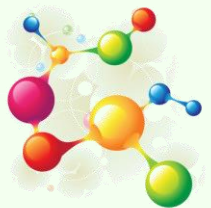


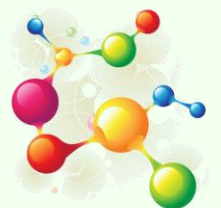
Moments at MMETFP 2021

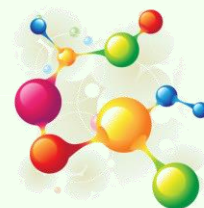


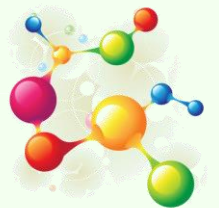






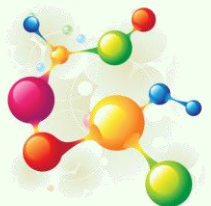








Answers to Quiz: 1. B; 2. B; 3. D; 4. B; 5. C.



December, 2021

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Grow

Contribute

CHEMSTREET

2022

HAPPY
NEW YEAR

**Looking
Ahead
2022**



*Cover & Back Cover by Dr. Megha
Balha & Dr. Nandini Mukherjee*