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CHEMFLASH

THE CHEMISTRY NEWS LETTER
EASWARI ENGINEERING COLLEGE

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CONTENTS:

Quotes

Message from HOD'S desk

Department events

Achievements

Articles

Love and peace of mind do protect us.
They allow us to overcome the
problems that life hands us. They
teach us to survive... to live now... to
have the courage to confront each
day." —*Bernie Siegel*

**"Nobody gets everything in this
life. You decide your priorities
and you make your choices. I'd
decided long ago that any cake I
had would be eaten."
— Donald E. Westlake**

**MESSAGE FROM THE HOD'S
DESK**

**Dr. C. Ravichandran
Professor and Head**

The department of chemistry has brought out its quarterly news letter **chemflash**. Its focus is on all the recent happenings in the field of chemistry. This news letter is sure to give a suitable platform to all the budding engineers to widen their perspective. I express my heartiest congratulations to all the staff and students who were behind the success of chemflash.

I seek their continued co-operation in all the future endeavours.

Dr. C. Ravichandran

SCIENCE EXHIBITION

Students from various Schools and first year students from our College displayed their projects for competition and Judges from other University and college (totally 22 Judges from Department of Chemistry, Easwari Engineering College has organized Science Exhibition for IX to XII standard School students on 30th October 2018. Pamphlets have been issued for **287 schools** in and around Chennai. **Around 107 teams from various schools (320 Students)** and first year B.E/B.Tech Students (15 teams, 45 students) from our College has been participated in the Science Exhibition.

Dr. C. Ravichandran, Head of Chemistry Department and Convener, welcomed the gathering and gave an overview of the science exhibition. Chief Guest Mrs. N. Satyakumari, Principal, St mary's Matric. Girls Hr.Sec.School, Perambur, Chennai delivered the inaugural address. Dr. K. Kathiravan, Principal, delivered the presidential address. Dr. K. Murugesan, Vice Principal (Admin) & Dr.V. Elango, Vice Principal (Acad) offered their felicitations.

Anna university, University of Madras, SRMIST and Easwari Engineering college) evaluated the projects displayed by school students and I year B.E/B.Tech Students separately. **Around 843 students from 11 schools have visited** the project display very enthusiastically

In the Evening Session, Chief Guest Mrs. B. Chamundeeswari, Principal, JBAS Memorial Mat.Hr.Sec.School, Teynampet, Chennai, gave the valedictory address and distributed the prizes.

In Batch I level (XI & XII Std) the prizes were packed by **I Prize – Rs. 5000/-** cash award, shield and certificate to JBAS Memorial Mat.Hr.Sec.School, Teynampet, **II Prize – Rs. 3000/-** cash award, shield and certificate to St' Brittos Hr.Sec.School, Velacherry and **III Prize - Rs. 1000/-** cash award, shield and certificate to SRM Nightingale Matric Girls Hr. Sec.School West mambalam.



Science Exhibition Hall Opening Ceremony by Chief Guest



Chief Guest, Deputy Director, Principal and Vice Principal visiting the project models

In Batch II level (IX & X Std) the Prizes won by, **I Prize – Rs. 5000/-** cash award, shield and certificate to Omega international school, Kolapakkam, **II Prize – Rs. 3000/-** cash award, shield and certificate to Assisi Mat.Hr.Sec.School, Ramapuram and **III Prize - Rs. 1000/-** cash award, shield and certificate to Swamys Mat. Hr. Sec.School, Madhananthapuram, and participation certificate was given to other participants.

For college teams distributed the shield and the certificates for the prize winners. Finally it was concluded by vote of thanks.



Science Exhibition Inaugural function

INTERNATIONAL PUBLICATIONS – 2018

1. SP Vinodhini, B Venkatachalapathy, TM Sridhar, R Manonmani, Electrochemical, mechanical and osseointegration evaluation of NBPC-coated 316L SS by EPD, Surface Engineering, , Volume 34, Issue 7, pp511-519, 2018
2. Anithadevi, R, Ravichandran, C. Enhanced photo-degradation activity of hybrid ZnMgTiO₂ nanocomposites against methyl orange dye under uv irradiation”, vol. 14, no. 6 pp 449 -457
3. AbinayaRajendran, Subha Balakrishnan, Ravichandran Kunaladaivelu , Multi-element substituted hydroxyapatite-

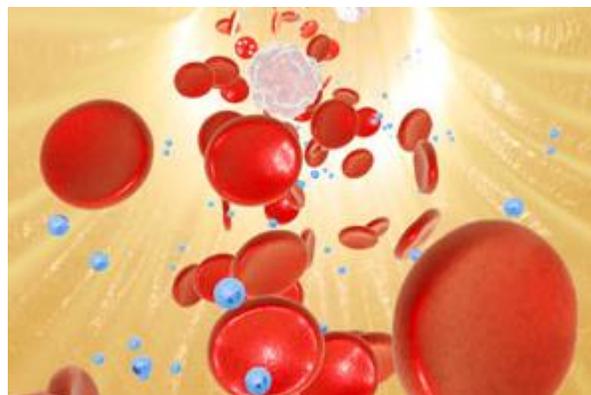
synthesis, structural characteristics and evaluation of their bioactivity, cell viability, and antibacterial activity, *Journal of sol-gel science and Technology*, Volume 86, Issue 2, pp 441–458, 2018

4. S. Praveen Kumar, S. Munusamy, S. Muthamizh, A. Padmanaban, T. Dhanasekaran, G. Gnanamoorthy, and V. Narayanan Voltammertic determination of 4-nitrophenol by N,N'-bis(salicylaldimine)-benzene-1,2-diamine manganese(II) Schiff base complex modified GCE. *Materials Today* .volumeNo.5, Issue no 2, pp8973-8980,2018
5. Marimuthu Ponram, Umamahesh Balijapalli, Baskaran Sambath, Sathiyarayanan Kulathu Iyer, Venkatachalapathy B, Ravichandran Cingaram and Karthikeyan Natesan Sundaramurthy, “Development of paper-based chemosensor for the detection of mercury ions using mono- and tetra-sulfur bearing phenanthridines”, *New Journal of Chemistry*, Volume No. 42, issue 11, PP:8530-8536, 2018
6. NS Karthikeyan P Marimuthu, B Umamahesh, S Baskaran, K Sathiyarayanan, K Kranthiraja, T Giridhar, B Venkatachalapathy, C Ravichandran, “Inkjet-printed phosphorescent Iridium (III) complex based paper sensor for highly selective detection of Hg^{2+} ”, *Dyes and Pigments*, SHJin, volume 163, pp176 -182, 2019

ARTICLES

CANCER DIAGNOSTICS STRIKES GOLD

A blood test that uses gold nanoparticles to track tumour cells circulating in the body can reveal in real time how cancers are progressing and evolving in response to ongoing treatment.



A team led by University of Queensland researchers developed the diagnostic test by attaching different antibodies to tiny particles of gold. Each antibody can stick to a different protein found on the surfaces of circulating tumour cells (CTCs). When struck with laser light, the nanoparticles emit barcode signals. These signals change slightly when proteins are bound to the nanoparticles, thereby revealing the full diversity of CTCs in a patient.

The researchers validated the system using blood from 10 patients with advanced melanoma skin cancer who were undergoing immunotherapy or receiving a targeted drug agent. The test revealed changes in the CTC population make-up in response to treatment, including the presence of drug-resistant cells — information that could help guide therapeutic decision making.

V. KAVYA

II YEAR ECE B

SEAWATER TURNS INTO FRESH WATER THROUGH SOLAR ENERGY: A NEW LOW-COST TECHNOLOGY

According to Food and Agriculture Organization (FAO) estimates, by 2025 nearly 2 billion people may not have enough drinking water to satisfy their daily needs. One of the possible solutions to this problem is desalination, namely treating seawater to make it drinkable. However, removing salt from seawater requires 10 to 1000 times more energy than traditional methods of freshwater supply, namely pumping water from rivers or wells.

Motivating this problem, a new prototype to desalinate seawater in a sustainable and low-cost way, using solar energy is considered as a more efficient process. Compared to previous solutions, the developed technology is in fact able to double the amount of water produced at given solar energy, and it may be subject to further efficiency improvement in the near future.

The working principle of the proposed technology is very simple: "Inspired by plants, which transport water from roots to leaves by capillarity and transpiration, our floating device is able to collect seawater using a low-cost porous material, thus avoiding the use of expensive and cumbersome pumps. The collected seawater is then heated up by solar energy, which sustains the separation of salt from the evaporating water. This process can be facilitated by membranes inserted between contaminated and drinking water to avoid their mixing, similarly to some plants able to survive in marine environments (for example the mangroves)," explain Matteo Fasano and Matteo Morciano.

While conventional 'active' desalination technologies need costly mechanical or electrical components (such as pumps and/or control systems) and require specialized technicians for installation and maintenance, the desalination approach proposed by the team at Politecnico di Torino is based on spontaneous processes occurring without the aid of ancillary machinery and can, therefore, be referred to as 'passive' technology. All this makes the device inherently inexpensive and simple to install and repair. The latter features are particularly

attractive in coastal regions that are suffering from a chronic shortage of drinking water and are not yet reached by centralized infrastructures and investments.

Up to now, a well-known disadvantage of 'passive' technologies for desalination has been the low energy efficiency as compared to 'active' ones. Researchers at Politecnico di Torino have faced this obstacle with creativity: "While previous studies focused on how to maximize the solar energy absorption, we have shifted the attention to a more efficient management of the absorbed solar thermal energy. In this way, we have been able to reach record values of productivity up to 20 litres per day of drinking water per square meter exposed to the Sun. The reason behind the performance increase is the 'recycling' of solar heat in several cascade evaporation processes, in line with the philosophy of 'doing more, with less'. Technologies based on this process are typically called 'multi-effect', and here we provide the first evidence that this strategy can be very effective for 'passive' desalination technologies as well."

R. SARANYA
IIIT B

NEW HOUSEPLANT CAN CLEAN YOUR HOME'S AIR



We like to keep the air in our homes as clean as possible, and sometimes we use HEPA air filters to keep offending allergens and dust particles at bay. But some hazardous compounds are too small to be

trapped in these filters. Small molecules like chloroform, which is present in small amounts in chlorinated water, or benzene, which is a component of gasoline, build up in our homes when we shower or boil water, or when we store cars or lawn mowers in attached garages. Both benzene and chloroform exposure have been linked to cancer.

Now researchers at the University of Washington have genetically modified a common houseplant - **POTHOS IVY** to remove chloroform and benzene from the air around it. The modified plants express a protein, called 2E1, that transforms these compounds into molecules that the plants can then use to support their own growth. The team decided to use a protein called cytochrome P450 2E1, or 2E1 for short, which is present in all mammals, including humans. In our bodies, 2E1 turns benzene into a chemical called phenol and chloroform into carbon dioxide and chloride ions. But 2E1 is located in our livers and is turned on when we drink alcohol. So it's not available to help us process pollutants in our air.

GREEN LIVER CONCEPT

2E1 can be beneficial for the plant, too. Plants use carbon dioxide and chloride ions to make their food, and they use phenol to help make components of their cell walls. The researchers made a synthetic version of the gene that serves as instructions for making the rabbit form of 2E1. Then they introduced it into **POTHOS IVY** so that each cell in the plant expressed the protein. **POTHOS IVY** doesn't flower in temperate climates so the genetically modified plants won't be able to spread via pollen.

This whole process took more than two years. That is a long time, compared to other lab plants, which might only take a few months. But they wanted to do this in **Pathos** because it's a robust houseplant that grows well under all sort of conditions. The researchers then tested how well their modified plants could remove the pollutants from air compared to normal **pothos ivy**. They put both types of plants in glass tubes and then added either benzene or chloroform gas into each tube. Over 11 days, the team tracked how the concentration of each pollutant changed in each tube.

.The team is currently working to increase the plants' capabilities by adding a protein that can break down another hazardous molecule found in home air: formaldehyde, which is present in some wood products, such as laminate flooring and cabinets, and tobacco smoke.

These are all stable compounds, so it's really hard to get rid of them. Without proteins to break down these molecules, use high-energy processes to do it. It's so much simpler and more sustainable to put these proteins all together in a houseplant."

SENTHURAMMAL
II YEAR ECE-C

Prepared By: Mrs. R. Anitha Devi	Approved By: HOD/Chemistry
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