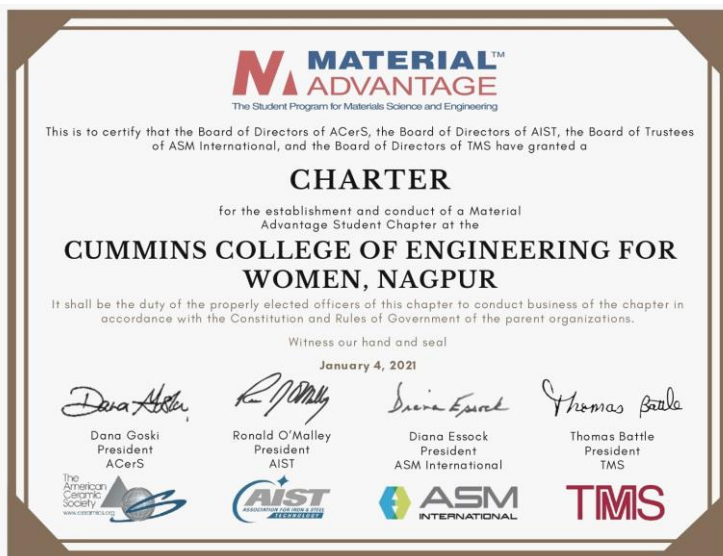


MAY 2021 | ISSUE 1

THE BEACON

CCOEW Nagpur Material Advantage Student Chapter Newsletter

Contents



- Message from Editors About the Chapter
- Message from ASM Int. Pune Chairman
- Message from Dr. Bharatbhusan Joshi (Principal CCOEW)
- Message by Faculty Advisor (ASM)
- Technical Article : Graphene: The new Wonder Material
- Fun facts
- Technical Article: Material for Lithium-Ion battery
- Riddles, Did You Know?
- Past Events
- Achievements, Planned Event
- Crossword

Message from Editors

It is with profound pleasure, humility, and anticipation that we celebrate the launch of the newsletter of the Material Advantage student chapter. On behalf of the CCOEW Editorial Team, we would like to extend a very warm welcome to the readers. We take this opportunity to thank our authors, editors, and anonymous reviewers, all of whom have

volunteered to contribute to the success of this newsletter. Further, we will periodically issue special calls for articles to modernize and strengthen areas of research and development showcased in the field of material science and engineering. We would like to thank our sponsors for sponsoring this newsletter.



Amanjeet Kaur
Editor



Shruti Dhole
Co-Editor

About the Chapter

Cummins College of Engineering for Women (CCOEW) Nagpur Material Advantage Student Chapter was formed in January 2021. Our Student Chapter is the only chapter with all women members in India! Since then, our chapter is been involved in various material-related interesting activities and competitions. Material Advantage is a window providing access to material science and engineering's most prominent societies that is Acers - The American Ceramic Society, AIST - Association for Iron & Steel Technology, ASM International, TMS - The Minerals, Metals, and Materials Society.

Message by ASM

Int. Pune Chairman

Hello Team Materials Advantage Chapter,

It is a matter of pride for me to know that Materials Advantage (MA) Chapter, Cummins College of Engineering for Women, Nagpur is publishing its first Newsletter. Hearty Congratulations!

I am sure this newsletter will establish an excellent communication channel amongst the members during the current Covid-19 Pandemic. Please circulate this amongst all students including non-



member also for motivating them to join MA chapter. I would advise you to circulate this newsletter among other Indian MA Chapters.

MA Chapter, Cummins College of Engineering for Women, is unique in many aspects. This is the first MA chapter in the world with all women members. It is worth noting that this Chapter has been active right from its inception and has conducted various activities in spite of restrictions imposed by the pandemic.

This newsletter is a demonstration of your team spirit. This Newsletter can be used as a platform to demonstrate your creativity. In addition to reporting MA chapter activities, you may enrich it by making it theme based Newsletter, Themes can be both - Technical & Management for future issues and you may touch upon various aspects of selected themes.

I am sure in future this MA chapter will come up with many more innovative & enriching initiatives.

I am especially thankful to Principal Bharatbhusan Joshi, Prof Yogesh Dandekar Faculty Advisor, Prof Prasanna Mahankar and Management of MKSSS Cummins College of Engineering for Women, Nagpur for supporting this activity.

Best Wishes.

**Udayan Pathak, FIE, FASM
Chairman,
ASM International Pune Chapter**

Message by Dr. Bharatbhushan Joshi (Principal CCOEW)

I am very glad to know that the material advantage group at Cummins College of engineering for women Nagpur is coming out with its first newsletter.



I am sure that this newsletter will serve the purpose of giving them information about the important activities of the material advantage group. The articles published.

The articles published by the students will be a great source of knowledge to the other students. I propose that students should study the usage of various materials and should write in-depth articles in this newsletter.

Congratulations to the editorial team and coordinator Teacher Yogesh Dandekar for taking efforts to bring out this newsletter. I wish the best of luck in their future endeavours

Dr. Bharatbhushan Joshi
FIETE, FIE, SM IEEE, M IDST, M ISSS,

Message by Faculty Advisor (MA)

At the outset, I wish to congratulate the entire team of the Nagpur Material Advantage Student Chapter for taking a leap ahead by starting this monthly Newsletter!



Within a very short time duration, the team has decided to publish the Newsletter, and a separate team to volunteer this activity has been formed.

Dear readers, you can see a variety of columns in this newsletter that include Technical Articles, Riddles or you may come across interesting stuff like Did You Know, achievements, and past and upcoming events.

Please feel free to contact us anytime for any queries or valuable suggestions. We will definitely like to improve.

Prof. Yogesh Dandekar
Faculty Advisor Material Advantage

GRAPHENE: The Wonder Material

By: Pranali Mahant (3rd year mechanical student)

Recycling and material recovery

The market for lithium-ion battery recycling is expected to grow tenfold over the next decade. It is estimated that, by 2030, it will be possible to recover over 120,000 metric tons of lithium carbonate equivalent worldwide from used Li-ion batteries, along with other raw materials such as nickel and cobalt.

WHO DISCOVERED GRAPHENE?

Scientists are puzzling over graphene for several years. In 1947, Canadian physicist Philip Wallace wrote a pioneering paper about the electronic behavior of graphite that sparked considerable interest within the sector. accolade-winning chemist Pauling was speculating about how flat, single; layers of carbon atoms behave way back in 1960. In 1962, such materials were named "graphene" by German chemist Hans-Peter Boehm, who had spotted them under his microscope the year before. Theoretical research into graphene continued for the following four decades, boosted within the 1980s and 1990s by the discoveries of fullerenes and carbon nanotubes Graphene was only produced in an exceedingly laboratory in 2004, by Russian-born scientists Andre Geim and Konstantin Novoselov engaging at the UK's University of Manchester. Eventually, after a decent deal of labor, they were amazed to hunt out they'd some bits of graphite just one atom thick—graphene.



WHAT ARE THE PROPERTIES OF GRAPHENE?

General properties:

Graphene is an amazingly pure substance due to its simple, orderly structure-based tight, regular, atom bonding. As carbon might be non-metal graphene can also be identical but since it behaves way more style of metal, lots of scientists describe it as semimetal or semiconductor.

Electronic properties: The electronic properties of graphene are highly unusual. Optical In graphene, each carbon atom is connected to three other carbon atoms on a two-dimensional plane, which leaves one electron free for electronic conduction. Recent studies have shown electron mobility at values more than $15,000 \text{ cm}^2 \cdot \text{V}^{-1} \cdot \text{s}^{-1}$. Graphene moves electrons 10 times faster than silicon using less energy. Graphene has no band gap. A band gap is the gap between the energy of an electron when it is bound to an atom, and the so-called conduction band, where it is free to move around.

WHAT ARE THE APPLICATIONS OF GRAPHENE?

- Ø Biomedical
- Ø Composites and coatings
- Ø Electronics
- Ø Energy
- Ø Membranes
- Ø Sensors.



Resource: www.tandfonline.com

Fun-Facts

Nitinol is strong enough to stop a bullet! According to lead researcher **Afsaneh Rabiei**, the metal foam can stop a bullet even if the thickness is less than an inch. Although the bullet can't penetrate nitinol, it'll hit it and bounce off. The material is so strong that it was able to pulverize.



One square meter of **graphene** weighs about 0.77 milligrams. For scale, one square meter of regular paper is 1000 times heavier than graphene and as a single sheet of graphene big enough to cover a football field would weigh less than a gram.



A new type of **biodegradable solar panel** which is made from a material obtained from cotton and castor beans. which is basically a biodegradable, non-toxic solar-panel. With the same efficiency as that of a normal solar panel.



Metal foam is what you get when you add a foaming agent, powdered titanium hydride, to molten aluminium, then let it cool. The result is a very strong substance that is relatively light, with 75–95% empty space. Because of its favourable strength-to-weight ratio, metal foams have been proposed as a construction material for space colonies. Some metal foams are so light that they float on water.



You thought that steel is not '**rocket science**' Then take a look at the latest rocket design of **SpaceX** - it's all steel.

Reasons: Carbon fibre costs \$135 per kilogram, and 35 percent of the stuff must be scrapped — "you cut the fabric, and some of it you can't use," So, the true cost of the material is nearly \$200 per kg, compared to just \$3 for stainless steel.

Using aluminium or carbon fibre, for a steady-state operating temperature, you're really limited to about 300 degrees Fahrenheit [150 degrees Celsius]. And there are some carbon fibres that can take 400 degrees Fahrenheit, but then you have strength knockdowns. But steel, you can do 1,500, [or] 1,600 degrees Fahrenheit [820 to 870 degrees C].



Material of Lithium -Ion Battery

**By: Vaishnavi Ugale (2nd year
mechanical student)**



Today, there are different kinds of batteries that are used based on their applications. Lithium-ion batteries are incredibly popular and the most energetic rechargeable batteries. They are used in our daily devices like laptops, tablets, cell phones, and iPods. Dr. Goodenough invented the Li-ion battery in 1991 and its work on lithium-ion batteries from 1970 and its good progress has been made since 1980. The first commercial lithium-ion battery was released in 1991. For example, solar energy stored in lithium-ion batteries during the daytime then the energy will supply at night when the sunlight is not available at that time. The demand for Li-ion batteries expands very speedily, with the demand for electric power vehicles.

Lithium-ion batteries are flexible. Lithium-ion batteries not only the high-power high charging rate high capacity, but also for safety and low cost. One may have noticed in daily life the functionality of electronics mobile always demand good lithium-ion batteries. Battery Life Lithium-ion battery is basically defined as the number of completely charge-discharge processes. Manufacturer datasheet generally uses the word "Cycle life" batteries are not completely changed and discharged in real uses such as smartphone, laptop, and electric cars.



Advantages of lithium-ion batteries

- Lithium-ion batteries are able to recharge many times and also more stable.
 - They have higher energy density voltage capacity and lower self-discharge rate than the other rechargeable batteries.
 - Lithium-ion batteries provide the benefit for the environment over the fossil fuel alternatives.
- Disadvantages of lithium-ion batteries
- Inflammable: lithium-ion batteries catching fire easily.

Cost: lithium-ion batteries are very costly and expensive to buy than their counterparts.

Developing Technology: we should always remember that it is related to new types of power sources Lithium-Ion and Lithium-Ion Polymer batteries are great power sources for projects but they require care during use and charging. They can be easy to damage or misuse and can hurt you or your property! All the batteries we sell pass testing and certification but you should still be careful with them.

Lithium-ion batteries create relatively little waste when disposed of, but are subject to aging

Recycling and material recovery

The market for lithium-ion battery recycling is expected to grow tenfold over the next decade. It is estimated that, by 2030, it will be possible to recover over 120,000 metric tons of lithium batteries, along with other raw materials such as nickel and cobalt.

Resources: www.sciencedirect.com

Riddles

I'm teary-eyed but never cry. I'm silver-tongued but never lie. Double-winged, but never fly. Air cooled but never dry. Who am I?

People use me to keep things hot or cold,
You can shape me into any moulds,
my atomic number is evil if on the right day,
I can recycle in the right way,
Who am I?



Did You Know?

About Fire-resistant plastic materials?

If these plastic materials when set alight, they will extinguish themselves soon after the heat source is removed. Some plastic materials are inherently self-extinguishing and do not need additives to meet this requirement. Other plastics can use additives to meet the requirement of being self-extinguishing.

What is Aerogel?

Aerogel is the lightest and lowest-density solid known to exist. It is typically 50-99.5% air yet can hold 500 to 4,000 times its weight in applied force! We can find Aerogel in space where it collects very tiny dust particles. After a particle hits aerogel, it buries itself in the material comes to a stop. Then, the aerogel is returned to Earth where scientists can examine it more closely.

Why is Aerogel blue?

The same reason the sky is blue! The very small particles that compose the aerogel scatter blue light more than any other color light which causes aerogel to appear blue.

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

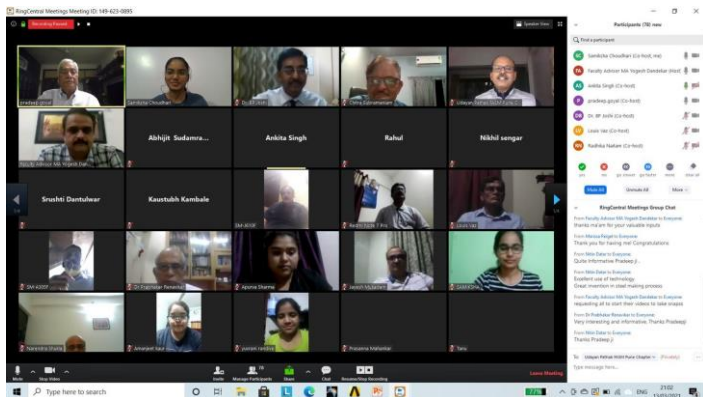
Metal corrosion destroys 3-4% of the gross domestic product in developed countries each year.

Steel is the main material used in delivering **renewable energy** – solar, tidal and wind. It contains also the highest fraction of recycled material of all structural material.

Past Events

1. Installation of the executive committee

On March 13th CCOEW Material Advantage Student Chapter conducted an installation program whose outcome came as a big success. **Dr. Marris Reigel, Pradeep Goyal, Udayan Pathak, Dr. Bharatbhushan Joshi** were the chief guests of the program. Members of the chapter were introduced. Chief guests enlightened students with their inspiring words. The announcement of the upcoming event fit-mat was also done.



2. Technical Talk by Mr. Pradeep Goyal

On March 13th we had a technical talk on industrial microwave research. He explained in brief the working mechanism of microwave. He told about the current projects he is working on, the challenges he faced and how he overcame them. The doubts of all the students were solved.

3. Logo Designing Competition

To design the logo of our CCOEW Material Advantage Student Chapter, we conducted one competition named "Logo Designing Competition". We received overwhelming responses from the participants. Every participant designed their own creative logos for our chapter. All the logos we got were so creative, it became tough for the members to select one. But at last, one logo was selected and the participant was declared as the winner.



Achievements

1. **Samiksha Choudhari** Coordinated the Women's Day program for the ASM Pune Chapter

Samiksha Choudhari the chair of our material advantage student chapter CCOEW, Nagpur Coordinated the Women's Day program for the ASM Pune Chapter. The timely and impressive event serves as a role model not only for women in material events but also for ASM's global interactions. She also interviewed **Diana Essock** the president of ASM International.

2. **Prof. Yogesh Dandekar** was Speaker on Failure Analysis organized by ASM PUNE and ARAI

Prof. Yogesh Dandekar who is also the faculty advisor of material advantage student chapter CCOEW Nagpur was the Speaker on Failure Analysis which was jointly organized by ASM PUNE and ARAI which was organized on 15th December 2020.

3. **Logo Designing competition** won by **Shruti Dhole**

The winning logo gives an insight into the various shapes that represent different people, sects, languages, united together just like elements in an alloy bounded with a cause. She received a book signed by Dr. Raghunath Mashelkar.

4. **Prof. Abhijit Getme** is now member of **CWC** of **ISHRAE Nagpur Chapter**.

Prof. Abhijit Getme is now member of CWC (Chapter Working Committee) of ISHRAE Nagpur Chapter.

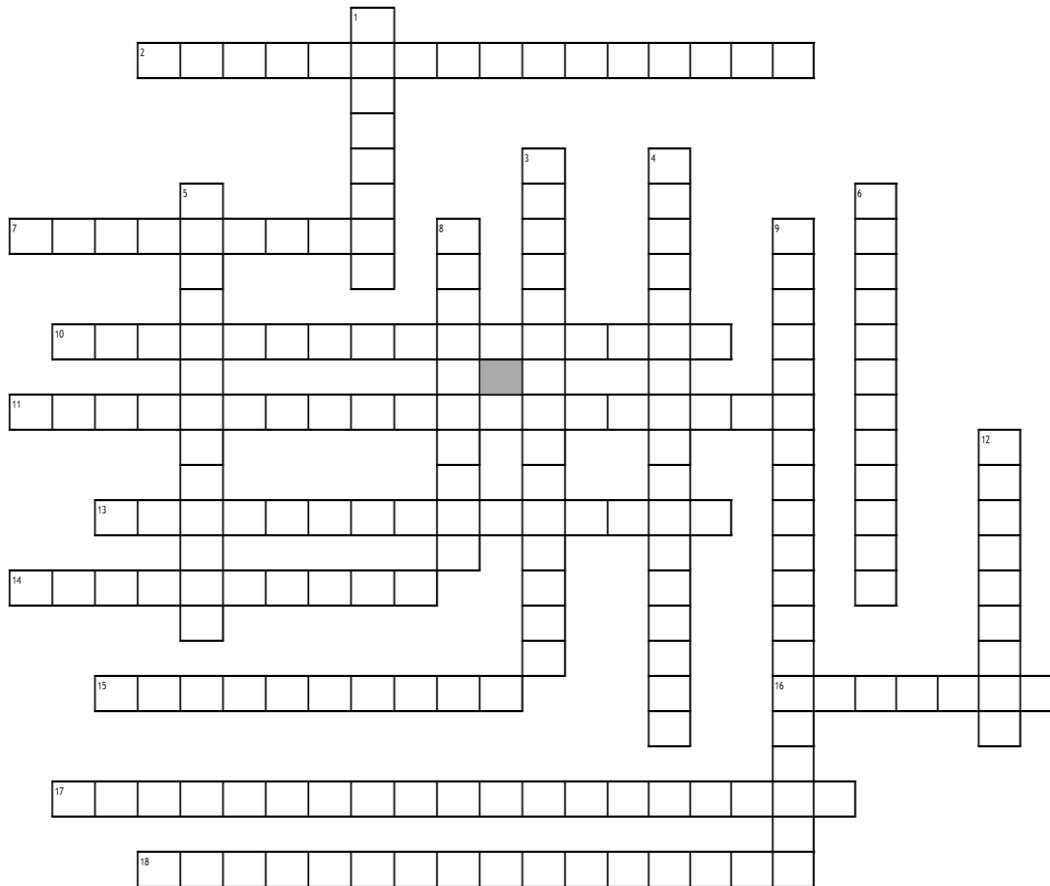
5. Our alumna **Ms. Debasmita Mohanty** is now **CWC Member** of **ISHRAE** Nagpur Chapter.

Planned Events

1. **Technical Article Writing competition**

A technical article writing competition is going to be organized in our college, where various colleges can participate in it and write competent, virtuous articles.

Crossword



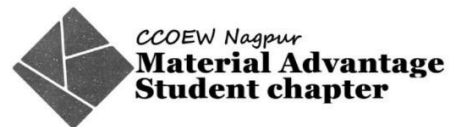
Down:

1. The ability to resist abrasive wear such as scratching, surface indentation
3. The ability to resist stretching or pulling forces
4. The ability to withstand twisting forces from applied tension or torque
5. The ability to resist sliding forces on a parallel line
6. The ability to withstand deformation by compression without cracking
8. The ability to be deformed and then return to the original shape when the forces are removed
9. Allows the flow of electrical current through the material
12. Ability of a material to be drawn or plastically deformed without fracture

Across:

2. The increase in material volume in response to a heat input.

7. The ability to absorb impact force without fracture
10. Prevents the transfer of heat through the material
11. Does not allow the flow of electricity through the material
13. The ability to resist forces that may bend the material
14. The ability to be permanently deformed and retain the deformed shape
15. The ability of the material to be fused or converted from a solid to a liquid or molten state
16. The mass of the material in a standard volume of space
17. The ability to withstand being crushed or shortened by pushing force.
18. Ability of a given material to conduct/transfer heat.

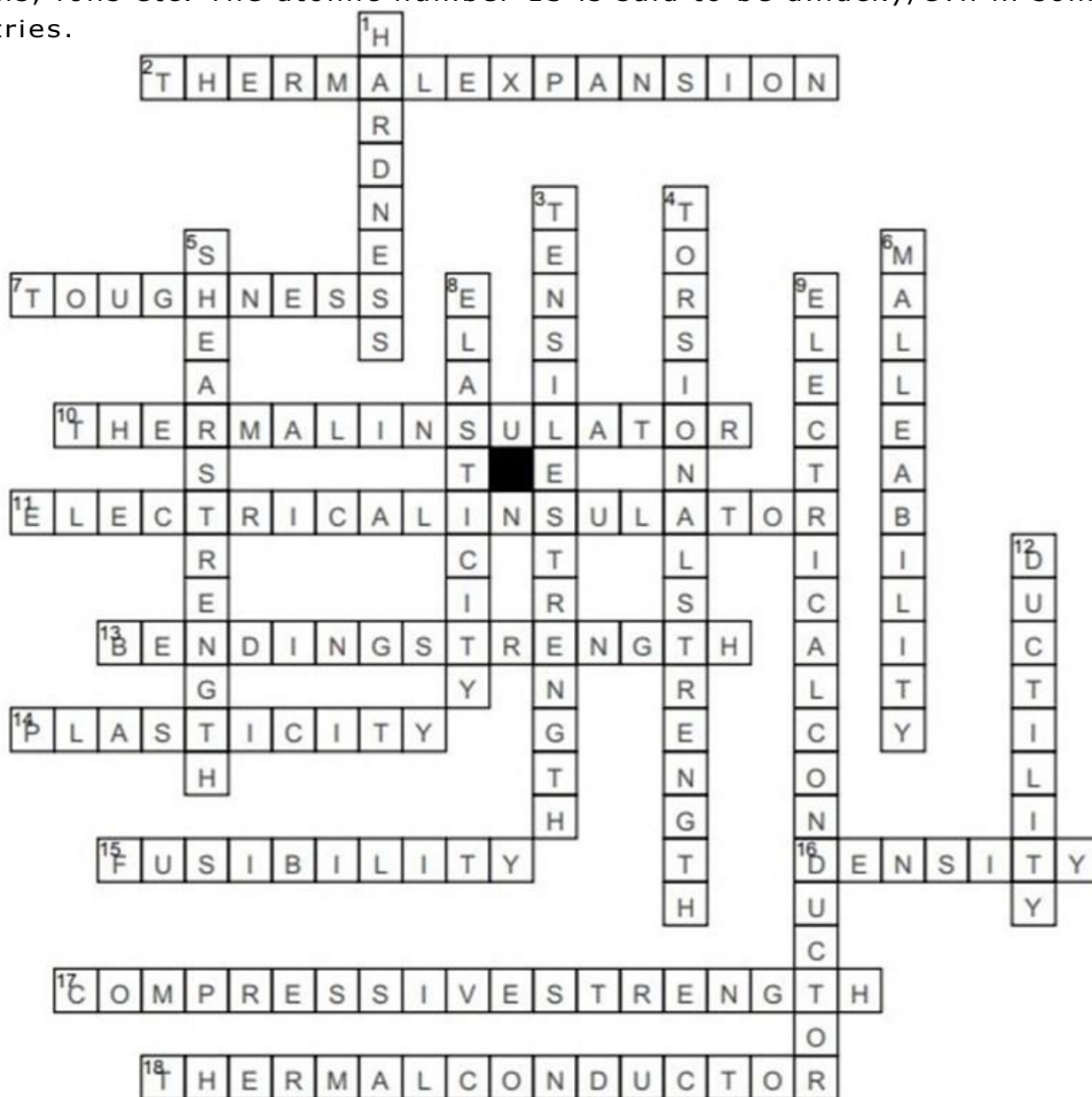


Answers

Riddles:

Answer: Mercury. The element looks shiny, silver, wet. The god Mercury has two wings but only uses them to fly!!

Answer: Aluminium, you can keep all hot and cold things in aluminium vessels, foils etc. The atomic number 13 is said to be unlucky/evil in some countries.



RudMo

**SALES
SERVICE
FINANCE
EXCHANGE**

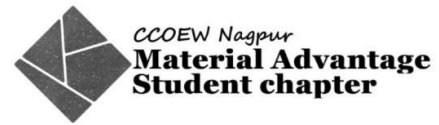
EXCITING DISCOUNT OFFER



FREE LABOUR CHARGE



**Block No.3/4, Kambhale Tower, Saoner Road, Koradi,
Nagpur-441111. M.: 9309782750**



Connect with Us

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

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

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

WordPress: <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

