



MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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July 2022

TEMPUS

Chemical Engineering Department Newsletter



Interview with
Dr Ashish Kulkarni
CEO, Shree Rasayani

Recent and Upcoming
Events

Student and Faculty
Achievements

From the HOD's Desk

Dear Reader,

Warm wishes to you!

We are happy to place before you this July 2022 issue of TEMPUS.

The newsletter showcases the achievements of the students, faculty, staff and alumni and chronicles the activities in the Department of Chemical Engineering.



The editorial team deserves rich praise for bringing out this issue in a pleasing form which has been possible only because of their hard and continuous work.

After a gap of nearly two years due to the disruptions from COVID, the semester that ended saw the classes resuming in the physical mode from March 2022. It was pleasing to see normalcy come back with the sight of the campus buzzing with students once again.

This issue features an interesting interview with our distinguished alumnus Dr Ashish Kulkarni, CEO of Shree Rasayani, Nashik (Class of 1990). We sincerely thank him for taking his valuable time and obliging us. We also have many other exciting articles from students featured in this issue on topics of varied interests.

To all the contributors we offer our sincere thanks and appreciation.

Happy Reading!

Best Wishes to all. Take Care.

Dr K Balakrishna Prabhu

Professor and Head, Department of Chemical Engineering

Manipal Institute of Technology, Manipal

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Vision and Mission of the Department

Vision

To be the department that fosters excellence in education, research and innovation in Chemical Engineering and emerging interdisciplinary fields.

Mission

- To provide quality education that prepares the graduate for leading roles in their chosen career and life-long learning.
- To develop technology through excellence in research, in conjunction with the technical education that is recognised by the peers in the profession in the emerging field of Chemical, Biochemical, Energy, Environmental engineering and Material Science.
- To achieve technical excellence through industry-institute interactions.
- To produce graduates who are able to perform in multi-disciplinary teams and demonstrate superior leadership.

Program Educational Objectives

- Graduates will pursue their careers in Chemical Engineering and related fields of engineering such as oil and gas, petrochemicals, biochemical, environmental, material science and renewable energy.
- Graduates will use modern engineering knowledge, skills and computational methods to identify, formulate and solve engineering and design related problems.
- Graduates will demonstrate team work, leadership, ethical conduct and problem solving skills and provide appropriate solutions in global, social, environmental and economic context.
- Graduates will be motivated to enroll for post graduate courses and the continuing education programs, and demonstrate lifelong independent learning.



Program Outcomes

PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3. Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. Modern tool usage: Create, select, apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7. Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary settings.

PO 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11. Project management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

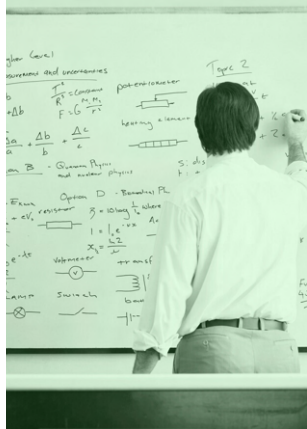
- Apply the principles of unit operations and unit processes to design chemical process equipment.
- Develop, Model, Simulate and optimize the chemical process systems.
- Recommend sustainable solutions for environmental and energy engineering related challenges.



View from a classroom

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From the HOD's
Desk



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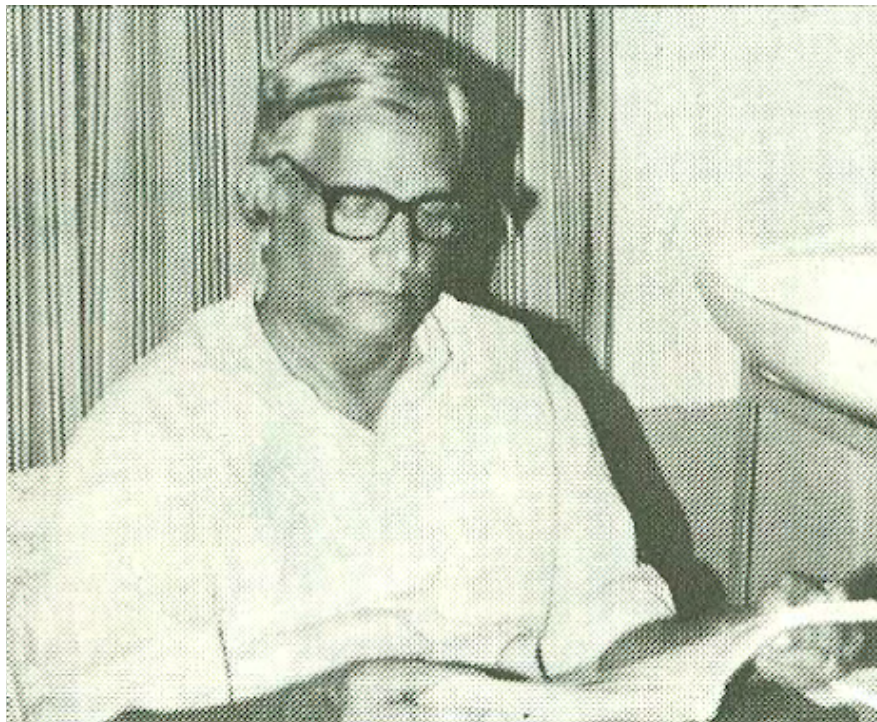
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Advisory Board



Tribute to Dr KJR Sarma

"With a deep sense of sadness, we mourn the demise of Prof K J R Sarma who left for his heavenly abode on 3rd March 2022. He was ailing with old-age-related issues and passed away peacefully at the age of 90 years.



The contribution made by Prof Sarma in the growth and development of the Chemical Engineering Department is immense and notable.

Dr K J R Sarma was one of the early builders of the Chemical Engineering Department of MIT Manipal, who joined as Professor and Head of the Department in November 1982—a post he held till October 1991. After this successful journey, he continued as faculty-on-extension until 1995. He was instrumental in streamlining many of the laboratories. As a person he was known for his soft-spoken and friendly gestures. His students still remember him as a fatherly figure who went out of his way to help them in several ways.

A committed member of the Mangalore Regional Centre of the Indian Institute of Chemical Engineers (IChE), he was conducive in establishing an active student chapter in MIT, Manipal.

As the Organising Secretary, Dr KJR Sarma was responsible for admirably conducting the International Annual Conference IChE CHEMCON-92 during December 1992, which is still regarded as a pinnacle for the Chemical Engineering Department.

We offer our humble respects to the memory of Prof KJR Sarma. He might have left us physically. But his words, his contribution to the industry and the fond memories will continue to live with us in our hearts for ages to come. May his soul rest in peace."

Obituary



Mr P Ganesh Prabhu

It is with deep sorrow and profound loss that we share with you the demise of P Ganesh Prabhu on April 25, 2022 at 51 years of age. He served as a Senior General Duty worker in the Department of Chemical Engineering.

Having joined the Chemical Engineering Department during the year 1991 he served the department with dedication for over 30 years as a non-teaching staff.

His sudden departure came as a great loss to the department, his family, colleagues and friends.

The faculty, staff and students of the chemical engineering department offer their respects to the departed soul and pray to the Almighty to give strength to his near and dear ones to bear this irreparable loss.

Illustrious Alumnus

An Interview with Dr. Ashish Kulkarni

Dr. Ashish Kulkarni completed his B.E. in first class with distinction from Manipal Institute of Technology in the year 1990. Then he joined the University of Leeds to pursue his Ph.D. during the period 1990-1995. After which, he joined **Shree Rasayani**, located in Nashik, Maharashtra and served at various capacities in the **electroplating and metal finishing industry** for a long period of 25 years. Currently he is the **CEO of the company**. He is also the **Member of International Corrosion Council and President of Metal Finishers' Association Nashik**. Besides this, he is involved with other activities such as being the Caretaker for Mary Morris International Residence, Headingly and Treasurer PGSRC, University of Leeds.

We are honoured to have an alumnus who is an entrepreneur and has taken great strides in the field of corrosion prevention.

We highly appreciate your enthusiasm and keen interest in contributing to your alma mater through various avenues – be it your involvement in the deliberations of the curriculum conclave and an advisory board member of the Department Newsletter.

We are very keen to know about your journey and your insights on running a successful business of chemical formulations and process design.



To begin with, how would you recall your time spent at MIT and the Department of Chemical Engineering?

The time spent in MIT from July 1986 to May 1990 was simply excellent. Not only did we learn engineering, the exposure to students from all parts of India and also abroad gave us an experience that could not be replicated easily. Moreover, living away from home in the age where one had to send letters that reached 8-10 days after posting and phone calls had to be booked 2-3 hours in advance and we were charged by the minute was also something that will never be experienced again. Notes had to be taken down when the lectures were being delivered, reference books had to be physically read and important points noted down, a mini drafter and drawing board had to be carried by every student from the D blocks to the class and most importantly computers were something that we chemical engineering students could only see from a distance. Our project report and thesis were typed by a typist after we had

written everything by hand. There are many such things that make the entire experience a novel one.



What sparked your interest in the field of chemical engineering? Was it a turning point or a life long interest?

I was not interested in biological sciences simply because I felt that there was nothing to understand in biology – everything had to be memorised and the Latin names were the last thing for me to remember. So I had to do something in physical sciences, and chemistry and chemical engineering were something that I was most comfortable with.

How have your experiences in the department of chemical engineering helped you in shaping your future?

Our department was very small, perhaps the smallest. We were just 23 or 24 students in the class and the department had a history that till 1990 only one girl from Iran had taken up the course and even she had left it half way! So this was a true All Boys Club.

The small class resulted in excellent friendship and camaraderie that has lasted even till today. All of us are in touch with each other even now – of course made much easier with modern communication. The teaching and laboratory classes were also of a very high standard. I say this with confidence because I used to be a demonstrator in the undergraduate laboratories in the UK for 3 years. Of course, the focus in those days was on the core curriculum consisting of heat and mass balance, transport phenomena and reaction engineering. Prof Prabhu joined the department in our last year and he used to teach us Process Control which many of us thought was not at the heart of chemical engineering. We used to think that this could also be done by an Instrumentation or Electronics engineer although Perry's handbook had a chapter on Process Control and Instrumentation.

Dr P G Krishnamurthy was in a different league all together. He did teach us some aspects of chemical engineering but what he used to emphasise on is to get your own answers. "Make observations, ask questions and answer them yourself" – that is what he used to keep repeating.

Having worked at a reputed industry like the Technology and Innovations Centre, in Larsen & Toubro, in the helm of process design, and as a leader of a chemical industry what do you feel are the most important skills a chemical engineer must have?

This depends on the nature of the business of the company and the exact project you are working on. For example, L&T is mainly a contracting company. It fabricates equipment based on designs that come from elsewhere. It does not decide which processes to adopt in chemical manufacturing. The customer with his process consultants will do that.

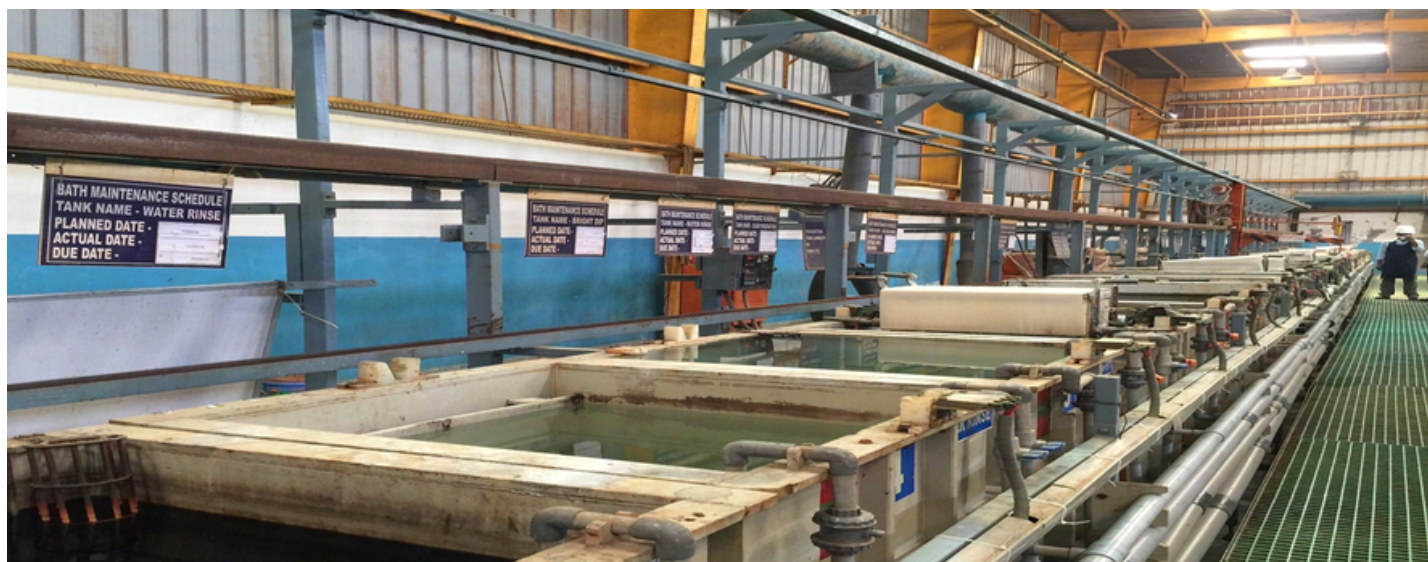
Sometimes a contractor can recommend but it all depends on the nature of the contract. Sometimes the contract obtained is on a turnkey basis where the contractor takes full responsibility for process selection, equipment design, fabrication, erection and commissioning.

*On the other hand one could be working in a chemical manufacturing unit where a project could involve **setting the terms of contract and selecting the contractor.***

The projects also could be of expansion of existing facilities or modernisation with a view of reduced energy and water consumption or reduced effluents. In addition to this, if you happen to work with consulting companies, the project could be of carrying out feasibility studies.

In relation to your role as a project leader at L&T, could you share your experience as an engineer—the pressures and perks of being in a leadership role?

*As a project leader, skills other than engineering become more important. **One is to forge a ‘team’ of competent individuals,***



all from different disciplines of engineering, maybe different specialisations in their Masters' course, different colleges and mainly different age groups. The youngest and the oldest member could be separated by 25 years!

It is like a captain of a cricket team who has no role in selecting the players but is expected to make each of them perform at their best and win the match. Planning of activities becomes important – the schedule, the sequence etc. Making a list of all resources required also becomes important and making sure that they are available in time is also a part of the job of a project leader.

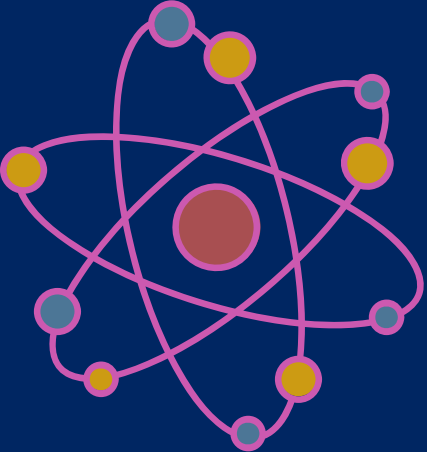
Finally, understanding the technical points the team members are making – mind you not all will be chemical engineers, and making every member of the team appreciate it can also be difficult.

You are a successful manufacturer of formulations for corrosion prevention and surface treatment. How does your business cope with the fast advancements in technology, new cutting edge tools and equipment that are emerging in the market? What are the challenges you face while doing so?

Corrosion is something that is certain. It cannot be avoided, it can only be delayed. The emphasis is on studying new systems (materials and environment) and getting the corrosion data. The expertise required here is that of a corrosion scientist and also of a materials scientist – who understands metals, plastics, composites, ceramics etc.

What is your advice for future engineers who want to choose between honing their knowledge of the latest software used in the industry and gaining hands-on-experience on the shop floor?

Unless you are involved in the manufacturing activities for some time – maybe 4 or 5 years, you will never understand the importance of process control, equipment maintenance, analytical procedures, safety issues and many more. Ultimately the purpose of every other activity is to make manufacturing safer, less polluting, less energy intensive and more precise. So learning new software is to be welcomed but the appreciation will not come unless you know what difference it will make to the activities on the shop floor.



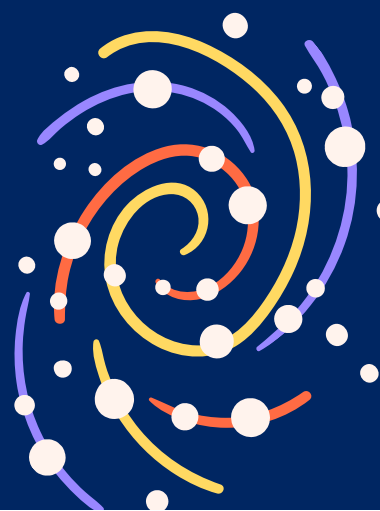
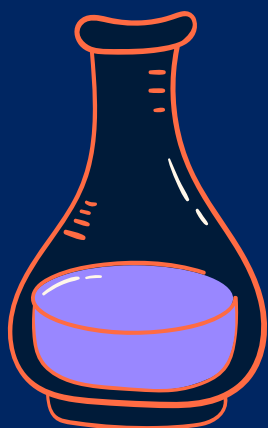
From the

Students

Digesting Pollutants— The Search for Plastic-Eating Enzymes

Metal with Memory— Nitinol

Cancer Cure Discovered or a Distant Reality?



Digesting Pollutants—The Search for Plastic-Eating Enzymes

Written by Kushaan Choksi (BTech Batch of 2024) and Devangshi Debraj (BTech Batch of 2023)

Several advancements have been made in pursuit of a solution to moderate the ever-increasing plastic that chokes the world. One such idea is the search for a plastic-eating enzyme, a natural solution to a man-made problem. Among the various plastic wastes plaguing the lithosphere, the removal of PET seems to be a Herculean task.

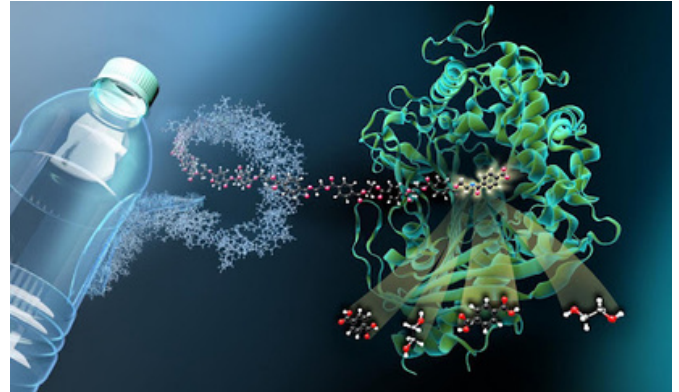


Fig 1: An artistic rendition of enzymatic degradation of plastic

While PET is among the most recycled plastics, the World Economic Forum reports that this makes up only a little more than half of the total waste, and an even lesser amount is actually reused. Hence, it is imperative that we find a solution to this suffocating predicament.

In 2016, a plastic-eating bug was discovered at a Japanese waste site. **Researchers isolated the enzymes in the bug that helped break down plastics into monomers.** Good inventions are often a replication of nature—bacteria that break down natural polymers like cellulose, have evolved a twin approach for the same. **One enzyme breaks down the polymer, while a second accelerates this process.** A study in 2018 found that **while PETase helped degrade the hard, crystalline structure of plastic bottles, the second enzyme isolated from the Japanese bug, helped accelerate the breakdown.** Thus, by linking the two enzymes, they were able to create a super enzyme that worked six times faster than known before.



Fig 2: It takes two days for FAST-PETase to break down a 6.4 gram piece of untreated, but uniform, plastic at 50°C.

In a recent study published in the peer-reviewed journal *Nature*, a team of researchers led by Professor Hal Alper at The University of Texas, Austin, successfully engineered a hydrolase enzyme variant. It was found to be **capable of breaking down polyethylene terephthalate (PET) into its constituent monomers in about 24 hours.**

Fabricated with the help of a neural network, the new enzyme called **FAST-PETase (functional, active, stable, and tolerant PETase)** is a variant of the PETase—a plastic-eating enzyme discovered at a Japanese bottle recycling factory in 2016.

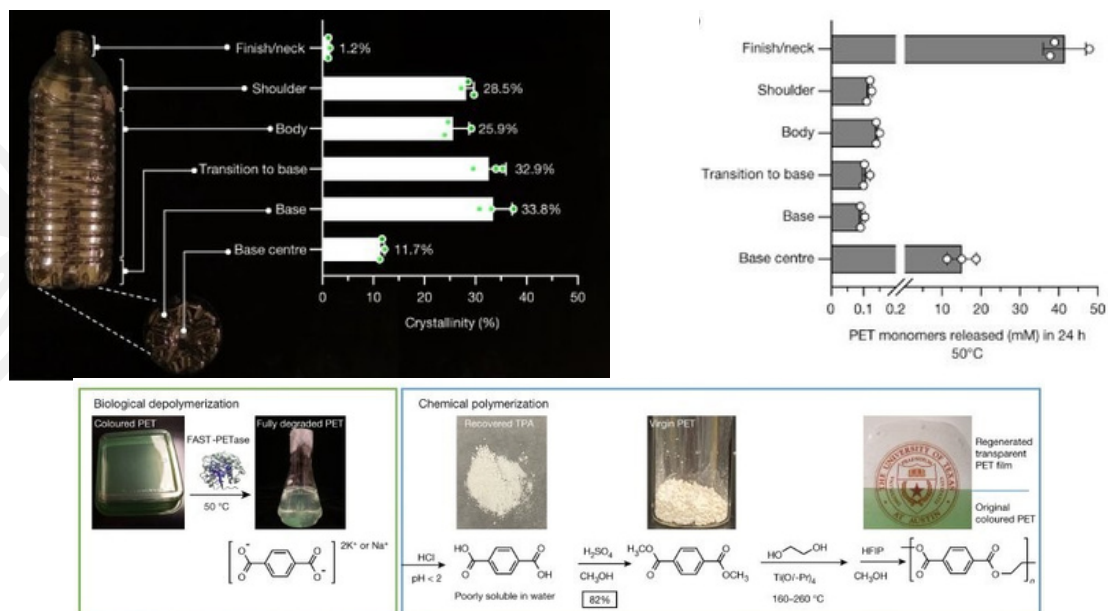


Fig 3: Representation of Biological depolymerization and chemical polymerization of PET plastic

In the beginning, the algorithm was trained to study over 19,000 protein structures to understand the chemical environments of their corresponding amino acids. The insights gathered were then applied to each of the 290 amino acids in PETase. The algorithm would suggest an alternative if an amino acid was deemed unsuitable for that particular environment.

Considering these suggestions and previous experimental data, a total of five structural modifications resulted in the birth of FAST-PETase. This enzyme completed a “circular process” where it broke down PET into monomers that can be re-used to make various products.

Finally, to demonstrate this closed-loop recycling process, the team observed the depolymerization of 51 commercial PET products. **The experiment lasted a week at just 50°C and showed that new plastic items could be made from the degraded product.** Similar results were obtained when a plastic tray degraded within 48 hours (fig 2). **Impressively, the enzyme worked just as well with mixed-colour PET as it did with clear products.**

With a patent in the pipeline, the researchers are now looking for ways to scale production to fit industrial and environmental standards. A French company, Carbios, recently partnered with major corporations like Pepsi and L’Oreal, to accelerate industrial-scale recycling using a similar enzyme they discovered and isolated. While it is hard to ascertain whether enzymatic depolymerization can be used on a large scale, researchers are hopeful about its application in treating landfills and industrial waste.

References: World Economic Forum, The Guardian, Nature

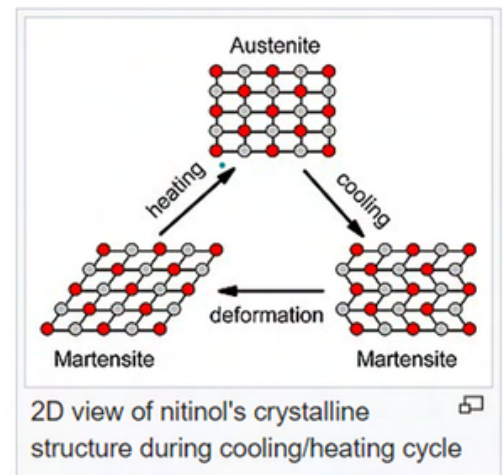
Images: Joshua Hehe: Plastic-Eating Bacteria And Their Pollution-Reducing Enzymes (Medium); NikoMcCarty: AI-Designed Enzyme Eats Plastic, Codon Magazine; Hongyuan Lu (2022), Machine learning-aided engineering of hydrolases for PET depolymerization 2022, Nature

Metal with Memory - Nitinol

Written by Adyasha Kar (BTech Batch of 2024) and Amrita Dam (BTech Batch of 2023)

Nitinol, the "metal with a memory," which is transforming manufacturing, engineering, and medicine, was **discovered in 1959 by William J. Buehler** of the U.S Naval Ordnance Laboratory, **developed by Buehler and Frederick E. Wang**. It is composed of two elements, **nickel and titanium** which are present in roughly equal atomic percentages (50 to 51% nickel by atomic percent).

Its unique properties are due to reversible solid-state phase transformation known as a **martensitic transformation**: this occurs between 69–138 MPa of mechanical stress. At low temperatures it exists in the form of complex monoclinic crystal structure known as **martensite or daughter phase**. While at higher temperatures it exists in **austenite or parent phase**. This transformation between parent to daughter state involves 4 transition stages. Martensitic crystal undergoes a type of deformation known as twinning, in which the atomic plates rearrange themselves rather than break their atomic bonds. Although they have limited deformation limits, this structural change allows for a **strain tolerance of 6–8%**. Once the temperatures are increased, martensitic nitinol reverts to the austenite phase, regaining original structure despite the deformation.



Despite nitinol's potential being readily understood, commercialization efforts did not start until much later. The exceptional **difficulties of melting, refining and machining the alloy** significantly contributed to this delay along with financial obstacles that were not easily overcome until the 1980s.

Production of nitinol is highly challenging as it requires a **tightly controlled environment to produce the required composition effectively**. Currently, for laboratory scale production physical vapour deposition method is used. While at industrial level it is produced using two main methods:

1. **Vacuum arc remelting (VAR)** – Implicated by using an electrical arc between a cooled copper plate and raw materials.
2. **Vacuum induction melting (VIM)** – This is done by alternating magnetic fields to heat the raw materials in a crucible, preferably carbon.
3. **Other methods** – Plasma arc melting, induction skull melting, and e-beam melting.

Nitinol as a biomaterial

The term "**biomaterials**" refers to materials used in the human body. Biomaterials must have two key characteristics: **bio functionality and biocompatibility**. Good bio functionality means that the biomaterial can perform the appropriate function. The term "biocompatibility" refers to the fact that the material should not be hazardous to the human body.

Nitinol biocompatibility is an essential factor in biomedical applications. In the medical field, nitinol has numerous applications, including **guided wire and heart valve tools, bone anchors, staples, septal defect devices and implants, fractured bone mending, stent technology, etc.**

Applications of nitinol in the dental field

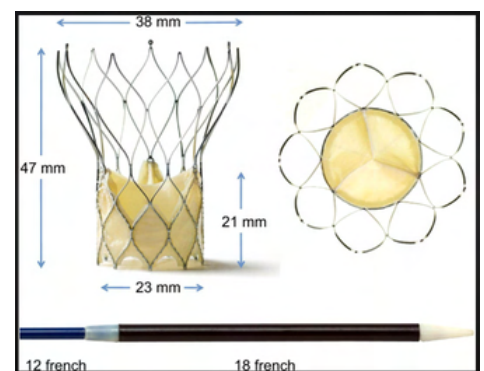
Nitinol has been used in the dental field for more than two decades. It is used in **archwire, palatal arches, distractors, and endodontic files**. It has a **large strain recovery capacity** and can generate continuous orthodontic force even with teeth movement, as this wire will change its shape during teeth alignment. It **has better resistance in saliva** as compared to stainless steel. Nitinol has a **low elastic modulus**, as a result of which fewer adjustments are required for the archwire to move the teeth to their final positions.

Applications of nitinol as guided wire and in endoscopes

A guided wire enters the body by a natural hole or a series of tiny incisions. Nitinol shape memory alloy is used in nitinol-guided wire, which **decreases the risk of harm**. It is also used in **active endoscopes**. The use of nitinol has improved flexibility and control of endoscopes.

Applications in the vascular field.

The emergence of shape memory alloys accelerated the development of **minimally invasive procedures**, in which the pathology is treated via **percutaneous device** insertion rather than surgical intervention. They are mainly used in **blood clot filters and stents** in cardiovascular treatments. Stents placed in the peripheral arteries are subjected to high mechanical stress from the surrounding environment, such as knee bending, walking, or running. Because of its **superelasticity and stress hysteresis**, nitinol can withstand these external forces better than other materials.



Example: transcatheter aortic valve composed of nitinol

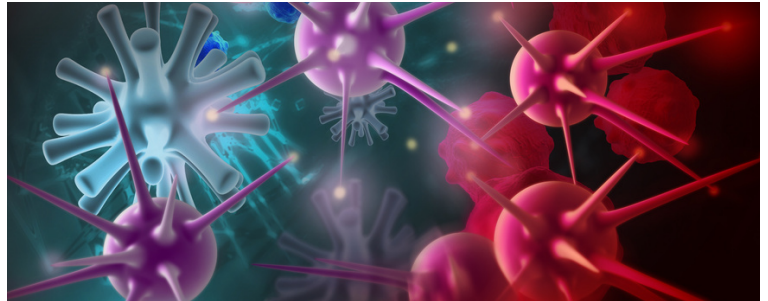
References: Wu, M. H. (2002). Fabrication of Nitinol Materials and Components. Materials Science Forum; Abdul Wadood, "Brief Overview on Nitinol as Biomaterial", Advances in Materials Science and Engineering, vol. 2016, Article ID 4173138, 9 pages, 2016.

Images: Wikipedia; Yigal Abramowitz (2015), Update on New Devices for Transcatheter Aortic Valve Replacement, Journal of Structural Heart Disease 1(3):112-126

Cancer Cure Discovered or a Distant Reality?

Written by Aditya Gupta (BTech Batch of 2024) and Melita Lis Fernandes (BTech Batch of 2024)

Cancer is a dreadful disease that has plagued the entire world, causing 1 in 6 deaths every year. Significant challenges faced by researchers, doctors and scientists include preventive measures to block the incidence of cancer occurrence. Other hurdles include improving the treatment protocol for curing cancers without degenerating the person's health and finding a new generation of cancer-preventing vaccines.



Cancer cells magnified

For the first time in the history of medical science, the 'magical' drug, **Dostarlimab**, was tested on 18 rectal cancer patients proving 100% success. Dostarlimab, sold under the brand name **Jemperli** and marketed by **GlaxoSmithKline (GSK)**, is an immunotherapy drug with laboratory-produced molecules and acts as substitute antibodies in the human body. This medication blocks cancer-causing cells that help the immune system identify and act against such cells and tissues. Each millilitre dose of concentrate solution contains 50 mg of Dostarlimab. **"Dostarlimab is an anti-programmed cell death protein-1 (PD-1) immunoglobulin G4 (IgG4) humanised monoclonal antibody (mAb) produced by recombinant DNA technology in mammalian Chinese hamster ovary (CHO) cells."** When doctors administer immunotherapy like Dostarlimab, it ramps the immune system to identify the cancerous cells and kill them. It is an effective treatment for advanced deficient Mismatch Repair (dMMR) solid tumours.

The participants of the drug trial were in similar stages of rectal cancer. They were given a minimum of nine dosages every three weeks for six months. At the end of the trials, all the patients recovered completely as there was no trace of the tumours in any physical exam, endoscopy, positron emission tomography (PET), or magnetic resonance imaging (MRI) scans. Though one in five Dostarlimab cases are known to have adverse side effects, none of the tested patients showed any. This indicates that Dostarlimab has a great potential to be a 'possible' cancer cure for one of the most lethal tumours and an investigation continues before the drug is approved for mass use.

References: Business Standard, Health Economic Times, Medical News Today, India Today

Image: Canva

IChE Manipal Student Chapter

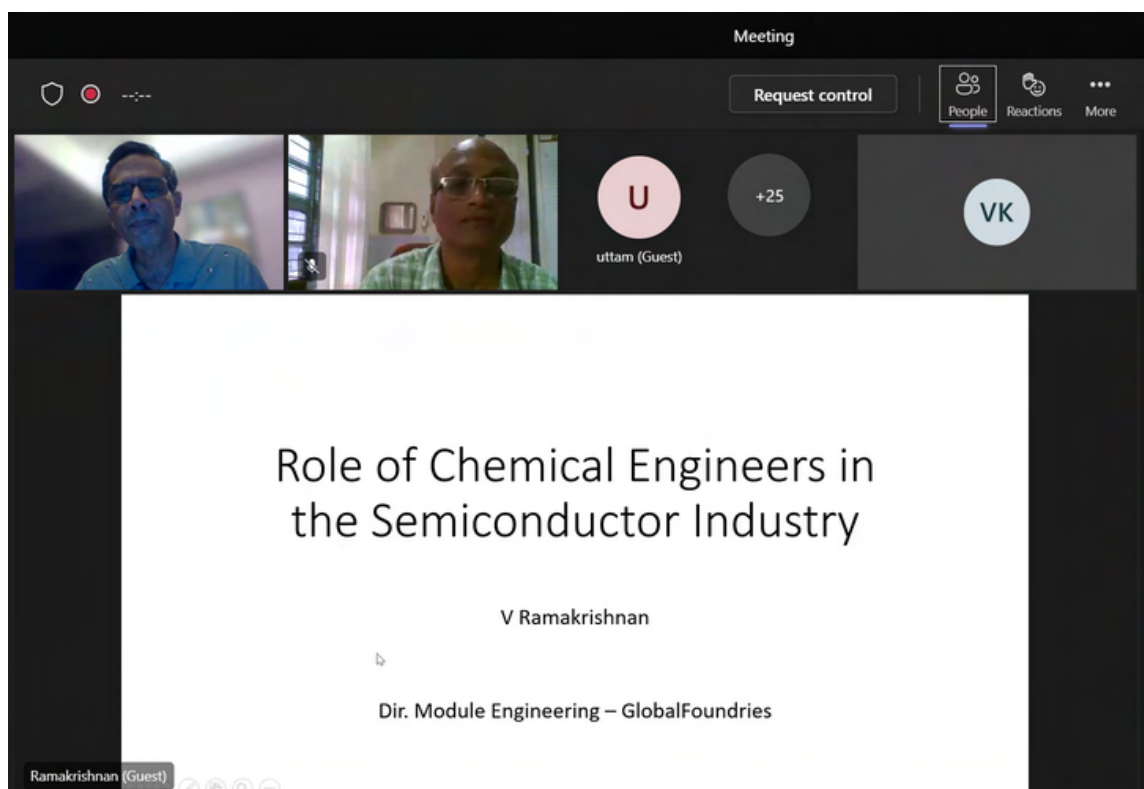
(Indian Institute of Chemical Engineers,
A student chapter of the Department of Chemical Engineering)

Alumni Guest Lecture

Speaker: Mr V Ramakrishnan

Director, Module Engineering, Global Foundries, Singapore

Date of Event: 7th May 2022



A lecture on “**The Role of Chemical Engineers in Semiconductor Industry**” was delivered by an alumnus, Mr. V Ramakrishnan, Director, Module Engineering, Global Foundries, Singapore (1990 Batch of Chemical Engineering, MIT) on MS Teams.

A lot of technical aspects of semiconductor fabrication, **including the design of the circuitry, purification of Silicon, the influence of dopants on the behaviour of semiconductors and the amalgamation of sophisticated hardware and software tools employed in every step of layering, cutting and quality control** were explained with the help of a video.

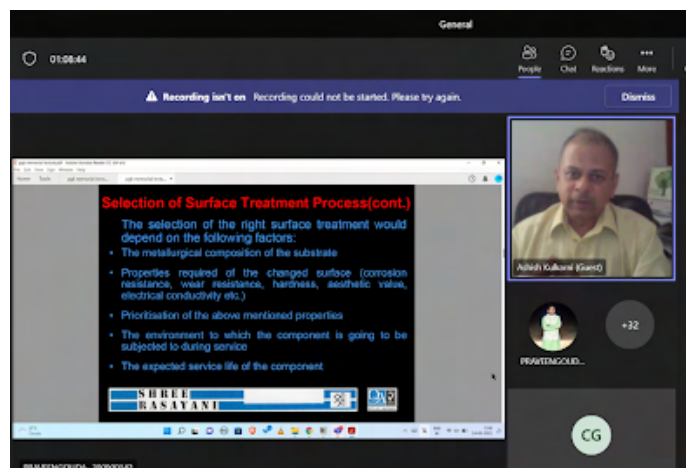
The lecture was organised by Dr. C. R. Girish, Alumni Coordinator, Associate Professor, Chemical Engineering Department, MIT, Manipal, in association with IChE Student Chapter, Manipal.

Prof PGK Memorial Lecture

Speaker: Dr Ashish Kulkarni

CEO of Shree Rasayani, Nasik, Maharashtra

Date of Event: 24th June 2022



‘Prof. P.G.K. Memorial Lecture’ was organized by the Department of Chemical Engineering in association with IChE Student Chapter, MIT, Manipal on the topic **"The Importance of Coatings in Industries"** on 24th June 2022 on MS Teams.

The Prof. PGK Memorial Lecture was instituted by means of a corpus fund in memory of the much loved and respected faculty, Late Dr. P. G. Krishnamurthy, former Professor and Head, Department of Chemical Engineering, MIT by his relatives.

Dr. Ashish Kulkarni, CEO of Shree Rasayani, Nasik, Maharashtra, a 1990 batch alumnus of the department of chemical engineering and a student of Prof. P. G. Krishnamurthy was the guest speaker. **The lecture presented an overview of the various types of coatings applied in the engineering industry and the technical challenges they present.**

The online event was graced by Mr. Ganesh Upadhyya (Relative of Prof. PGK); distinguished alumni of the department who were students of Prof. PGK, namely Mr. V. Ramakrishnan (1990 batch), Prof. Leon Ittiachen, (1994 batch), Dr. Ronald DSouza (1990 batch), Mr. Rohit Arora (1994 batch), Mr. Riyaz Ahamed (1990 batch); Dr. Krishna Bandaru (Chairman, IChE Mangalore Regional Centre and Professor, Chemical Engineering Department, MIT, Manipal), faculty and students of the department. The lecture was organised by Dr. C. R. Girish, Alumni Coordinator, Associate Professor, Chemical Engineering Department, MIT, Manipal.

Placements: A Way Forward

Speakers: Aishwarya Baliga, Aneesh Sastry, Paarth Dand, Lakshmanan V

BTech Chemical Engineering Batch of 2022

Date of Event: 29th June 2022



On 29th June 2022, IChE Manipal Student Chapter held an event with the current eight-semester students from the BTech batch of 2022 from the Department of Chemical Engineering. **The speakers invited were Aishwarya Baliga, Aneesh Sastry, Paarth Dand, and Lakshmanan V who were placed in Deloitte, KPMG, JSW and Gharda Chemicals respectively.**

The speakers covered the entire spectrum of the placement process in MIT, Manipal including pre-requisites to applying to companies and tackling the feelings of dejection after being rejected. They deeply motivated the audience to approach the placement process with a positive mindset and encouraged them to have a backup support system for each individual during mentally tough times.

While Aishwarya and Aneesh elaborated on the work profile as an analyst and the skills required for the same, Paarth and Lakshmanan gave an insight on building resumes, CVs and the turmoil before identifying the kind of work profile that interests a graduate.

The speakers provided a comprehensive overview of Dos and Don'ts in tests and interviews that companies conduct. They touched upon tips and tricks including websites and important topics and subjects as well.

Maintaining an informal, friendly interaction, the newly recruited employees also gave a detailed description of the shift from student life to work life and the opportunities and challenges they confronted. They finally clarified all doubts and queries students raised in the audience, wrapping up the session within 90 minutes. Wishing everyone luck and keeping their contacts open, the event was a success and received wonderful feedback from the participants.

Steer Your Way to Masters' Ed

Speakers: Surabhi Awasth, Sriram S, Vratin Srivastava, Anirudh

BTech Chemical Engineering Batch of 2022

Date of Event: 5th July 2022



On 5th July 2022, IICHe Manipal Student Chapter held an interactive event with students from the eight-semester students who have been admitted into various universities abroad to pursue their higher education. **The speakers invited were Surabhi Aswath, Sriram S, Vratin Srivastava, and Anirudh KS** who will be joining **Imperial College of London, Arizona State University, Carnegie Mellon University and Politecnico di Milano** respectively.

With the help of a PowerPoint Presentation, the speakers detailed the entire process of applying to universities. Covering respective regions of the world—United Kingdom, United States and European Union, they elaborated on their personal experiences in identifying their areas of interest and methods they adopted to find best-suited institutions.

Emphasizing aspects of **Statements of Purpose (SOPs), Letters of Recommendation (LORs), CVs, grades, and research experiences**, the speakers enlightened the audience on the importance of each element of the application procedure.

The speakers spoke greatly about **good CGPAs** and experience, wholesome learning and in-depth knowledge in their area of interest. **Financials** including tuition fees and scholarships and living expenses in different regions of the world were also touched upon.

A long FAQ session clarified doubts raised by the students in the audience including the significance of college-club activities.

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DEPARTMENT EVENTS

An exhibit on discovery, evolution,
and innovation



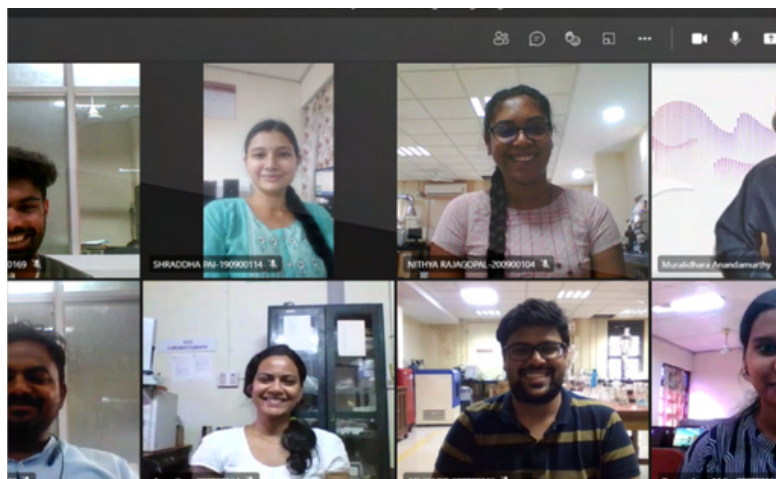
Workshop: Statistical Discovery for Chemical Engineers using JMP

Speaker: Dr Muralidhara Anandamurthy

JMP Academic Team, India

Date of Event: 3rd-4th Jan 2022

A workshop on “Statistical Discovery for Chemical Engineering Using JMP” using JMP Academic Suite was organised in the department from 03-01-2022 to 04-01-2022. The speaker was Dr Muralidhara Anandamurthy from JMP Academic Team, India. In the workshop sessions, the following topics essential for data analysis & design of experiments for researchers were introduced and



discussed: **Statistical Thinking & Chemical Engineering; Introduction to JMP and Measurement Scales; Data Visualization - Graphs, Plots, Charts, and Interactive Visualization, Distribution, Descriptive Statistics & Inferential Statistics; T-Test; Chi-Square & ANOVA; Correlation and Regression (Simple Linear and Multiple Regression); Introduction to Predictive Modeling.** Students and research scholars of the department participated in the workshop. The workshop was organised by Dr Srikanth Divi, Assistant Professor, as the coordinator.

JMP Academic Suite software license is available now for students and faculty members of the university campus of MAHE, Manipal.



MAHE-Class-Of-1994 Golden Jubilee Lecture

Speaker: Prof Ravindra D Gudi

Professor-in-Charge IIT Bombay Research Park

Date of Event: 1st April 2022



The Department of Chemical Engineering organised the "MAHE-CLASS-OF-94 Golden Jubilee Lecture" on the topic "**Exciting opportunities in AI/ML in chemical engineering**" on April 1st, 2022. This lecture series was been initiated by the batch of 1994 of the Department of Chemical Engineering, MIT, Manipal. Prof. Ravindra D Gudi, Dean-alumni and corporate relations and institute AI/ML chair professor at IIT Bombay, was the guest speaker for the day. **He provided a glimpse into the intersection of the two fields, Artificial Intelligence/Machine Learning and Chemical Engineering, and spoke about various applications in the industry.**

Prof. Gudi started his lecture by rephrasing his topic from "Exciting Opportunities in AI/ML" to "Whither AI: Artificial or Augmented Intelligence", by providing a fresh perspective on the conjunction of augmented and artificial intelligence. He critically analysed the role of data in chemical engineering by emphasising that data analysis and utilisation are important along with data generation and talked about how theoretical principles of chemical engineering are essential in giving us a complete picture of the process and improving it.

He also touched on the various applications of AI/ML in process control, optimisation, and plant performance analysis, along with examples from industry and literature.



Dr Leon Ittiachen, a representative of the BTech batch of '94, now Adjunct Faculty, Dept of Chemical

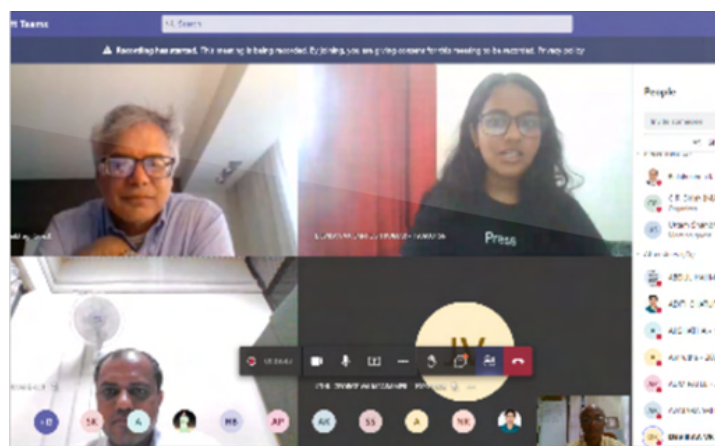
Chemical Engineering, MIT, Manipal and Professor, Department of Biotechnology, Sahrdya College of Engineering & Technology Trichur, Kerala; Cdr. Dr Anil Rana, Director, MIT Manipal and Dr Balakrishna Prabhu, Professor and Head of the Chemical Engineering department addressed the gathering

Alumni Guest Lecture

**Speaker: Mr Uttam Shanbhag
Director, Technology, Air Liquide, Delaware, USA**

Date of Event: 29th April 2022

An alumni guest lecture on the topic **“Emerging Challenges in Chemical Engineering”** was delivered by Mr. Uttam Shanbhag, Director, Technology, Air Liquide, Delaware, USA (1990 Batch of Chemical Engineering Batch, MIT) on 29th April 2022.



Mr. Shanbhag touched upon various aspects and challenges that chemical engineers could help in resolving while referring to **Air Liquide's contributions to transitioning to a low-carbon, hydrogen-based society, and facilitating better health, while still dealing with Oxygen, Hydrogen and Nitrogen**, three fundamentals, but most essential elements which could drive change, and improve the world.

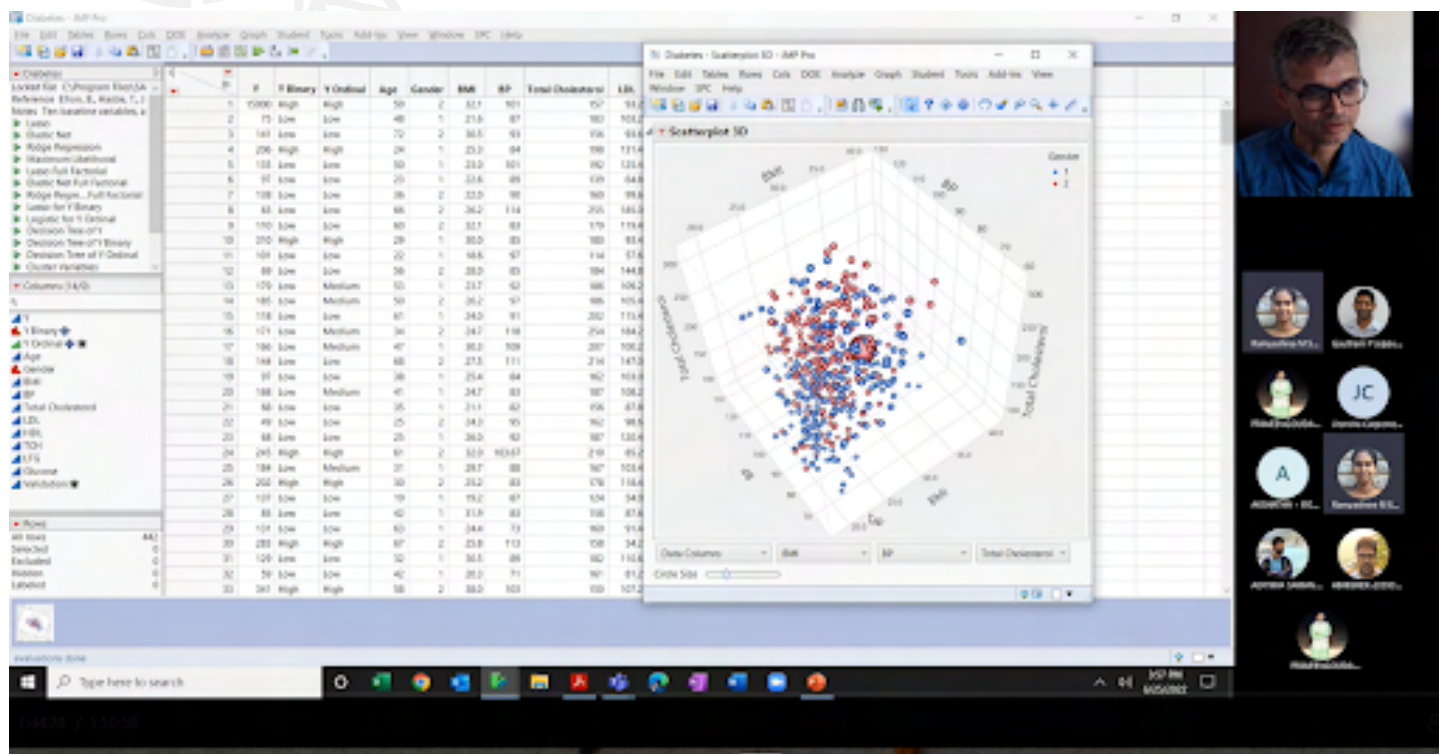
The lecture was organized by Dr. C. R. Girish, Alumni Coordinator, Associate Professor, Chemical Engineering Department, MIT, Manipal.

JMP Expert Talk Series on "Statistical Foundations using JMP"

Speaker: Dr Muralidhara Anandamurthy

JMP Academic Team, India

Date of Event: 29th June 2022



The department organized a JMP Expert Talk Series-1 on “Statistical Foundations using JMP” on 26-06-2022 via MS Teams. Dr Muralidhara Anandamurthy, from JMP Academic Team, India was the speaker for this session.

In this event, onboarding JMP and the hands-on training were given for the following topics: **Statistical Thinking; Shake hand with JMP and Measurement Scales; Data Visualization - Graphs, Plots, Charts, and Interactive Visualization, Distribution, Descriptive Statistics & Inferential Statistics; T-Test; Chi-Square & ANOVA, Correlation and Regression.** Students and faculty members of the institute participated in the hands-on training session. The workshop was organised by Dr Srikanth Divi, Assistant Professor, Department of Chemical Engineering and was coordinated by PhD Research Scholars Ramyashree and Adithya.

JMP Academic Suite software license is available now for students and faculty members of MAHE University, Manipal campus only. Request for the software using this [link](#).

For past event recordings and JMP updates visit this [link](#).



UPCOMING EVENTS

Students' Chemical Engineering Congress (SCHEMCON-2022)

Date of Event: 23rd-24th September 2022

The SCHEMCON 2022 on “Sustainable Technological Advancements In Chemical Industries -2022 (STAC-2022)” is **organized by the Department of Chemical Engineering, National Institute of Technology Warangal, TS and IChE-Hyderabad Regional Centre** under the aegis of IChE Student Chapter of NITW from **23rd to 24th September 2022**.

It aims at exploring recent developments and trends in chemical engineering. Abstracts are invited from all topics relevant to the theme but not limited to the following broad categories:

- Chemical Industry 4.0
- Materials and Polymers for Advanced Separation Processes
- Biochemical, Biorefinery and Chemical Processes for Circular Economy
- Catalysts for Sustainable Development
- Physical, Theoretical and Computational Studies of Chemical Processes
- Energy and Environment.



The poster for SCHEMCON 2022 features the following information:

- Organizers:** Indian Institute of Chemical Engineers (IICChE) and National Institute of Technology Warangal & SCRC (IITW).
- Event Title:** SCHEMCON 2022, 18th Annual Session of Chemical Engineering Students Congress.
- Theme:** Sustainable Technological Advancements In Chemical Industries -2022 (STAC-2022).
- Venue:** NIT Warangal.
- Dates:** 23rd & 24th Sept 2022.
- Registration:** Register Today to win CASH PRIZES. Save the Date.
- Website:** <http://cms.iitw.ac.in/schemcon/>
- Activities:** Keynote Lecture, Invited Lectures, Oral Presentations, Poster presentations, M.P. Chary Memorial Award, Cultural Night.
- Important Dates:**

Submission of Extended Abstract	10th July '22
Acceptance Notification & Registration Fee	25th July '22
Full Paper Submission	5th Aug '22
Last date of Registration	5th Aug '22
Conference Dates	23rd & 24th Sep '22
- Contact:** For more information: Organizing secretary, SCHEMCON-2022 (+91 999 46 466 10)

Chemical Engineering Congress (CHEMCON-2022)

Date of Event: 27th-30th December 2022



CHEMCON provides an opportunity for all senior students of Chemical Engineering, research scholars, professors, and industry experts to come together ensuring four days of an intensive interface of knowledge and experience. These exchanges of thoughts and theories help all delegates to constantly update and equip themselves in a fast-changing scenario which calls for research and development in Chemical Engineering applications.

CHEMCON 2022 will be the 75th Annual Session of IChE and will be **organized by Kanpur Regional Centre in association with the Indian Institute of Technology, Kanpur, Harcourt Butler Technical University, University Institute of Engineering and Technology, Kanpur, Dr. Ambedkar Institute of Technology for Handicapped and Rajiv Gandhi Institute of Petroleum Technology.**



Faculty Achievements

Faculty Achievements

Patents

Dr. Gautham Jeppu, Associate Professor and his team filed 3 patents titled “An additive mixture for enhanced biogas production”, “An apparatus for generation of biogas” and “A portable filter straw for water purification”.



Grants

Dr. Gautham Jeppu, Associate Professor and his team were granted a fund of ₹10,000 by KSCST for their work on “Solar assisted biogas production”.



Research Lab- Process Control



Research Lab- Gas Chromatograph

Journal Publications



[View Scopus Profile](#)

Dr V Ramesh

Dr V Ramesh, Associate Professor and his team have published a paper in “Environmental Research” Journal (Q1, Impact Factor: 6.498), titled “Green synthesized hydroxyapatite nano adsorbent for the adsorptive removal of AB113 dye for environmental applications”.

DOI: <https://doi.org/10.1016/j.envres.2022.113274>



[View Research Gate Profile](#)

[View Scopus Profile](#)

Dr S. Raja

Dr S Raja, Associate Professor (Senior Scale) and his team have published a paper in “Chemosphere” Journal (Q1, Impact Factor: 7.086), titled “Magnetic activated charcoal/Fe₂O₃ nanocomposite for the adsorptive removal of 2,4-Dichlorophenoxyacetic acid (2,4-D) from aqueous solutions: Synthesis, characterization, optimization, kinetic and isotherm studies”.

DOI: <https://doi.org/10.1016/j.chemosphere.2021.131938>



Dr S. Shanmuga Priya

Dr S. Shanmuga Priya, Associate Professor (Senior Scale) and her team published a paper in Case Studies in Thermal Engineering, (Vol 30, February 2022, 101744, IF : 4.724.) titled “Thermal model of a photovoltaic module with the heat-protective film”.

DOI: <https://doi.org/10.1016/j.csite.2021.101744>

Dr. S. Shanmuga Priya, Associate Professor (Senior Scale) and her team published a paper in the International Journal of Hydrogen Energy, (Volume 47, Issue 35, 26 April 2022, Pages 15820-15831, IF : 5.816) titled, “Molecular simulation of copper-based metal-organic framework (Cu-MOF) for hydrogen adsorption”.

DOI: <https://doi.org/10.1016/j.ijhydene.2022.03.089>



[View Scopus Profile](#)

Dr M. Srinivas Kini

Dr M Srinivas Kini, Professor and his team have published a paper in “Environmental Research” Journal (Q1, Impact Factor: 6.498), titled “Adsorptive removal of AB113 dye using green synthesized hydroxyapatite/magnetite nanocomposite”.

DOI: <https://doi.org/10.1016/j.envres.2022.112951>



Student Achievements

Student Achievements



Dimitra Shenoy, BTech Batch of 2024

Dimitra represented the MIT women's Badminton team conducted by NIT-K (Suratkal) in the Badminton tournament named Smash and placed the second position.

Dimitra also won the first position in MIT's Revels 2022 Badminton tournament.



P.V. Hanukrutha, BTech Batch of 2024

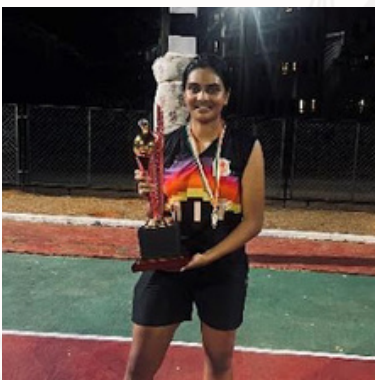
Hanukrutha represented MIT in the Revels 2022 Athletics events. She won a bronze medal for the 200m race and her team won the gold medal for 4x100m relay. Her team was awarded the overall championship in the Athletics team.

She bagged the IASc-INSA-NASI Summer Research Fellowship in 2022 under Professor Abbasi in Pondicherry University.



Kavit Vora, BTech Batch of 2023

Kavit is MIT's Squash team captain. He's also part of MIT's Tennis team. Kavit won second place in Squash singles and first place in the tennis team event (MIT-A) in Revels 2022.



Shrividya Ramesh, BTech Batch of 2023

Shrividya, represented MIT Women's Basketball team as captain and led her team to victory in MIT's Revels 2022.



Kshitij Bang, BTech Batch of 2023

Kshitij won the MIT IDEATION competition organised by Innovation Centre, Manipal with the theme 'Reduce, Reuse and Recycle'. He and his teammates developed a mini plastic model to make a unit to convert plastic to fuel. The plastic was heated in the absence of oxygen in a thick pre-conceptualized metal drum to give combustible gases and fuel oil as the major products. The economic stability, future growth and marketing strategy of the product were also discussed.



Koena Maji, BTech Batch of 2023

Koena presented a paper on Magnetic Nanoparticles and their Application in Cancer Therapy at ACMS 2022. It was arranged by IChE Headquarters, NIT Jalandhar, Osmania University. It was held at Heritage Institute Kolkata in April 2022.

Koena delivered an oral presentation on “Identifying Exoplanets' Potentiality for Life in Habitable Zones: Giving New Dimension to Cosmological Studies” at Indian Planetary Science Conference (IPSC 2022) arranged by PRL, Ahmedabad. The programme was attended by the chairman of ISRO in March 2022.

She delivered the same at Astrobiology Science Conference (AbSciCon) 2022 held virtually in Atlanta arranged by AbSciCon Scientific Organizing Committee in May 2022.

Koena was invited to be the Instructor at Mars Analogue Site Expedition (MASE) 2022 arranged by Spaceonova Private Limited India.



Shradha Pai, Ph.D. Research Scholar

Shradha published a paper titled “Adsorptive removal of AB113 dye using green synthesized hydroxyapatite/magnetite nanocomposite” in Environmental Research, IF: 6.498, volume 210, July 2022, under the guidance of Dr. M. Srinivas Kini, Professor, Department of Chemical Engineering and co-guided by Dr. S. Raja, Associate Professor (Senior Scale), Department of Chemical Engineering.

Fun Zone

Find Words in the Maze!

Crafted by Devangshi Debraj

H	S	U	F	M	M	W	A	F	A	U	E	D	E	L
E	U	A	Z	G	H	K	G	L	V	U	K	L	E	A
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J	I	T	J	M	G	M	Q	O	E	A	B	G	S	N
M	A	Q	N	M	O	M	E	N	T	U	M	K	J	F

SAPONIFICATION

ENTHALPY

DISTILLATION

ENZYME

CONVECTION

LEACHING

MOMENTUM

RESIN

OPTIMISATION

FLANGES

ENTROPY

LAMINAR

CARBON

HEAT

MASS

Guess These Places!

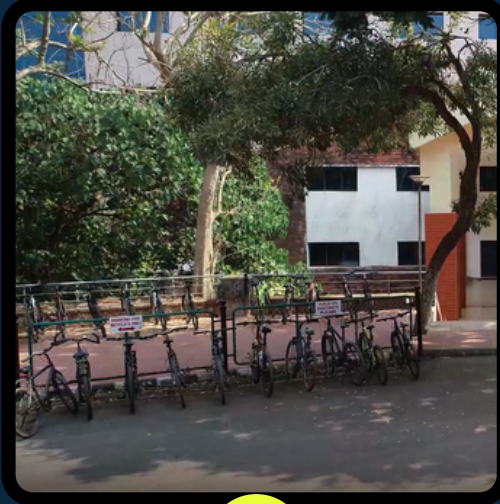
Crafted by Dhruv Agarwal



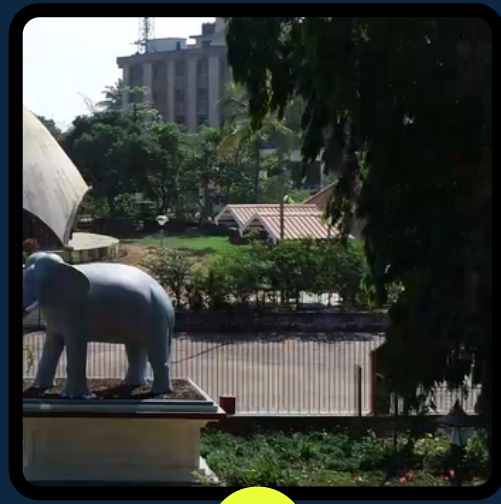
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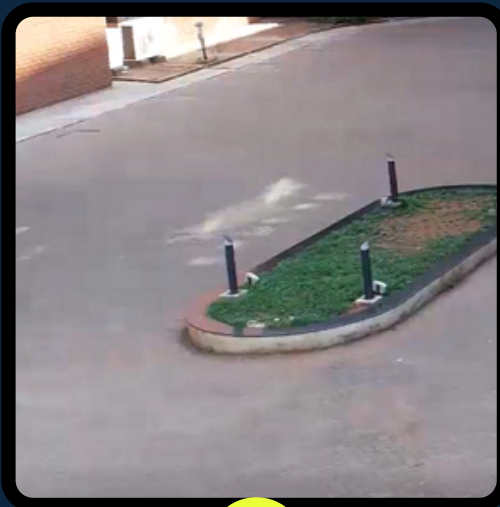
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6

ANSWERS:
1: Student Plaza 2: MIT road 3: Academic block 5 4: Vengugopal
temple 5: Academic bloc 3 6: MIT ground road

TEMPUS ARCHIVES


Take a deep-dive into our previous edition [here!](#)



CROSSWORD
CLICK ON THE LINK HERE TO ACCESS THE CROSSWORD

ACROSS

4. A potential source of harm.
5. It is a chemical process in which a substance reacts rapidly with oxygen and gives off heat.
8. A general name for a process involving the refining of petrochemicals with hydrogen gas.
10. A classification of fluids in which viscosity is independent of shear stress and time.



THE ALUMNI CORNER

Words of Wisdom from the past to the present

MR. BHARATRAM MURALIDHARAN

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MANIPAL INSTITUTE OF TECHNOLOGY

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JULY 2021

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NEWSLETTER

VOLUME 2

FEBRUARY 2022

TEMPUS

CHEMICAL ENGINEERING DEPARTMENT NEWSLETTER



emotion rather than an institution because I'd never do it justice. You s

IIChE Events

Student Chapter of the Chemical Engineering Department

MAKING THE OFF-BEAT PATH

Date of event: 9th July 2021
Interactive session with Mr. Dhairya Danav
his journey from an engineer to an advisor.
as an advisor and speaker, he walked through his personal experience exploring emerging products in AI, AR and wearable

Presidential Fellowship from MIT
concept Labs efforts in designing
at MIT Media Lab for AI
Forbes 30 Under 30
ors list & m

UPCOMING EVENTS

Students' Chemical Engineering Congress (SCHEMCON)

Click on the link above to know more

An annual event organized by the Students' Chapter of Indian Institute of Chemical Engineers (IIChE) under one of its Regional Centers (IIChE) under Kolkata, is being organized jointly by MANIT Bhopal and IISER Bhopal. It provides a platform to Chemical Engineers for interacting, learning and to gain exposure of research in the area of Chemical Engineering. SCHEMCON-2021 with a theme "Globally Advancing Technology for Environment (GATE2021)" is expected to develop a formal platform for enriching scientifically through discussions and knowledge sharing in the field of chemical and process industries. The aim of the SCHEMCON-2021 is to challenge and inspire the budding chemical engineers, research scholars and industry for exchanging knowledge and sharing of best practices in a global-scale context toward advances for a clean and sustainable environment. To be held on 24th-25th September 2021



Department Documentary

Cinematographer:
Sam Jose Thomas
B.Tech Batch of 2022
Media Technology

Director & Editor:
A Varun Menon
B.Tech Batch of 2022
Chemical Engineering

Watch the documentary [here!](#)





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Mr Sandeep Kattamuri

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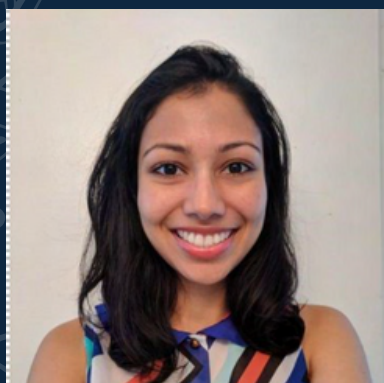


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Photo Credit: Prof. Nithesh Kumar, Dept of Media Technology

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