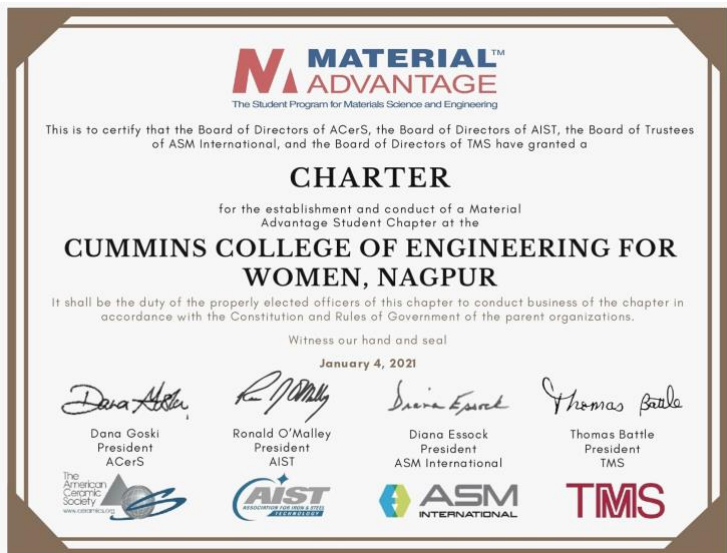


JUNE 2021 | ISSUE 2

THE BEACON

CCOEW Nagpur Material Advantage Student Chapter Newsletter

Contents

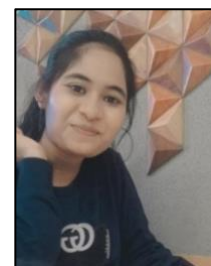


- Message from Editors about the Chapter
- Message from ASM Int.
- Message by Faculty (ASM)
- Technical Article: Computational Material Science.
- Fun facts
- Technical Article: Composite Material.
- Riddles, Did You Know?
- Past Events
- Achievements, Planned Event
- Crossword

Message from Editors

Welcome, everyone to our monthly newsletter. It is indeed a great honour to be the editor and co-editor of our monthly Newsletter "THE BEACON". And it is an immense pleasure to be a part of the June newsletter of Material Advantage Student Chapter. It is with profound pleasure, humility, and the purpose of the Newsletter is to

promulgate information of unattainable value to members of the group. While we deem this a worthwhile purpose, we would like the Newsletter to be something more, something better. We take this opportunity to thank our author, editors and anonymous reviewers.



Editor
Tannu Kanojiya



Co-Editor
Kalyani Kadwe



Message by Mr. Pradeep Goyal

At the outset, I wish to compliment you and your team of Material Advantage members for outstanding work you are doing to advance the knowledge of Material Science.



I had the privilege of seeing the first newsletter and was overwhelmed by the contents and the quality of the magazine. I am sure it beats any of the magazines being published by ASM Chapters.

The honour of being the first ever Women’s chapter carries with it a lot of responsibility and I am confident that you all are exceeding the expectation of your parent ASM Chapter.

As with all professionals Organizations, it is incumbent upon the leadership to ensure that all members participate in the activities and simultaneously create an environment of succession planning. That will go a long way in ensuring the continued success of the Chapter. The goal should be to raise the flag of the Cummins College Chapter in the entire world to gain top position.

I wish you all the very best and assure you of our continued support to enable young Material Science graduates prosper in their respective careers. Finally, my compliments to the entire Management team of the college for creating a conducive environment for the chapter.

Pradeep Goyal
Founder Chairman & Managing Director Metals Limited.



Requirement of improving exiting material properties and developing new materials:

In any kind of energy conversion machines or mechanisms the properties of materials play a very crucial role. The efficiency, reliability, and scope for improvement are some of the factors which provokes materialists to develop new type of material. Let's look at few examples where I feel the improvement in material properties will certainly solve a few technological challenges.



Ideally, the efficiency of Carnot cycle and Rankine cycle greatly depends on the higher temperature of the source. The greater the temperature of heat addition, the higher is the efficiency of these ideal cycles. Physical properties like melting point and change in material properties at higher temperature put limitations on operating temperatures. Developing low-cost material with good physical and material properties is the biggest challenge. For example, in steam power plant material of boiler, piping of turbine and turbine material does not allow superheated steam after certain temperature. If we increase the temperature say, beyond 500-600 degree Celsius, material may get degraded and fails. It is the fact that due to several irreversibility's like heat transfer through the material due to temperature difference, lack of perfect insulation, these cycles cannot be achieved in practice. Engineers are taking efforts to develop new methods approach the process defined in these cycles.

Many designs of solar cookers are developed by researchers to date. Though it is being used for cooking for many years, it is not much popular in domestic

applications due to certain deficiencies in the present form(design) of solar cookers. The major lacunae can be regarded as the slow rate of heat transferrin the cooker, laborious for handling, and its nonviability after sunset. Solar cooker takes time to cook the food. Heat transfer rate in conventional cooker is very low that cooking time is usually more than other cooking methods. Nanofluid can play a vital role to increase heat transfer performance. But it works in a limited range of specific heats. Phase change materials are very good inventions for storing solar heats during the day and releasing it in the evening. Despite using PCM (Phase Change Material) like paraffin to store solar energy and used it in the late evening, due to low thermal conductivity of PCM materials and low heat rate transfer to food, the cooker is less effective in the evening. So, developing PCMs having large specific heat and higher thermal conductivities can be a milestone in solar cooking technologies. Similarly in the case of wind turbines, the requirement is of lighter and stronger material. Currently, available materials have load carrying capacity but heavier. Due to large densities, these materials cannot be installed beyond a certain height and put limitations on wind turbine speed and efficient design. Currently, fiberglass reinforced with epoxy and other composites are lighter and strong, but the need of better material has not ended yet.

It is clear from the above examples that quest from improving exiting material properties and developing new materials is an utmost requirement to curb their challenges.

Mr. Prasanna Mahankar (Assistant Professor, Mechanical department) MKSS's Cummins College of engineering for Women, Nagpur

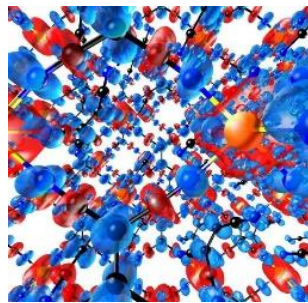
Computational Material Science:

By: Samiksha Tembhare (3rd year mechanical student)



Computational materials science involves computational tools for solving the material related problems.

There exist different mathematical models for investigating problem at multiple length and time scales



which help in understanding the evolution of material structures and how these structures effectively control material properties. With this understanding, we can select material for specific applications and design advanced materials for new application as it uses modelling, simulation, theory, and informatics to understand materials.

As CMS is that the prediction of fabric properties from atomic to microstructural scale may be a key, cross-cutting strength of materials. It provides a framework for understanding the detailed role of individual parameters like composition, surface structure and chemistry, microstructure, nature of defects and their distribution in material synthesis, processing, and properties.

Material science is historically linked to an engineering- driven by the need for material with specific properties to manufacture infrastructure, machines, and devices. Therefore, there has always been a need for novel and better material that are stronger and lighter-weight, less expensive, easier to process, more durable and has a less environmental impact. Computational means have supported the planning of tools, buildings, and vehicles.

The application of computer in material science and engineering is developing increasingly to use the technology correlatively, for instance, processing, simulation techniques mathematical model and database etc. Through the method of building the mechanism model, employing a computer data analysis process in materials science, the model predicts the optimal design to realize. Computer application technology continues to evolve, gradually and comprehensively solve the main technical problems in material science and engineering.

Resources: Computational Materials Science: An Introduction, Second Edition
By June Gunn Lee
Computational Materials Science of Polymers
By Andreï Aleksandrovich Askadskii

Fun-Facts

Curium-244 has been used in Alpha Proton X-ray Spectrometer to detect the presence of chemical elements in the atmosphere and rock surface compounds of Mars. The element is believed to glow red in the dark due to its radioactive nature.



Aerogels are used in the spaceship 'stardust' on its travel to comet wild 2 as interstellar dust collectors.



Beryllium oxide is an electrical insulator, yet, conducts heat very well. Therefore, Beryllium oxide is used as a high-voltage insulator because it conducts heat away while keeping them isolated electrically.



Antimony has been an important mineral throughout much of human history. Archaeological and historical studies indicate that antimony and its mineral sulphides have been used by humans for at least **6 millennia**. Antimony crystallizes in the rhombohedral class of the hexagonal system. Estimates of the abundance of antimony in the Earth's crust range from **0.2 to 0.5** parts per million.



Electron Back-Scatter Diffraction (EBSD), which is sometimes also referred to as Backscatter Kikuchi Diffraction (BKD) is a typically SEM-based backscatter or transmission electron diffraction technique for retrieving crystallographic orientation and phase information from crystalline materials.

Caesium is the material most often used to make atomic clocks. They are considered the most accurate timekeeping devices. It was the first element ever to be discovered using the newly created spectroscope.



Composite Material:

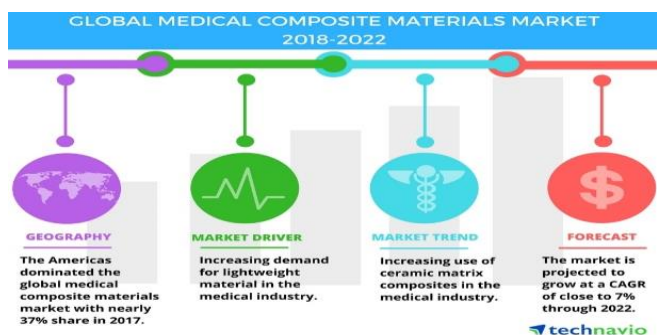
By: Tanaya Khond (2nd year Mechanical student)



The world needs Eco-friendly materials which can pollution free and would improve the environmental quality of the products. The need for green materials has led to the utilization of fiber composite made from natural fibers and polymer matrices. For controlling pollution problems, natural materials may be preferred for many reasons like they are light- weighted, strong or has low cost than the traditional one.

Today, what mankind have found out is the best materials are going to be nothing but the natural materials which are available. The **Composite Material** is the combination of two or more different materials which are in the form of mixed or bonded on a microscopic scale. It is composed of reinforcement embedded in a matrix to make a third material which their applications are in many fields like aerospace, automobile, marine, architecture and other home décor products. The earliest uses of composites were by the ancient Mesopotamians and Egyptians around 1500 B.C. They used the mixture of straw and mud to create a strong, durable buildings. The Mongols invented the first composite bow using wood, bone, and animal glue. With the further demand for such products the first commercial boat hull was introduced in 1946.

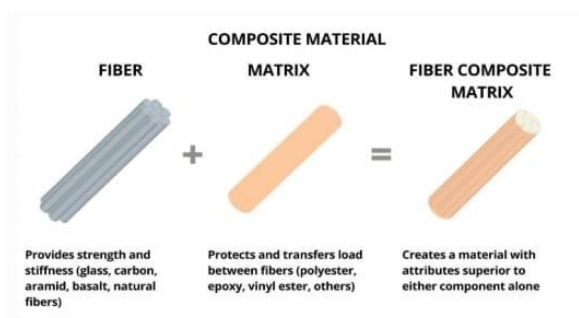
Composite Material are classified at two distinct levels.



- The first level is made with respect to matrix constituent. Based on matrix we can classify polymer matrix composite, metal matrix composite, ceramic matrix composite and carbon matrix composites (carbon-carbon composites)
- The second level is in the reinforcement form fiber reinforced composites (FRP), laminar composites and particulate composites. FRP can be further classified into discontinuous and continuous fibers.

There has been increase in demand for these materials in medical industry as they are light weighted and resistant to corrosion. Ultrasonic C scan has been established as the primary inspection method for composite material. Composites are more resistant than metal, resulting in fewer costly inspection over the aircraft's lifespan.

The mechanical properties of materials depend upon applied load. So, most of the materials can be predictable their service life for future needs. The properties which are considered for mechanical tests are tensile, toughness, compressions, and hardness. Due to their mechanical properties, these materials can be used for many purposes.



Resources:

https://www.efunda.com/formulae/solid_mechanics/composites/comp_intro.cfm

Riddles

I am Shiny and metallic
But not a piece of bling
They're to make a noise
Shake them and they will ring.
Who Am I?

This has been known to cause a rush
But it's not a Black Friday sale
It's a precious yellow metal
Weighed in troy ounces on a scale.
Who Am I?



Did You Know?

Aluminium is extremely easy and cost Effective to recycle but the global recycling Rate for aluminium is only **69.1%**

The **Titanic** did not sink because the steel Plates failed but because the rivets failed

Volcanic Lava Can Turn into Glass
Obsidian, a type of natural glass, can form When hot lava cools quickly after being Expelled from a volcano.

Copper has very powerful anti-microbial properties. For example, a stainless-steel sink will contain germs for two weeks while a copper sink will be germ-free in two hours.

Steel bridges are four to eight Times lighter than built from Concrete's Golden Gate Bridge (1937) required 83,000 tons of Steel whereas half of that amount Would be required today.

Past Events

1. Technical Article Writing Competition.

On 23th May CCOEW Material Advantage Student Chapter conducted A Technical Article Writing Competition. For this competition, we get total thirty-four entries.

2. Launching of Newsletter "The Beacon".

On 26th May we launch our first Newsletter "The Beacon". It is a proud moment for us to present you THE BEACON, the first ever Newsletter of CCOEW Nagpur Material Advantage Student Chapter. The launching was held at the hands of Mr. V. Babu Sathian, Chairman, ASM Int. India National Council, Dr. Ashok Kumar Tiwari, VC, India National Council, Mr. Udayan Pathak, Chairman ASM Int. Pune Chapter, Dr. Manoj Tarambale, Principal of PVG's College of Engineering & Technology & Dr. B. P. Joshi, Principal, Cummins Coe, Nagpur.

We will be interacting with you all every month through this Newsletter.



Maharshi Karve Stree Shikshan Samstha's
CUMMINS COLLEGE OF ENGINEERING FOR WOMEN NAGPUR

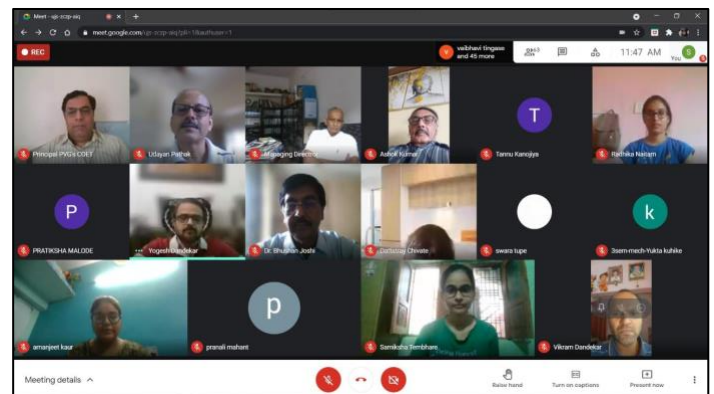
TECHNICAL ARTICLE WRITING COMPETITION.

Cummins College Of Engineering is conducting, " TECHNICAL ARTICLE WRITING COMPETITION " which will enhance your writing ability about the technical world.It will be interesting and engrossing competition. Refer the following steps for submission.

- Google form is provided
- Topics of Articles are given
- Upload your article in PDF form
- Best articles will be awarded
- Certificates will be provided to the participants
- Link is given below : <https://bit.ly/3nIA8cC>

Contact : Tannu kanojiya- 8805754866

The American Ceramic Society | AIST | ASM INTERNATIONAL | TMS



Achievements

1. UBA (Unnat Bharat Abhiyan)

Mandva & Lakhmapur villages

Adopted by Unnat Bharat Abhiyan (UBA) of Cummins College achieved ZERO Covid19 cases till Date. College authorities have felicitated them by an Appreciation Letter.



Planned Events

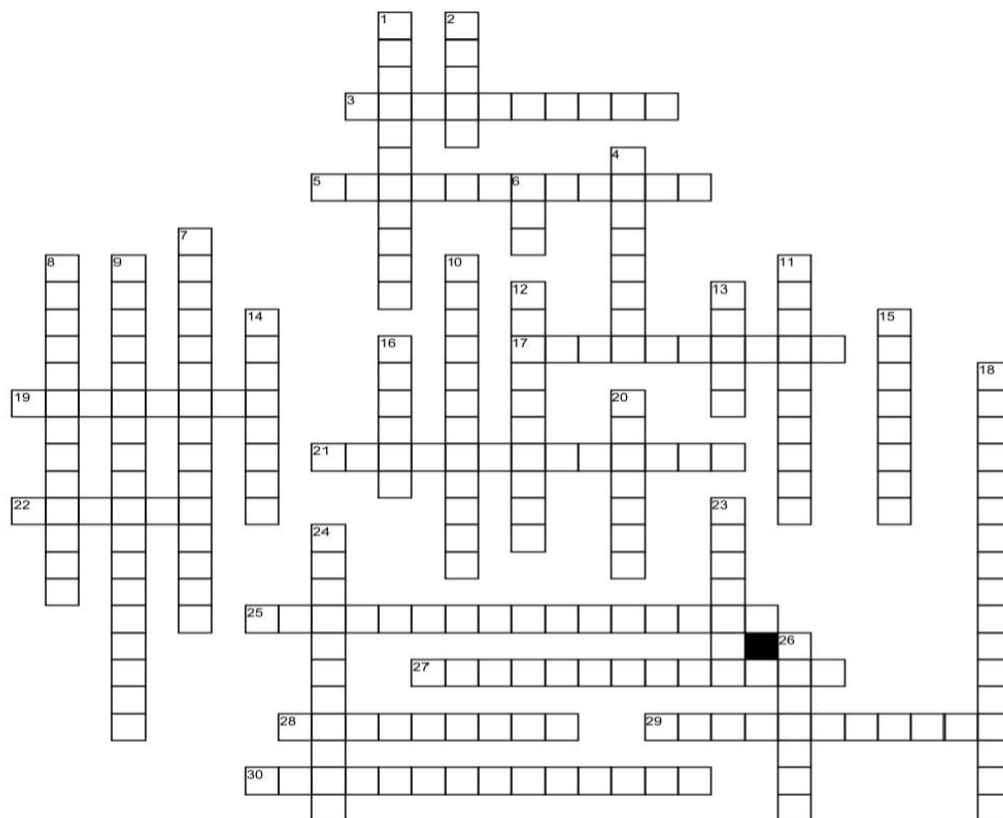
1. Quiz Competition

A Quiz competition is going to be organized by Material Advantage Student Chapter, where various colleges can participate in it. This quiz competition will be held based on materials, where students will get to know more about materials and material engineering.

2. Material kit

Material kit is an initiative taken by CCOEW Material advantage Student Chapter, Nagpur. Under this activity we are going to provide students a material kit in which there would be leaflets related to materials as well as some samples of materials too. They will get many facts, as well as information about materials they may have never heard of and how they are used. In this kid student will be able get a hand on the materials, they can see how they behave and there would be some small game related to materials, which will increase these budding minds interest in the are of material science and engineering. They will get many facts, as well as information about materials they may have never heard of and how they are used.

Crossword



Down:

1. Definition of stress
2. A ceramic used in windows
4. Type of bond that polymers have
6. A thermoplastic used to make hardhats
7. A ceramic used for drill bits and in nuclear devices
8. This smart material responds to heat
9. A composite used in building foundations and dams
10. This smart material responds to UV light fluctuations
11. Withstands wear and tear
12. How a material resists conduction
13. Thermoplastic often used in material/fabric
14. Hydro chronic inks react to what?
15. Withstands wear and scratches
16. Ductile and used in wires
18. How a material withstands twisting and torsion
20. How compact a material is
23. If an alloy contains iron, it is
24. Fluctuating amount of stress
26. This space memory alloy us made from nickel and titanium

Across:

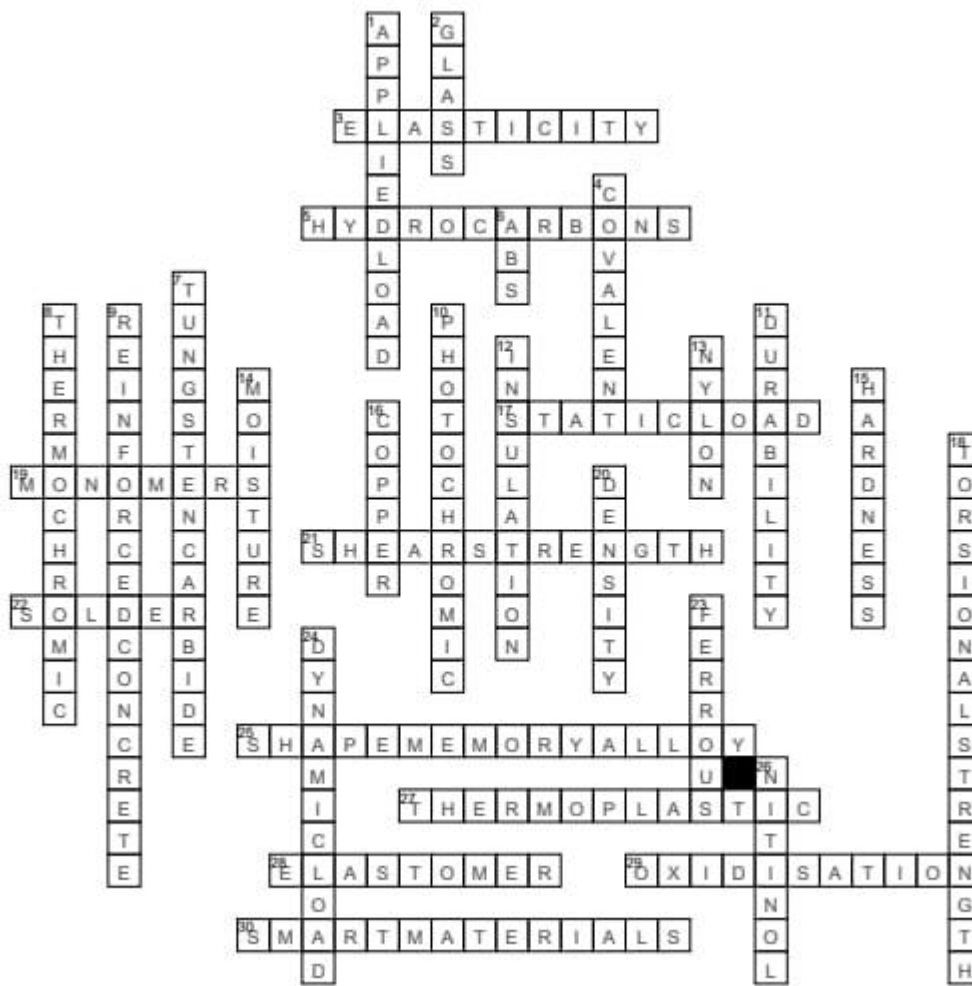
3. Ability to be deformed and return to Original shape
5. What do encapsulate polymers absorb?
17. A constant amount of stress
19. Polymers are made of chains of
21. Withstanding forces pushing in Opposite directions
22. The alloy of tin and lead
25. SMA stands for
27. What type of plastic is polymorph?
28. What material classification Is neoprene?
29. The of rust is called
30. This material category Changes significantly as a result of External stimulus

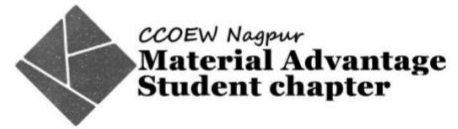
Answers

Riddles:

Answer: 1. Bell

Answer: 2. Gold.





Connect with Us

Facebook: <https://www.facebook.com/CCOEWMatAdv>

LinkedIn: <https://www.linkedin.com/groups/12476423>

Instagram: <https://www.instagram.com/madvccoew/>

Word Press: <https://materialadvantageccoew.wordpress.com/blog/>

For Further Queries Contact:

Yogesh Dandekar-9823016700

(Faculty advisor)

yogesh.dandekar@cumminscollege.edu.in

Samiksha Choudhari

(Chair)

samiksha.choudhari@cumminscollege.edu.in

