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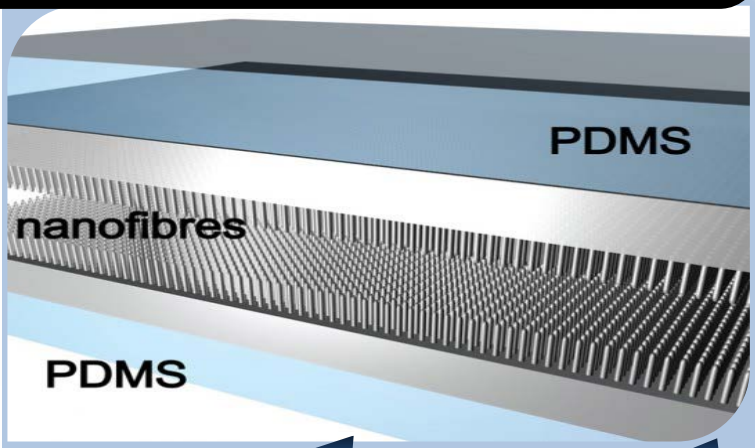
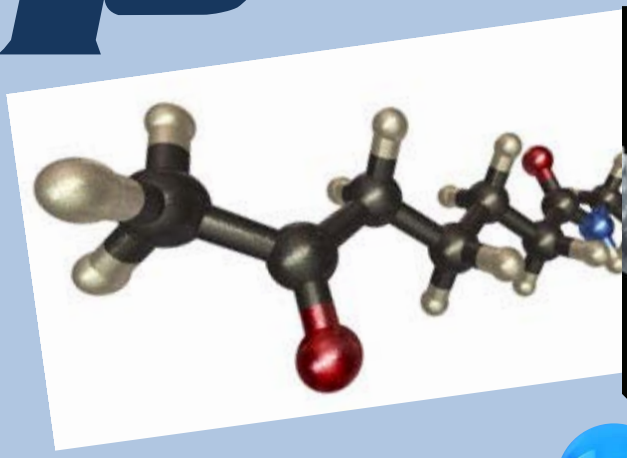
Department of Plastic and Polymer Engineering



PLAST MEDIA



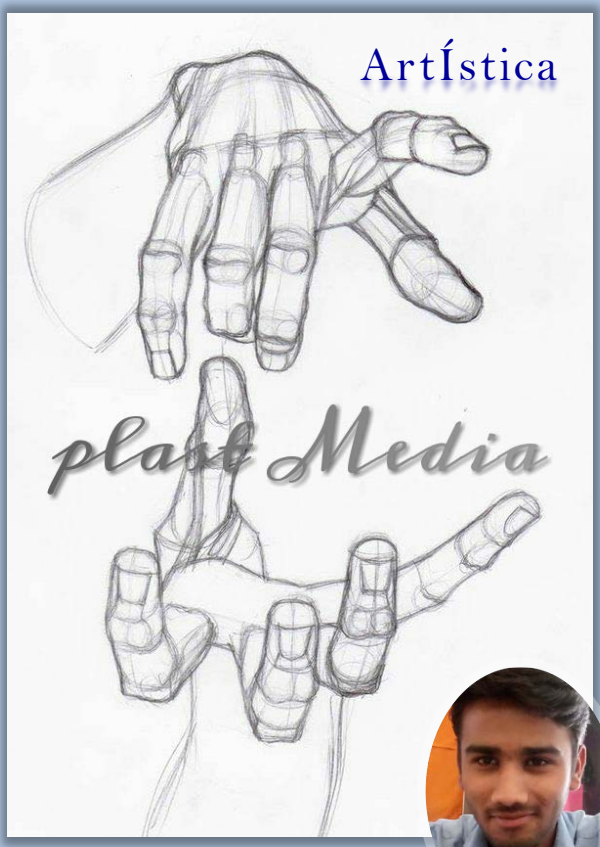
THEME

Polymers in the world of diversity

Vol. 1, Issue 1, January (2018)

Website: https://btech.mit.asia/plastic.aspx?CollegeID=3&CourseID=2&BranchID=10

Contents



Issue editor:

Vishal Rai (3rd Yr.)

Faculty coordinators:

Dr. Subhendu Bhandari

Mr. Ayan Dey

..... Akshay Sewatkar (3rd Yr.)

From the desk of the HOD

….. Dr. Aniruddha Chatterjee

The e-magazine of the Department of Plastic and Polymer Engineering is an endeavour of our students which has paved a long way from 2016 with the transformation of the previous name, E-Plastizine to Plastmedia in 2018. Hope, this edition would grow interest among the readers about the applications of polymers in the world of diversification. I wish all the best to the team.

From the desk of the editor

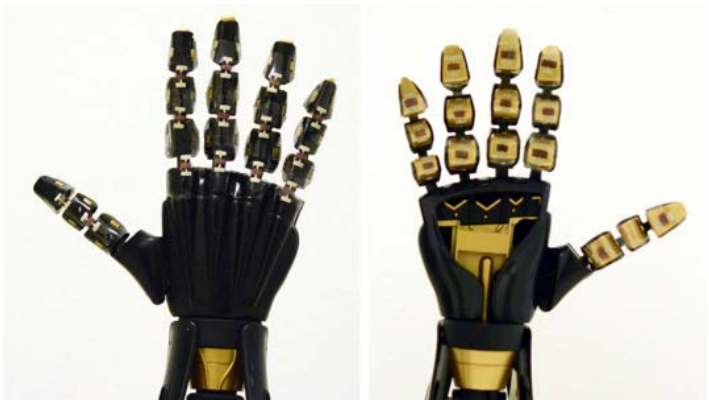
….. Vishal Rai (3rd Yr.)

First the test-tube, then the pail,
Then the semi-working scale,
Ever bigger, ever faster,
Faster, faster, then disaster!
-------J. M. G. Cowie

It is my immense pleasure to publish the first issue of Plastmedia in 2018. The objective of this issue is to accumulate latest innovation and techniques used in polymer industries meant for various applications in today's life. Today's most discussed topic preliminary includes, "whether we stop using plastic or reuse it." There have been ages which shaped human history like stone age, Bronze age, Iron age, all this age helped the humans to cultivate their culture and to relish the endeavours of mankind history. In our modern society which has changed the human history very rapidly just because of plastic and polymers. The potential of polymers lets the achievement possible like humans for the first time landed on moon and we will land on mars very soon. Plastics have given the speed and flexibility to humans to perform their day today tasks. In view of the fact, reduction is not the possible solution. However, modulation of the way to use the polymer product may become the possible solution of the shortcomings like pollution and waste material hazards. This issue includes various puzzles, related information, recent news regarding new advancement in technology and question and answers' section regarding polymer technology.

Artificial flexible film sensor mimicking human skin

.... Shahabaj Choudhari (3rd Yr.)



Cunjiang Yu, an eminent scientist working at University of Houston first developed a new kind of polymer material that is able to sense strain, pressure and temperature like human skin. Such materials can be useful for robotic part development, sensor etc. He named the material as “artificial skin” which is very sensitive and able to detect human impulses. Generally it is developed by incorporating semiconducting nanofibers (These nanofibers are 1,000 times thinner than a human hair) into a polymer solution of polydimethylsiloxane (PDMS). According to the concerned scientist:

"It's a piece of rubber, but it has the function of a circuit and sensors."

Ref.:

https://www.livescience.com/60386-robots-artificial-skin-stretchy-semiconductor.html

Acrylic mirrors

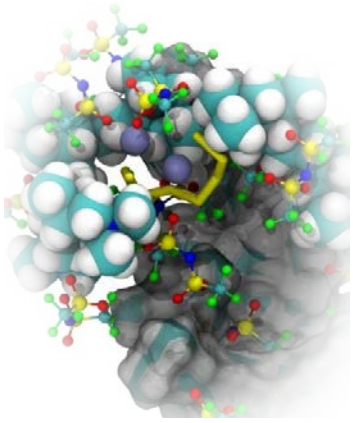
.... Nilesh Mahale (3rd Yr.)

Plastics mirror offer durable, shatter resistance and the best alternative to traditional glass mirrors. The versatility of the acrylic mirror comes from its impact strength 17 times that of an equally thick glass mirror and excellent lightweight properties (half the weight of its glass replica). Such mirrors become excellent candidate due to its easy and simpler handling. Additionally, it comes in wide range of colors and textures to fit any design need. Acrylic mirrors are optimal for use in high-traffic areas such as gyms and play areas, in-school spaces like lockers and bathrooms and detention centers where the fog-proof, moisture resistant, and shatter resistant are the essential requirement.

Ref.: http://www.dezignwithaz.com/butterfly-branch-acrylic-mirrors-p-1222.html

A polymer used for lithium-sulfer batteries

.... Jay Patel (3rd Yr.)



Lithium-sulfur batteries are promising candidates for replacing common lithium-ion batteries in electric vehicles since they are cheaper, weigh less, and can store nearly double the energy for the same mass. However, lithium-sulfur batteries become unstable over time, and their electrodes deteriorate, limiting widespread adoption.

Now, a team of researchers led by scientists at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) have reported that a new lithium-sulfur battery component allows a doubling in capacity compared to a conventional lithium-sulfur battery, even after more than 100 charge cycles at high current densities, which are key performance metrics for their adoption in electric vehicles (EVs) and in aviation.

They did it by designing a new polymer binder that actively regulates key ion transport processes within a lithium-sulfur battery, and have also shown how it functions on a molecular level. The work was recently reported in *Nature Communications*.

"The new polymer acts as a wall,"

The research team took their study one step further by also examining the performance of lithium-sulfur cells made with the new polymer binder. Through a set of experiments, they were able to analyze and quantify how the polymer affects the chemical reaction rate in the sulfur cathode, which is key to achieving high current density and high power with these cells.

Ref.: https://phys.org/news/2018-01-polymer-bar-lithium-sulfur-batteries.html

Tomato peels and eggshells to improve tire performance

.... Shahabaj Choudhari (3rd Yr.)

.... Prakash Kadam (2nd Yr.)

Researchers at Ohio State University have discovered that food waste, specifically tomato peels and eggshells make excellent filler for rubber tires exceeding industrial standards for performance. Such filler is combined with rubber for use in tires. Thus, food waste might partially replace carbon black (the petroleum-based filler, conventionally used in tire manufacturing) to reduce the use of petroleum-based products.

Ref.: https://www.popsci.com/food-waste-tire-rubber

Thermochromic polymers

….. Prof. Arun D. Ashtaputre

A smart colour In recent year functional polymers changing their visible, optical properties in response to an external stimulus have met with grooving interest. According to external stimulus which affects the optical properties are called chromogenic polymers. In terms of specific stimulus, they are classified as thermochromic (temperature), photochromic (light), electrochromic (electric field), piezo chromic (pressure). There are different types of thermochromic polymer materials. Such as polymers thermochromic themselves, polymer material doped with thermochromic additives, thermochromic through polymer additives interaction and thermochromic polymer systems e.g. Blends, gel etc. Most of the thermochromic materials are based on liquid crystals technology. At specific temperature the molecules orient their self and colour change is observed. In such liquid crystalline phase, a helical superstructure is observed due to the presence of chiral molecular structure. The nematic phase converts into cholesteric phase.

Thermochromic polymers foils based on cholesteric liquid crystals as available. Such foils consist of a black backing layer which is of cholesteric liquid crystal and a protective clear polyester layer. They can indicate temperature changes ranging from a fraction of a degree to over 20 °C. by varying their colour continuously through the entire visible region. Many cellulose derivatives have been found to possess cholesteric mesopause with selective reflection in the visible wavelength region. The pentyl ether of hydroxypropyl cellulose is a cholesteric polymer. At room temperature it shows selective reflections at 500 nm, with increasing temperature the selective reflection smoothly increases reaching 650 nm at 80 °C. The potential application is in information technology for optical data recording. This application requires a fixing of the cholesteric order at any user defined colour. Thermochromic properties are also observed in some of the conjugated polymers such as polyacetylene, polythiophene and polyanilines. Many conjugated polymers show absorption of light in the visible range as well as high reflectivity, therefore they are colored and show metallic property. The thermochromism property in such conjugated

…. contd

polymer is due to conformational changes of backbone which can occur continuously with temperature but the color changes in conjugate polymers are reversible.

Another way to obtain thermochromic property into incorporate color changing thermo chromic pigments are now used in printing inks and fabrics and even in injection molded articles. The new phosphorescent pigments can emit light up to 10 hours. Thermo chromic pigments change the color at specific temperature when such paints are applied on polymer film it acts as thermometer when the current flows through a printed resistor (in battery) under thermo chromic film and heats it to cause a color change.

For example if a black thermo chromic pigment is applied to a white surface and when the temperature in changed the black surface becomes white. In the same way if the same pigment is applied to orange surface at certain temperature the black color disappears and looks orange. The thermochromic equipments are of five types i.e. black, golden, blue, violet and brilliant green.

Most important is that when thermochromic equipments are mixed with different coloured acrylic paint they change their colour at certain temperature. For example if a blue pigment is mixed with yellow acrylic paint the colour is green but at 27 °C the blue and green colour disappears and gives only yellow coloration.

The potential application of thermochromic material include temperature tunable light and heat radiation filter the materials changing their colour with temperature are already in use such as fabrics, toys, coffee pots, labels for wine bottles etc. Potential industrial and processing applications are monitoring of overheating of machine parts, observation of thermal leaks, storage of heat sensitive materials. In medical science skin temperature indicator with integrated thermochromic effect.

Coating of heating plates, fine doors and equipment parts as domestic appliances which become hot during their use, Path making, etc.

It is particularly effective for night time illumination and provides a distinct visible light in condition of absolute darkness.

Apart from their ability to detect temperature changes the optical property plays an important role such materials are optical shutters for light as well as for heat radiation. They act as functional layer in the construction of sun protecting glazing. Incident solar radiations is used for internal illumination of building and the solar energy reduces the energy consumption for space heating. There are number of applications which are coming up due to advanced research facilities.

Once happened in this month

.... Sachin Shelar (3rd Yr.)

.... Shubhanan Kanjalkar (3rd Yr.)

Jan 3

★ Robert L. Bank died in 1989 ; American chemist who co-discovered crystalline polypropylene polymer with J. Paul Hogan

★ Keith James Laidler, a pioneer in chemical kinetics, was born in 1916.

Jan 7

★ Elihard Mitscherlich was born in 1794 . He discovered crystal structure, catalysis, benzene and its derivatives. He also discovered chemical isomorphism.

★ Yugoslavian-Swiss chemist Vladimir Prelog died in 1998. He shared the Nobel Prize for Chemistry with John W. Cornforth in 1975 for his work on the stereochemistry of organic molecules and reactions. He proposed systematic naming rules for molecules and their mirror-image versions as “dextr0” and “levo”.

Jan 14

★ Ludwig Claisen was born in 1851. He discovered condensation of esters and rearrangement of allyl vinyl ethers.

Jan 22

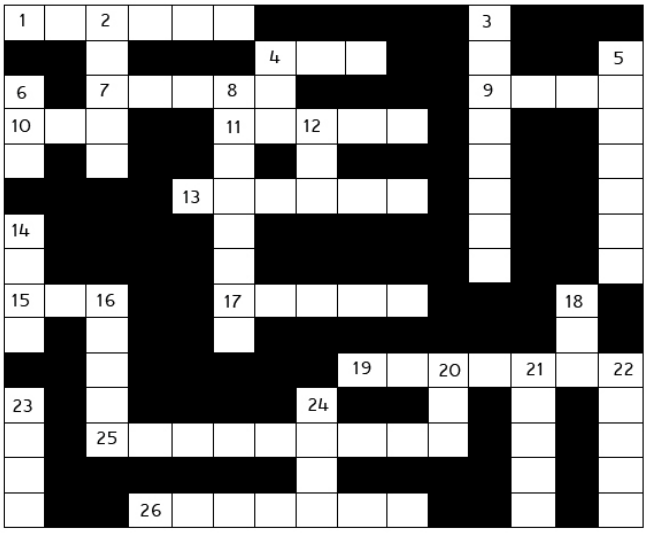
★ Alan Heegar was born in 1936. He was awarded Nobel Prize in 2000 for inventing conducting polymers.

Question of the month

What is frontal polymerization?

WORD CROSS

.... Lokesh Mohod (3rd Yr.)



Vertical

2.Excess material coming out from the mould.

3. Name of an organic elastomer .

4. Commonly used in polymer as plasticizer

5. Which intrinsic parameter determines floatability of polymer in water.

6. Polymer constituent in daily used water bottles.

8. Synthetic chemically stable elastomar of dupant.

12. Rheometer used in estimating cure time .

14. Resinol type – F

16. DNA replication.

18. The type of electron beam used to analyze phases in multiphase composites.

20. The polymer known as Buna-N.

21. The device required to give shape to the polymeric material.

22. Phenol formaldehyde synthesize under alkaline condition.

23. The natural fiber anciently used in war to give protection against arrow.

24. Physical entanglement of polymer chain.

Horizontal

1.Trade name of the polymer which is used for cooking pan .

4. Invention of James Watsan and Francis crick in 1953.

7. _____ acid as constituent of human body.

9. Linear thermoplastic polymer used for flexible packaging.

10. Quantitative elemental analysis performed using electron microscopy.

11. The product of Bispheol-A and Epichlorohydrine

13. Shape of DNA.

15. The polymer which has free extinguishing property .

17. Polyamide, an engineering thermoplastic fiber.

19. Molecule used to form polymer

25.Highly stretchable polymer.

26. Natural polymer used in varnish to enhance the glass.

Departmental events

Entrepreneurship program

(23rd January)

Half day entrepreneur training program was organized in our department by Mr. Vijendra Chaudhary (faculty) on 23rd January, 2018 in association with Bhartiya Yuva shakti Trust (BYST). More than 40 student participants from TYPPE gained knowledge and information through this half days entrepreneur training program. Ms. PunithaSelvaraj (Special Project Officer BYST), Mr. Omprakash Zalani (Retired Senior Manager Bank of Baroda) and Mr. Prakash Gaikwad (Retired AGM Bank of Baroda) delivered lectures.

Events and achievements

- ***Kiran Thakare*** of second year B. Tech participated in ROBOWAR at VJTI, Mumbai (26-28 December, 2017) as the part of the Second Prize winning team of MIT ... Congratulations !!!
- Congratulations to the toppers of 2017-18 part-I ***Prathamesh Trivedi (4th yr.), Vikram Mane (3rd yr.)*** and ***Kiran Thakare (2nd yr.)***
- ***Swapnil Ghode, Avinash Chavhan*** and ***Pranali Raut*** presented posters in Aaviskar-2017 (competition on project work), and ***Ketan Tavhare, Prathamesh Trivedi*** and ***Bhagyesh Chavan*** presented (oral) in the next round ..... Congratulations !!!

Upcoming events

PLASTINDIA 2018, 10th International Plastics Exhibition, Conference and Convention will be organized at Gandhinagar, Gujrat from February 7-12, 2018. This is going to be a common platform of industry personnel, researchers, faculties and students to exchange knowledge in the field of plastics.

APC-RANGOTSAV 2018, Conference on Advances on Polymers and Coatings will be organized at ICT, Mumbai on March, 6-7, 2018. This is a great scope for the students to represent their project work and sharing key knowledges. Registration is open till 10th February, 2018.

Our team of the month

From Left: (Sitting) Dr. Subhendu Bhandari (Faculty), Dr. Aniruddha chattarjee (HOD), Mr. Vishal Rai (editor), Mr. Ayan Dey (Faculty)

(Standing) Vinay Bhuka, Shahabaj Choudhari, Nilesh Mahale, Sachin Shelar, Jay Patel, Shwata Upganlawar, Prakash Kadam, Lokesh Mohod, Shubhanan Kanjalkar, Akshay Sewatkar

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Team of the next issue

Third Year: Sagar Monde, Paras Tholiya, Sarthak Sontakke, Swati Gaidhani, Chirag Shah, Sachin Kokane, Pratik Mirlekar, Suraj Wankhade, Rajkumar Gadge, Diksha Nikam, Laxman Ohol, Pravin Waghamode.

Second Year: Dhotre Mamta, Akshit Kareliya, Vyankatesh Kshirsagar

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https://goo.gl/forms/VbH9Ykki6ESy26Ke2

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