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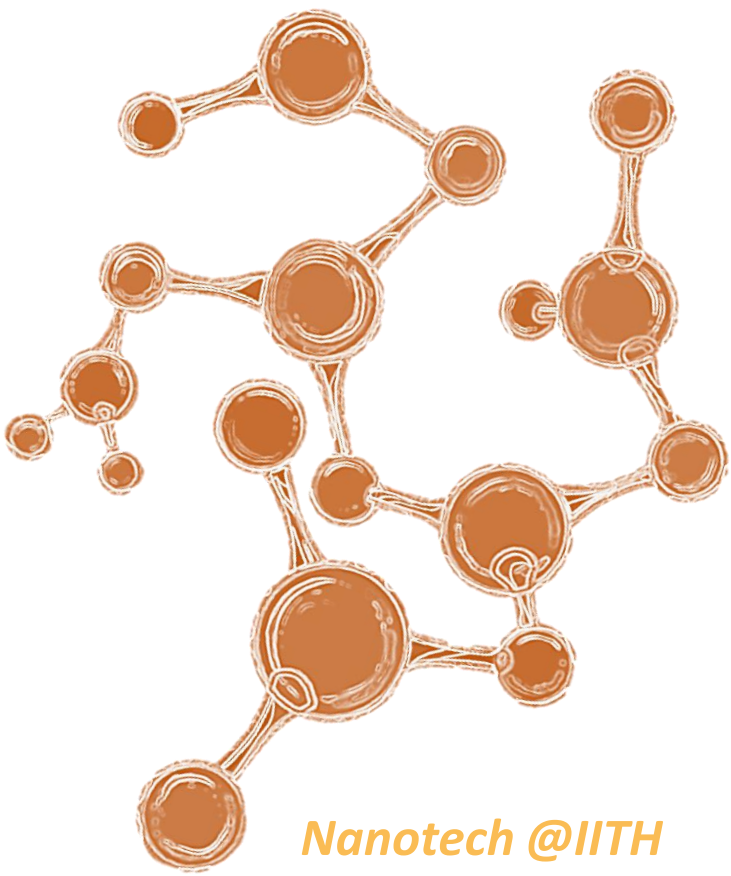
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

किरIITH

the crowning glory

A quarterly e-newsletter of IITH
Issue – 7 | June 2021



Nanotech @IITH

National Broadcasting Day "July 23"

Editorial Epistle

Dear Readers,

We hope you are doing well!

We sincerely thank all our readers for acknowledging and honoring our efforts for the past six issues. Your valuable suggestions have helped us improve, and we hope that **किरIITH - The Crowning Glory, Issue-7** reflects the same.

Every evolution in humankind has been based on new inventions starting from fire to wheel way up to artificial intelligence and 5G network. Similar to those, here stands nanotechnology knocking our doors for offering other revolutionary changes and advancements to humanity. Nanotechnology encompasses science, medicine, engineering, computing and robotics. It offers the potential for new and faster kinds of computers, more efficient power sources and life-saving medical treatments.

Each Issue of KIRIITH is dedicated to a particular thrust area at IITH. With Issue-7, we bring you the novel ideas and innovations at IITH in the field of Nano-Technology.

We hope this edition **किरIITH - The Crowning Glory, Issue-7** ***#Nanotech@IITH*** will give you a keen insight of Nanotech at IIT Hyderabad.

We also use this issue of KirIITH (our media to communicate to you) to observe ***National Broadcasting Day, July 23*** and ***release KirIITH, Issue-7, July 2021, Nanotech@IITH***. On this day in 1927, the first-ever radio broadcast in the country went on the air from the Bombay Station under the Indian Broadcasting Company.

We wish everyone a safe and healthy stay.

Enjoy reading!

Prof C Krishna Mohan
Dean (Public & Corporate Relations)
{Editor-in-Chief}

Prof Deepak John Mathew
HoD (Design)

Ms Mitalee Agrawal
Public Relations Officer

Ms Tisha Pantawane
Media & PR Head, Student Gymkhana, IITH

If you want to reach your goals, you must shrink the size of your 'BUT'!!!

Prof B S Murty
Director, IIT Hyderabad

Dear friends,

Hope you are doing well, staying safe & healthy and resumed to your normal and productive day to day activities after the second wave of pandemic.

It is an absolute pleasure to communicate with you through the medium of किरIITH about the major achievements of the Institute and the exciting research outcomes of the IITH Fraternity amidst the Pandemic. IITH enjoys its first year in the **top 600 in QS World Rankings** and the 2nd consecutive year within the Top 10 among the technical institutes in the country in the QS World Rankings.

Many path-breaking innovations and inventions have taken place like the development of sustainable and low-cost **Dual carbon battery,** an alternative for conventional Lithium-ion batteries, innovative DuroKea fast-acting and long-lasting technologies to combat COVID-19 virus spread, **Muscope, the world smallest Microscope** that will make medical devices low-cost, mobile and automated. Researchers made **Oral solution for 'black fungus'** ready for technology transfer and also explored **aspects of human language and cognition**. I am delighted that **Koala SoC, an NB-IoT 3GPP standards-compliant chipset**, has been jointly developed by IITH and WiSig.

I feel immensely glad to share with you that Cyient has instituted the first Chair at IITH, **Cyient Chair in Future Communications**, and **Prof P Rajalakshmi**, Department of Electrical Engineering, is the first appointee of the Chair.

Several MoUs have been signed to strengthen the academic & research capabilities within the institute. LafargeHolcim, a global leader in building solutions has partnered up with the IITH to collaborate on the development of innovative and smart building solutions. The National Institute for Materials Science (NIMS) and the IITH launched IITH-NIMS Joint Research Center for Materials Research "Aiming to strengthen the research exchange after COVID-19 pandemic end".

IITH has also partnered with **GMR Hyderabad International Airport Ltd** to collaborate in the space of Innovation & emerging tech areas.

IITH is a cradle for inventions and innovations. It advances knowledge and skill to the students in science, technology, and liberal arts. Following this vision, the institute is pleased to **announce seven online MTech programs and an online MDes program for Working Professionals starting August 2021.** The Swinburne University of Technology and IITH launched the joint doctoral program in a new format.

At IITH, we also focus on the well-being of our fellow residents. To keep the morale high of campus children in the given circumstances, IITH's Women Association has organized an interactive session.

IITH has **celebrated its 13th Foundation Day** in a virtual mode with Prof. Krishnaswamy Vijay Raghavan, Principal Scientific Adviser to the Government of India, as Chief Guest.

iTIC Incubator at IITH announced CLEAN-A-THON Winners and has undertaken many interesting and interactive activities like Sensitization event for FICCI Flo members & WIN Challenge to promote Innovation & Entrepreneurship culture at IITH.

To give further boost to entrepreneurship our **Entrepreneurship & Management Department** along Business Design Lab has launched Business Model Innovation Certificate Program.

Amidst pandemic too our students have kept their extra-curricular activities like **EBSB club** at IITH has taken up an event 'Jal hi Jeevan hai' to reiterate the need to conserve water whereas **Culturals** at IIT Hyderabad has organized CultCombat21.

Wish you all a mesmerizing monsoon!!!

Stay Safe & Stay Healthy, wherever you are…

Central Administration @ IITH

Prof Raja Banerjee
Dean (Admin)

The administrative structure of an IIT follows the Hub & Spoke arrangement with the Academic Departments concentrating on service delivery in terms of education and research and the Central Administration being responsible for the overall resource management and administration of the institute. Central Administration, therefore, needs to be efficient, transparent, and lithe for the smooth functioning of the institute.

Today IIT Hyderabad has approximately 240 faculty, more than 270 non-teaching staff, and over 3000 students. Moreover, IIT Hyderabad has several dynamically evolving academic programs and externally funded research projects that have consistently placed it in the top ten NIRF-ranked institutes within the engineering stream. All these require that the institute's administration should function efficiently. The most important element of an efficiently functioning organization is its employees. More than 150 non-teaching positions were advertised through NF-8. This was a mammoth exercise involving screening of more than 15,000 applications. This was doubly challenging as this recruitment drive was conducted in the middle of the ongoing COVID-19 pandemic. Several faculty and staff were engaged in various stages of this exercise, and I would like to record my sincere gratitude to all for their support in accomplishing this task smoothly.

It is important that the employees of an organization remain motivated. Employee rewards and recognition have been identified as a critical employee engagement strategy. This is expected to raise morale, elevate productivity, increase competitiveness. The institute has instituted the staff excellence award that is given annually to select a few high-performing staff. One staff member is also recognized for their dedication to their work through the Employee of the Month award. Staff members get to upskill themselves through various training programs. The Institute has organized innovative and effective training programs both by the In-house staff and external experts. Virtual training has been implemented and the benefits have been unprecedented. The Institute has introduced a scheme for compassionate appointments to the dependent family members of staff who have died in harness or retired on medical grounds. This would grant the family social security to its employees.

The impact of the COVID-19 pandemic is being felt across India and the whole world. IIT Hyderabad is no exception. COVID-19 related lockdowns and social distance norms require that the institute make every effort to keep members of the IITH community safe. To that effect, the institute's medical team has done an excellent job in not only offering its medical services continuous throughout this pandemic, but also providing COVID specific treatment and services. Regular sanitization of the institute buildings and other premises within the campus is being done since the beginning of the pandemic. Four vaccination camps were organized for its employees and their dependents in the campus since the COVID vaccination program was initiated by the Government of India. Employees in large numbers came forward to avail vaccines through these camps. To make health care more affordable to its employees, IIT Hyderabad has entered into MOUs with several leading Hyderabad-based hospitals to provide cashless health care at CGHS rates. An on-campus Apollo pharmacy provides prescription medicines on a cashless basis.

The IIT Hyderabad campus aspires to be a peaceful residential campus where the campus residents are surrounded by lush green flora and fauna and amenities of a modern lifestyle at a stone throw distance. An effort to that effect has been initiated. A massive plantation drive is ongoing where saplings of indigenous flora are being planted. Hopefully, within the next few years, the campus will have beautiful green foliage. The campus now has several services operational, like two banks with their ATMs, a post office, a beauty parlor & saloon, and a supermarket. A new school building will become operational shortly. A solid waste management system with a Resource Recovery Park has been recently commissioned. Recyclable, non-recyclable, and biodegradable waste is separated and processed accordingly. The above-mentioned facilities are a beginning, and more amenities are being planned and should get implemented in a short period of time.

IIT Hyderabad is a dynamically evolving institution and so is the Central Administration @ Hyderabad. The overall goal is to have a motivated and equitable workplace and become the dream destination of students, academicians, and researchers.

Hope & effort can move mountains: Believe in yourself

Prof Saptarshi Majumdar
Dean (Academic)

A cordial welcome to all of you.

Hope everyone is doing well & keeping safe!!

I am pleased to update you regarding new activities happening at our institute. Our humble intention is to inform the world about our various academic activities. The ultimate goal is to be recognized as ideators and leaders in higher education and research and to nurture human minds with creativity, technology, and passion for the betterment of India and mankind at large.

2nd wave of COVID-19 health crisis has created some major & extraordinary challenges for India as well as our campus. To ensure the least impact & to support the IITH fraternity, Institute has extended the online teaching and learning along with various drives to safeguard the health and safety of our students, faculty & staff.

In the last year, our faculty members have been extraordinary; quickly transforming their courses to online formats along with exams & assignments. Also, our students have shown remarkable resourcefulness as they transitioned to a new online learning environment and showed appreciable resilience as they departed from campus, leaving behind their friends, clubs, and community connections. They have tailored very fast to new e-ways of learning, living, and engaging with our campus community to navigate the impact and uncertainty created by the global pandemic. Of course, our staff members have provided pivotal support and service remotely to our students & faculty with great efficiencies.

In a relentless journey amidst challenging situations, IITH has kept an impressive growth in adding new programs not only for regular students but also expanded to working professionals in order to enhance the industry-institute interactions.

New Programs at IITH For the Academic year 2020-21:

1) BTech in Biomedical Engineering
2) Interdisciplinary Programs in MTech:
   - Additive Manufacturing
   - Energy Science and Technology
   - E-Waste Resource and Engineering Management
   - Integrated Sensor System
   - Polymers and Biosystems
   - Smart Mobility
3) PhD program: Entrepreneurship & Management

For the Academic year 2021-22:

1) BTech Programs:
   - Biotechnology and Bioinformatics
   - Computational Engineering (Interdisciplinary BTech Program)
2) Online MTech Programs (for working professionals):
   - Industrial Metallurgy
   - EV Technology (EV: Electric Vehicle) [Interdisciplinary Program]
   - Computational Mechanics
   - Integrated Computational Materials Engineering (ICME) [Interdisciplinary Program]
   - Communication and Signals Processing (CSP)
   - Power Electronics and Power System (PEPS)
   - Microelectronics and VLSI
3) Online MDes program: MDes by Practice (for working professionals)
4) Interdisciplinary Program in MTech: Medical Device Innovation
5) PhD program: Climate Change
6) PhD Opportunities in Interdisciplinary Programs (Jointly Guided by Faculty members from different departments)
7) Joint Doctoral Programs:
   - IITH - SUT (Swinburne University of Technology)
   - IITH - Deakin University
8) Fellowship for International Research Scholars in Technology (FIRST@IITH)

One of the most appealing parts is witnessing the length & breadth of mind-blowing innovation being done by our brilliant and passionate faculty and students. It is this spirit of innovation that has resulted a remarkable legacy of achievements built by generations of Students & faculty members. We will keep on elevating our commitment to excellence and to every possible opportunity for the betterment of society at large.

I invite you all to explore different aspects of IITH through various mediums like newsletters, social media platforms & our institute website. We are always looking for the next generation of ignited minds (students, scholars & researchers) to join various engaging & enriching programs at IITH.

ARCI-IITH collaboration on Nanoscale materials

Mr Tata Narasinga Rao
Director (Additional Charge), ARCI Hyderabad

My interaction with IIT Hyderabad started from the time of its inception. The institute was initially located at the Ordinance factory campus in Hyderabad, and I used to travel from ARCI once a week to teach Chemical Kinetics to the first-year BTech students as a guest faculty. One of the first few projects of IIT Hyderabad is our collaborative project on the development of high-performance Li-ion battery cathode materials. Lithium-ion batteries are currently the most suitable energy storage devices for powering electric vehicles due to their impressive properties including high energy efficiency, long cycle life, and high energy density. Fast charging of a Li-ion battery is a key requirement for its high performance which depends on the fast kinetics of Li-ion intercalation/de-intercalation in cathode and anode materials. A simple way of enhancing these kinetics is by reducing the powder particle size to nano-dimensions so that diffusion length for Li-on in the material is shortened drastically and the kinetics of Li-ion transport enhances significantly, in turn, enhancing the charging rates.

ARCI's collaboration with IITH Hyderabad started with nanomaterials for energy storage applications with faculty at Chemistry and Chemical Engineering departments through research scholars from ARCI registering for PhD at IITH. Eminent faculty of IITH has opted as research supervisors while selecting topics on nano-scale Li-ion battery cathode and anode materials for high-performance Li-ion batteries, involving novel battery compositions/chemistries. It was also recognized that nanoscale pore dimensions in the activated carbon enhance the specific surface area and thus increase the power density of supercapacitors drastically and this topic is also selected as a research topic for IITH collaboration. Further work on metal-oxide-based pseudo-capacitors and Li-Sulfur batteries was taken as new topics where nanomaterials play a crucial role, and two research scholars are pursuing in collaboration with the faculty at Chemistry and Chemical Engineering Departments at IITH.

Not only energy storage, ARCI, and IITH worked together in the field of energy conversion through thin-film solar cells, where significant enhancement has been exhibited by nanostructured thin films on the conversion efficiencies. In this respect, ARCI has collaborated with faculty at the Department of Metallurgy and Materials Engineering at IITH to develop high-performance nano-ink and nanostructured CIGS thin film-based solar cells.

The collaboration has not stopped with energy materials, and further ventured into advanced materials including electrodeposited and additively manufactured high entropy alloys, which are the emerging materials for advanced functional applications.

ARCI-IITH collaboration has resulted in the award of five PhD degrees, while another five students are pursuing their PhD at present in above mentioned three departments. Several patents and publications of international repute have emerged from this collaboration and many more are expected in the coming future.

Some memories from IITH-ARCI Pact:

Fig 1: EES Group at IITH

Fig 2: Launching CARBON Lab T-shirt

Fig 3: PhD Scholar with his mentor, ARCI-IITH collaboration

Better than nano: Infusing heterogeneities in nanostructured high entropy alloys for challenging the strength-ductility trade-off

Dr Pinaki Prasad Bhattacharjee
Professor, Department of Materials Science and Engineering

Materials with ultrahigh strength but requisite ductility are in great demand for various engineering applications, including automotive, aerospace, and energy sectors. Ultrahigh strength materials allow manufacturing components with thinner cross-sections leading to weight, materials and energy savings, and environmentally friendly processes and products. For conventional alloys, ultrahigh strength may be achieved through grain refinement down to ultrafine and nanoscale regimes. Unfortunately, strength is achieved only at the cost of ductility (the well-known strength-ductility trade-off), limiting the industrial application of ultrafine and nanocrystalline ultrahigh strength materials. Therefore, novel alloys with uncompromised strength-ductility synergy are expected to revolutionize a whole range of manufacturing activities. The emergence of high entropy alloys (HEAs) is a noteworthy development in that direction.

HEAs are multicomponent alloys, developed originally based on the novel alloy design strategy of mixing five or more elements in equiatomic or near equiatomic compositions [1, 2]. Therefore, this new alloy design strategy signifies a paradigm shift away from the widely-explored corners and edges of the phase diagrams to the vastly unexplored central region of the phase diagram. Despite the compositional complexities, high configurational entropy is assumed to stabilize HEAs into simple solid solution phases. The scope of HEAs has been further expanded to include non-equiatomic multiphase alloys, which has opened the massive composition space of the hyper-dimensional phase diagrams [3] containing galaxy of alloys (Fig 4). The HEAs have evoked phenomenal research interest in recent years due to their intriguing and attractive properties [4].

We have been one of the earliest groups nationally and internationally to start working on HEAs, particularly on tuning microstructure, texture, and properties of HEAs by thermo-mechanical processing. Towards this end, my former PhD student Dan Sathiaraj (presently an assistant professor at IIT Indore), for the first time, demonstrated that the quinary equiatomic CoCrFeMnNi HEA could be severely cold-rolled and annealed to develop ultrafine to a nanocrystalline structure. This work has received significant traction (cited close to 300 times) [5].

We have been instrumental in developing a new HEAs class known as eutectic HEAs (EHEAs). The EHEA AlCoCrFeNi2.1 shows a nano-lamellar structure consisting of ordered L12 (soft) and B2 (hard) phases (Fig 5). Contrary to the expectations, the EHEA offers remarkable workability during thermo-mechanical processing at ambient and surprisingly even at cryogenic temperature. These unique features of EHEAs originally reported by us attracted considerable attention, as may be evident from a large number of citations (close to 200 times) received [6].

We subsequently showed that severe cryo-rolling and annealing could lead to a novel heterogeneous nanostructure featured by ultrafine lamellar containing nanocrystalline FCC, coarse non-lamellar, recrystallized large FCC, and coarse B2 grains. This remarkably heterogeneous nanostructure resulted in simultaneous enhancement in strength and ductility, thus overcoming the strength-ductility trade-off (Fig 6) [7]. We further introduced a novel hybrid-rolling concept combining cryogenic and warm-rolling to switch from only structural heterogeneities to a structural-compositional dual heterogeneous nanostructure [8]. This dual heterogeneous nanostructure was accompanied by an unprecedented increase in strength yet retaining appreciable tensile elongation.

We have extended this heterogeneous nanostructure design concept to HEAs, even containing complex intermetallic compounds with remarkable success in enhancing the strength-ductility synergy. We are currently trying to develop steels and other light alloys with heterogeneous nanostructures for automobile and aerospace applications. In parallel, we are also exploring the possibilities of creating such heterogeneous structures in additively manufactured components. Overall, this heterogeneities-infused nanostructure design concept signifies a new paradigm in materials development, allowing far superior mechanical properties to be realized that those possible with nanostructuring approach only.

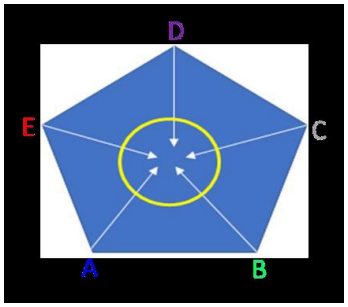


Fig 4: Schematic highlighting the key concept of moving from the corner and edges to the center of the composition space (A, B, C, D, E are components)

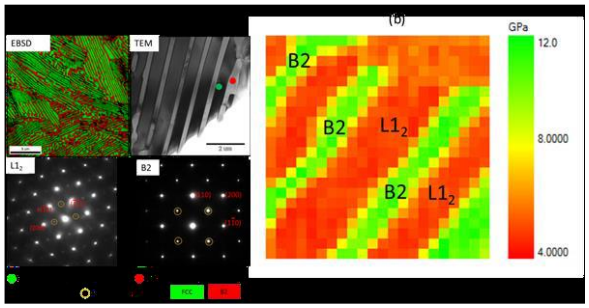


Fig 5: (a) Nano-lamellar eutectic HEA consisting of ordered L12 and B2 phases [6]. (b) shows a nano-indentation map illustrating much harder B2 than the L12 phase in the lamellar arrangement [7]

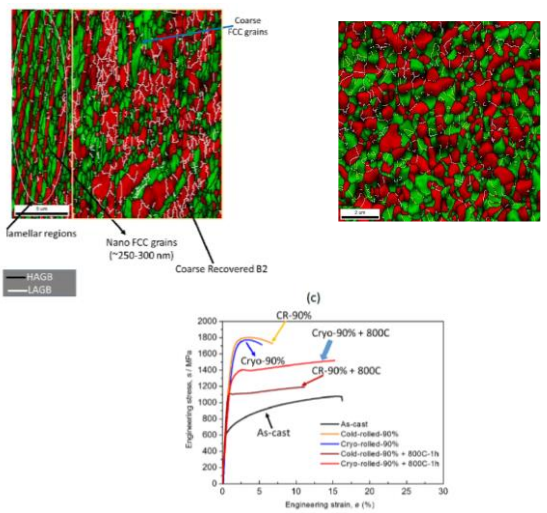


Fig 6: (a) Heterogeneous nanostructure of the cryo-rolled+annealed EHEA is compared with that of the typical microduplex structure of the cold-rolled (CR)+annealed EHEA. (c) shows the outstanding mechanical properties of the heterogeneous nanostructured EHEA overcoming the strength-ductility trade-off [7]

Acknowledgment

I sincerely acknowledge my collaborators Professor N. Tsuji (Kyoto University, Japan) and Sheng Guo (Chalmers University, Sweden). My since thanks to Prof B S Murty, with whom I have co-authored a book on HEAs. Last but not least, sincere acknowledgment goes to all my previous PhD students, namely Dr Dan Sathiaraj (Assistant Professor, IIT Indore), I.S. Wani (Assistant Professor, NIT Srinagar), S.R. Reddy (Institute PDF, IIT Kanpur), and U. Sunkari (Staff, MSME, IIT Hyderabad), with whom I have worked on various aspects of HEAs.

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Candle Soot Nano Carbon: Journey from a Pollutant to an Advance Energy Storage Material

Dr Chandra Shekhar Sharma
Associate Professor, Department of Chemical Engineering

"Carbon soot" is mainly released due to the burning of fuels such as wood, dung, wax, coal, and biomass, which has serious environmental and health concerns. Among these, candle soot is one such pollutant material released from the burning of the candle. Candle soot is rich in carbon content and has a fractal-like interconnected nanoparticle morphology. Our CARBON Lab has developed several facile and inexpensive approaches to synthesize candle-soot-derived carbon nanoparticles-based electrodes for energy storage applications. While investigating the microstructure of candle soot nanocarbon at higher resolution, we observed the presence of interconnected amorphous spherical carbon particles of size range 30-40 nm, which may facilitate better electron transfer during electrochemical activities. Moreover, scaling up the production of candle soot to meet industrial expectations is also currently under process. This wonder material has addressed many critical problems associated with energy storage devices used in electric vehicles to even Mars mission applications as summarized below.

Li-ion battery for Fast Charging Applications: The candle soot-based electrode is tested as binder-free anode material for high-rate lithium-ion batteries. Further, it has been modified with urea for nitrogen doping. The electrochemical performance of these fractal-like carbon nanoparticles seems very promising as compared to the present status of commercial anode materials used in Li-ion batteries used for fast charging applications. Further to enable its use for electric vehicles, hybrid electrodes are fabricated by decorating candle soot nanocarbon on three-dimensional microelectrode arrays.

Li-S battery for Electric Vehicles: Candle soot carbon finds very useful applications to develop next-generation Li-S batteries. It was used as a sulfur host to provide electrical conductivity to sulfur and tackle critical issues like polysulfide shuttling in Li-S batteries.

The batteries developed used candle soot carbon as host and also as an interlayer offered higher energy density than the currently used lithium-ion batteries for hybrid electric vehicle applications. At the same time, it also provides a cost-effective way to store energy with a low environmental impact.

Li-CO2 battery for MARS Mission: This work first time demonstrated the working prototype of Li-CO2Mars battery chemistry with porous carbon cathode prepared from candle soot carbon. The development of high energy density Li-CO2-Mars batteries can also be justified in terms of significant savings on mass, and volume, which is very essential in the Mars Lander and Rover missions. Another parallel aspect of this work is to develop efficient Li-CO2 battery systems and provide a striking option to fix CO2 emissions and environmental protection.

High-Performance Supercapacitors: Facile assembly of robust electrodes with excellent electrochemical performances is still challenging yet consequential for supercapacitor applications. In our group, we synthesize the metal sulfide/oxide – candle soot-derived carbon composites for high-performance super capacitor applications. The obtained results of the composites have shown superior performance compared to the existing commercial carbon-based supercapacitors. Moreover, the fabricated asymmetric supercapacitor device showed excellent energy and power density values with impressive capacitance retention of 100% over 10,000 cycles.

As discussed above, these are several applications of candle soot carbon in energy storage devices as worked upon by our group. Given the unique properties, we believe that there is much more to explore further with this wonder material not only in the field of energy but in other diversified areas such as catalysis, healthcare, and sensors.

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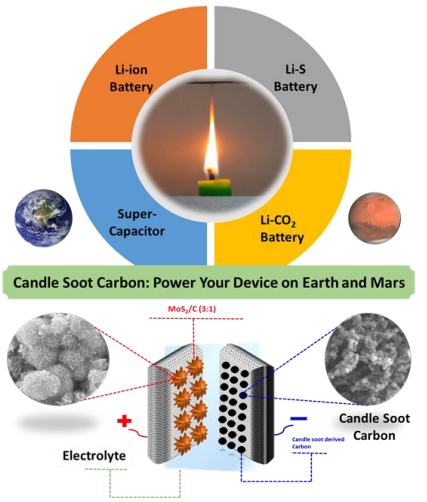

Fig 7: Schematic representation of candle soot carbon for energy storage applications in CARBON Lab

Nanofiber-based face masks

Dr Mudrika Khandelwal

Associate Professor, Department of Materials Science and Metallurgical Engineering

When everyone thought India was making great progress on covid response, the second wave hit hard. Thanks to vaccinations, the situation seems to get better again, but medical experts have been stressing the fact that SARS-CoV-2 is here to stay. The virus might continue to mutate and even affect the animals in the future. It's going to be around for a long time.

With the increasing fear of covid-19, face masks have become a legal requirement now and will continue to be in use for a long period. Since face masks have become the symbol of resistance to the virus, there has been an increase in demand for them worldwide. This resulted in the increasing mountain of plastic waste. UCTAD estimates that 75% of the estimated mask will end up in landfills or the sea. Single-use face masks that were used to stem the spread of coronavirus could be causing severe environmental damage. The current face masks we are using, be it cloth masks, surgical masks, N95 masks, or respirators of them have different kinds of problems along with all of them leading to huge amounts of waste on land and at the sea. Surgical masks are not very effective (they filter only half of the particulates) and can be used only once, N95 masks have breathability issues as they are made with microfiber, and respirators being effective are ill-fitting and uncomfortable to use. So, what is the most effective and sustainable solution? The answer is a Nanofibrous facemask.

The use of nanofibers in masks and respirators has increased widely. Nanofibres offer a very high specific surface area per unit mass that can improve the capture efficiency as well as other surface area-dependent phenomena such as ion exchange and catalysis. They have a small pore size, low weight, improved permeability, and good interconnectivity of pores. Functionalizing the nanofibres with chemicals and nucleating agents also helps in decomposing or deactivating the contaminants, which will reduce the risk of inhaling pathogens and viruses.

There are two main ways by which nanofibers can be incorporated into face masks. One is the usage of non-woven fabric of nanofibers as a layer in the mask and the second is the coating on nanofibers onto the existing mask materials. The most interesting aspect of nanofibrous filters is the possibility to lower pressure drop and hence allowing ease in breathability.

Cellulose group @ MSME IITH is working on naturally produced, fermentation-derived cellulosic nanofibrous material - bacterial cellulose - to produce a high-efficiency filter. Bacterial cellulose (BC) based face masks can have antiviral and antibacterial properties along with very high filtration efficiency at a very low-pressure drop on the incorporation of suitable antimicrobial agents. The most interesting aspect of this material is the in situ tunability to modulate pore size, porosity, and fiber dimensions which aid in improving filtration characteristics along with minimizing pressure drop. Work is underway to develop biodegradable self-cleaning filters for face masks. We are also looking at fundamental characteristics for depth filters such as permeability and tortuosity and establishing correlations with filter parameters such as fiber dimensions, and porosity. So far, we have successfully engineered pore sizes and shown its ability for liquid filtration. Going forward cellulose group is pursuing to develop these materials at the earliest and scale up for the larger societal benefit.

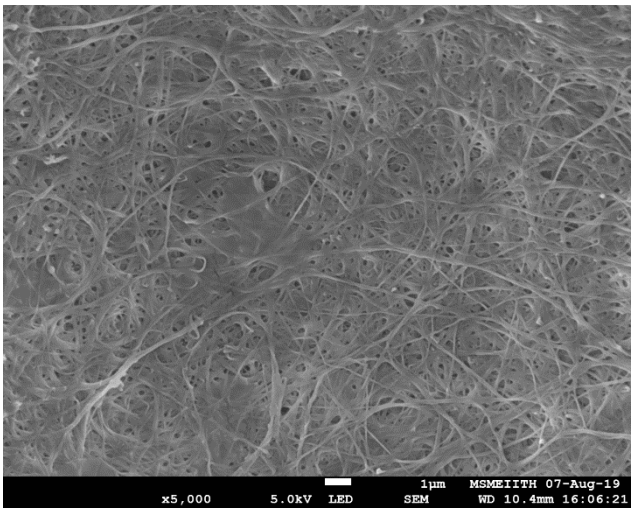

Fig 8: Scanning electron micrograph of microbial nanofibers that trap the microbe

Note: Articles has been co-authored by Ms Sharanya Bagannagari

Compressed Nanofibrous Tablets: An Oral Administration of Amphotericin-B towards the Potential Cure of Leishmaniasis and Black Fungus

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Department of Chemical Engineering

Dr Chandra Shekhar Sharma
Associate Professor, Department of Chemical Engineering

Leishmaniasis is a disease condition advanced in the body after the infection of protozoan parasites from more than 20 species of Leishmania. It is a vector-borne disease transmitted to humans and animals from infected animals through the bite of the female sand fly. The disease subsists in three forms namely cutaneous leishmaniasis (most common form), visceral leishmaniasis (most severe form), and muco-cutaneous leishmaniasis (most disabling form). In its most fatal form i.e., visceral leishmaniasis, the functioning of the liver, spleen, and bone marrow is severely hampered and, the fever turns body complexion into the dark. Hence it is called black fever or Kala-azar which if misdiagnosed with common fever, the fatality rate is more than 95%.

Leishmaniasis is endemic in approximately 88 poorly developed countries in the world and a billion of the population is under the threat of susceptibility. Annually 30000 new cases of visceral leishmaniasis and more than 1 million cutaneous leishmaniases are registered.

The shocking fact is, only India, Nepal, and Bangladesh contribute to 67% of global cases of Visceral Leishmaniasis. In India, Bihar is the worst-hit state subsequently followed by Uttar Pradesh, Jharkhand, and West Bengal.

Current treatment is highly expensive and comprising of parenteral administration of Liposomal Amphotericin B (AmB) under the presence of experts. The drug AmB is considered a golden standard for fungal assay and is a drug of choice to cure leishmaniasis. The mechanism of AmB involves killing individual fungal or protozoa cell by binding with ergosterol present in the cell membrane and extracting the cell content out; thus, causing cell death. Recently, Amphotericin B has also been used for the treatment of Mucormycosis, also known as black fungus. Black fungus has lately emerged in the patients who are suffering from covid-19 with diseases like uncontrolled diabetes and is even declared as an epidemic in India.

Due to its amphiphilic nature, the AmB has poor aqueous solubility and forms aggregates in the system which stresses renal filtration and thus causing nephrotoxicity. This is the reason the oral administration is abstained although being the most comfortable and effective route. In present research funded by DST-Nanomission, a team led by Prof. Saptarshi Majumdar and Dr Chandra Shekhar Sharma along with their PhD scholars Mrunalini Gaydhane and Anindita Laha intended to deliver Amphotericin B orally at an extremely slow rate, of course within the therapeutic window.

The purpose was to increase the drug absorption and reduce aggregation, so as to lower the drug toxicity. For this, we selected gelatin an FDA-approved polymer as an excipient for drug molecules. The drug-loaded nanofibers were fabricated by using the electrospinning technique. As gelatin nanofibers are water-soluble and mechanically weak, we cross-linked the drug-loaded nanofibers with minimum exposure to the aqueous vapor of Glutaraldehyde. The crosslinking imparts the water-insoluble groups and thus aids in the slow diffusion of drug molecules and improved water stability. However, the high specific surface area and porosity of the nanofibrous mat would have given fast release of drug molecules into the release media. Thus, we rolled and compressed the nanofibrous mat in a manual hydraulic press to form a tablet. Our first attempt where 20 mg of AmB was loaded into a 500 mg tablet demonstrated prolonged release till 10 days and efficient eradication of Candida Albicans fungi till 7 days of testing (Figure 9-A). However, the drug loading was on the lower side. To meet the realistic dosage of Leishmaniasis, we next fabricated the compressed tablets of 1.5 gm with 60 mg AmB loading. By employing different cross-linking strategies, compressing conditions, and alginate coating on tablets, we could achieve the zero-order drug release till 96 hours. The release study was demonstrated with varied pH conditions of the oral tract corresponding to mouth, stomach, intestines, and duodenum. Further, as the gastrointestinal tract contains different enzymes which hydrolyze the polymers, we checked and confirmed the enzymatic stability of tablets in pepsin. The significance of the nanofibrous tablets is depicted in Figure ab.

The main concern with high drug loading was if it imposes nephrotoxicity. To ensure this, we carried out a cell viability assay (MTT assay) against human kidney fibroblast cells which illustrated no evidence of cell toxicity caused by AmB as well as Glutaraldehyde crosslinker.

This is a first-ever attempt to fabricate nanofibrous oral tablets of Amphotericin B for the potential cure of Leishmaniasis or Kaala Azar. The slow and sustained zero-order drug release profile in a real physiological condition along with in-vitro cytocompatibility infers its feasibility towards the next step of developing the formulation. The Recent development of the use of Amphotericin B for the treatment of black fungus which is emerged as a major concern as post-covid-19 symptoms make this study more time and as a result of that, it has received wide attention in the media recently. Many pharma companies have come forward to realize its potential for clinical trials, necessary approvals for commercialization on a fast track.

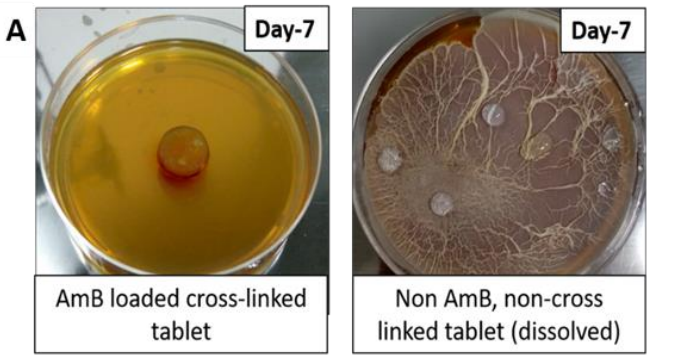

Fig 9: (A) Antifungal activity

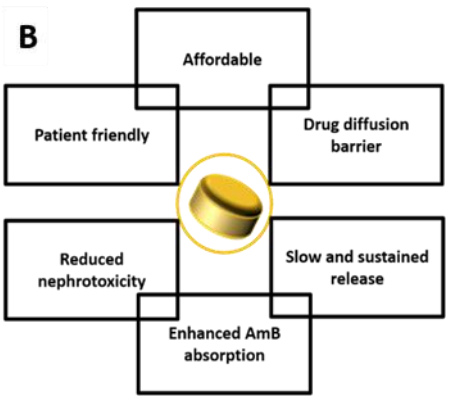

Fig 9: (B) salient features of AmB loaded nanofibrous tablet

From waste to energy - a sustainable technology

Dr Arthi Gopalakrishnan
Department of Electrical Engineering

Energy is an unavoidable sector in modern society. Unfortunately, current power supplies are mainly based on limited and non-renewable fossil fuels. To build a sustainable future, energy source needs to be reliable, affordable, and inexhaustible. To date, numerous energy conversion and storage technologies, such as solar cells, flywheels, fuel cells, super capacitors, and batteries, have been developed with the goal of utilizing sustainable energy sources. Among them, Super capacitors (SCs) possess several advantages over batteries but suffer from low energy density. Beyond the limitation of low energy density, recent advancements in SCs in terms of electrode materials and electrolytes hold significant potential to fill the gap between batteries and fuel cells and existing electrolytic-capacitor technology.

A widely used electrode active material for super capacitors is the porous activated carbon produced from carbon-rich biomass or organic precursors. But still, it could not meet the commercial requirement of a high efficient device similar to batteries. This limitation can be overcome by utilizing heteroatom doping to the carbon framework, which improves electronic and surface properties. Various biomass precursors contain proteins, amino acids, thio-based molecules, which results in doping of heteroatoms such as N, S, and P to the carbon network as shown in Fig. 10.

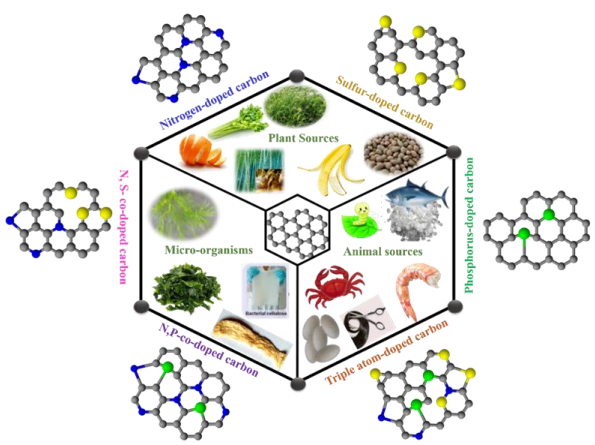

Figure 10: Various biomass sources to derive heteroatom doped carbon framework

Some of the biomass waste resources utilized in my work are Ginger root, Acorn nutshells, Onionskin, etc., to derived heteroatom-doped porous carbon nanosheets. All the above-mentioned biomass was converted to carbon nanosheets using KOH activation/carbonization under an inert atmosphere. The acorn nutshells contain protein molecules and large amount of ash contents which gets converted to N-doped carbon with SiO2 nanoparticles embedded carbon nanosheets shown in Fig 11(a). Similarly, it was also converted to S-doped carbon using the hydrothermal technique. We also demonstrated the fabricated supercapacitor device towards powering up various LED indicators as shown in Fig. 11(b). In addition, onion skin-derived carbon was doped with multi-heteroatoms of N, S, and P which may be due to the presence of amino acids, sulfur, and phosphorus content from the onion.

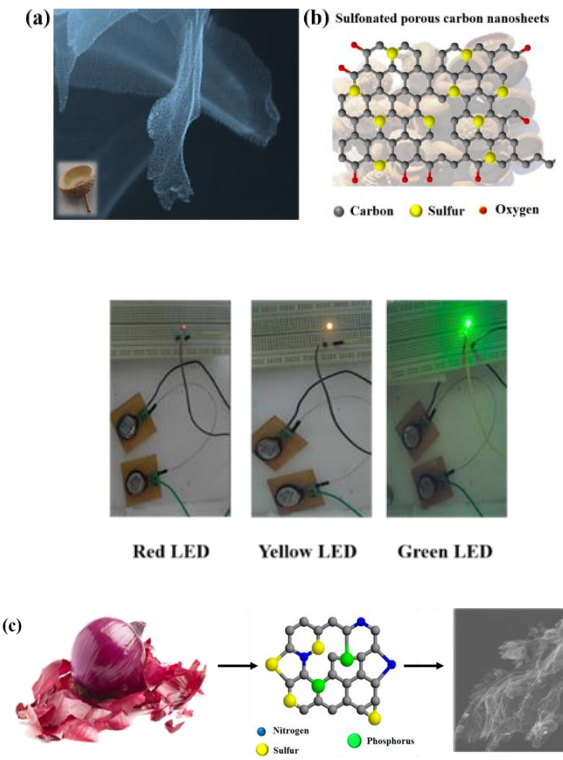

Figure 11: (a) FESEM image of N-doped Si-embedded carbon nanosheet; (b) S-doped carbon from acorn and fabricated device to illuminate LED's; (c) onion skin derived multi-heteroatom doped carbon nanosheets

In summary, my research work involving the low-cost and sustainable high-performance supercapacitor devices from these waste biomass resources is of significant importance in developing future hybrid energy storagedevices. My goal is to develop cost-effective commercial standard hybrid supercapacitor devices with these biomass-derived carbon electrodes. This can pave the way towards affordable and sustainable energy storage technologies for use in electric vehicles and other applications.

A facile way of surface texturing of Si{100} using TMAH for Silicon Solar Cells

Ms Arti Gupta,
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Department of Chemical Engineering

Micro/Nano-textured Si surfaces work as excellent antireflective surfaces and have various applications [1]. Most importantly, in photovoltaic devices, it increases light intensity reaching the active layer [1,2]. Light trapping structures result in more light absorption by taking multiple internal reflections; thus, more photon generation occurs and thus increases the device's efficiency. Observing the current energy scenario, photovoltaic devices have received widespread attention. It offers several benefits compared to conventional energy sources. It is secure, sustainable, environment friendly, noise-free with minimal maintenance requirements, and a modular electricity solution [2]. Wet etching is the best-suited technique for microfabrication in Silicon. wet etching of Si{100} in alkaline solution results in pyramids/hillocks bounded by four{111} planes [3]. Such geometrical structures work as excellent light trapping structures and may potentially help increase the solar cell's efficiency increment. Potassium hydroxide (KOH) and tetramethylammonium hydroxide (TMAH) are the two most widely used alkaline solutions for surface texturing of silicon [3]. TMAH is preferred over KOH as it is fully compatible with the CMOS process, easy to handle, and provides high etch selectivity between silicon and silicon dioxide [3]. We investigated the effect of very low TMAH concentration without adding any additive on surface texturing of Si{100} in detail. The main objective of the present study is to obtain improved etched surface topography at the lowest possible etching concentration, etching time, and etching temperature to maximize the light trapping for the fabrication of silicon-based solar cells with high efficiency.

Effect of etching concentration: Etching concentration is varied from 1.0 to 0.1 wt% TMAH at a step of 0.1 wt% for 20-100 min of etching time where etching temperature is fixed at 70°C.

Figure 12 (i) shows the reflectance spectra, where figure 1 (ii) shows the corresponding Rsw of the samples etched in 0.5 wt% TMAH at 70°C for 20-100 min. The lowest Rsw of 9.7% (Fig 12 (ii)) is found on a sample etched in 0.5 wt% TMAH at 80 min. Fig 12 (iii) shows the mean and standard deviation (SD) of Sq values with respect to etching time. In the case of a sample etched in 80 min, SD in Sq value is lowest, confirming improved surface morphology than the samples etched in other concentrations. Fig 12 (iv) and (v) show the surface morphology images of 0.5, and 1.0 wt% TMAH etched samples. As can be noticed, the structure is more uniform and denser in a 0.5 wt% etched sample that may be the reason for the lowest reflectance. Light trapping mechanism in both the case can be understood by the respective schematic.

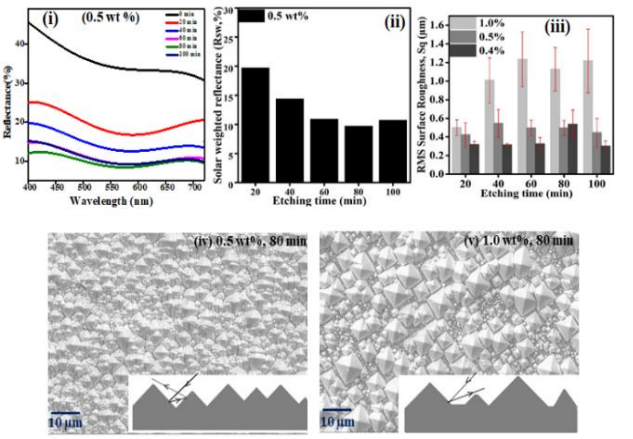
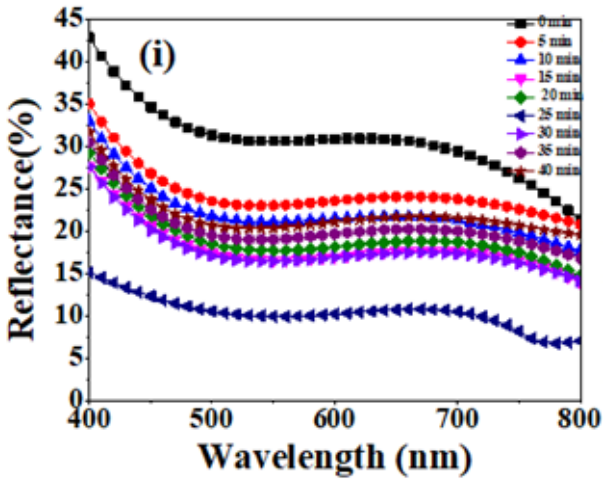
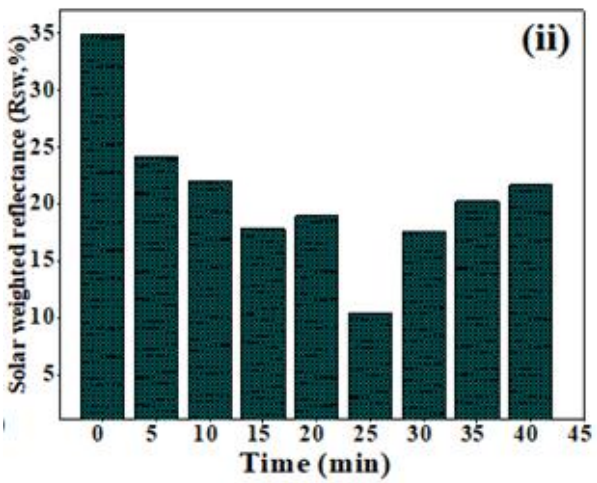


Fig 12: (i) reflectance spectra, (ii) Solar weighted reflectance (Rsw), (iii) RMS surface roughness (Sq), and surface morphology images with light trapping behaviour in (iv) 0.5 wt% (v) 1.0 wt% TMAH etched samples at 70°C for different etching times

Effect of etching temperature:

Etching temperature is varied from 80 to 85℃ at a step of 5℃ for 5 to 40 min of etching time where etching concentration is fixed at 0.5 wt% TMAH. Fig 13 (i) shows the reflectance spectra, where Fig 13 (ii) shows the corresponding Rsw of the samples etched in 0.5 wt% TMAH at 85℃ for 5-40 min. The lowest Rsw of 10% (Fig 13 (ii)) is found on a sample etched in 0.5 wt% TMAH at 25 min of etching time. Fig 13 (iii) shows the surface morphology image of 0.5 wt%, 25 min etched sample. It can easily be noticed that the structures are more uniform and denser, which may be the lowest reflectance at 25 min of etching time.





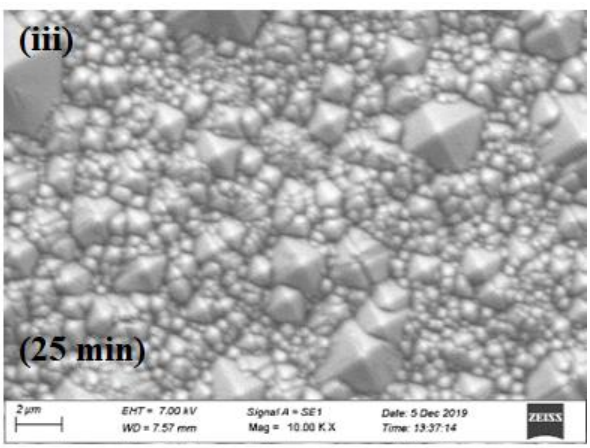


Fig 13: (i) reflectance spectra, (ii) Solar weighted reflectance (Rsw), and (iii) surface morphology of 0.5 wt% TMAH etched samples at 85℃ for different times.

References:

[1] Willey RR "Further guidance for broadband antireflection coating design". Applied optics 50: C274-C278 (2011).

[2] Solanki C.S., Singh H.K.: "Anti-reflection and Light Trapping in c-Si Solar Cells." (Springer, 2018).

[3] Pal P., Sato K., "Silicon Wet Bulk Micromachining for MEMS." (Jenny Standford Publishing, New York, 2017, First edit)

iTIC Incubator's new brand identity

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Mr Keyur Punjani
Manager - Programs
iTIC Incubator, IITH

iTIC Incubator refreshed its logo and brand identity in May 2021. The new logo is inspired by IIT Hyderabad's current logo of an open book. The new iTIC logo element is of a closed book and an upward arrow, which depicts the transformation of a student into an entrepreneur.

itic
IIT HYDERABAD
TECHNOLOGY INCUBATION CENTER

Fig 14: iTIC new logo

iTIC Makerlab and AR/VR lab

iTIC is setting up a state-of-art Makerlab and AR/VR lab which will be operational soon. The Makerlab will have a wide range of machines like 3D printers, 3D scanners, laser cutters, foam cutters, PCB milling machines, electronic equipment, development boards, and much more. Makerlab would also have a high-end workstation with software useful for startups.

The AR/VR lab will have top-end development devices like Hololens 2, Oculus Quest 2, and HTC Vive Pro. The facility would also have a green room, software, and a high-end workstation specially designed for AR/VR processing and development.

3D printers and laser cutters are already installed, and startups have started using them.

Cleanathon winners announced

iTIC Incubator launched the Cleanathon challenge in April end to support solutions for some of the toughest problems of the world in the areas of water/air/noise pollution, water body cleaning, waste disposal, upcycling, circular economy, plastic recycling, plastic alternatives etc.

The winners for the Cleanathon challenge are:
Gautami Chati, Winner
Khushbu Baid, Runner-up
Yalla Omkar Venkata, 2nd Runner-up

All the winners received cash prizes up to INR 20,000 and were offered support under iTIC pre-incubation to develop their prototypes.

Fig 15: Clean-a-thon Winners Announcement

WIN challenge

iTIC Incubator and WIN Foundation US organized WIN Challenge with a motive to provide innovative solutions to the problems around Child growth and Health Monitoring. Participants were asked to solve the problem in any of the 3 topic solutions. The challenges given to the participant were - from a picture or set of pictures, estimate the height, weight & unlikely health issue in the body of a child. This challenge focused on finding solutions for the problems by using the photographs of subjects using computer vision, AI/ML, and other deep technologies.
WIN Challenge was launched virtually in the Second week of June and received very good responses from students, researchers, academia, and entrepreneurs from across the nation with solutions. After the preliminary round of screening, top participants were called for a virtual interview and 2 winners were selected based on their technical understanding to solve these problems.

Fig 16: WIN Challenge Call

The winners of the Challenge are:
Romita Ghosh, Winner
Pankaj Saini, Runner-up

The winners will receive sponsored preincubation support for 12 months along with lateral entry to grant schemes.

Fig 17: WIN Challenge Winner Announcement

Sensitization event for FICCI Flo members

iTIC, CIE and FICCI Flo organized a webinar cum panel discussion especially for FICCI Flo members to sensitize them about the startup ecosystem and what are the benefits and support provided to the startups at different stages. The event received a very warm response from the FICCI Flo community. Prof Suryakumar S from iTIC Incubator at IITH and Prof Ramesh Loganathan from CIE IIITH were the panelists in the event.

Panel Discussion on 'Rising with resilient leadership'

To support NSRCEL IIM Bangalore's Goldman Sachs 10k Women program, iTIC Incubator and WE Hub Telangana organized a panel discussion targeted towards women entrepreneurs and women-led startups.

The speakers for the Panel Discussion were Aruna C, Co-founder, NumberNagar; Sri Devi Nune, Sr Manager, WE Hub, Govt of Telangana; Priyanka Mandal, Co-founder, Clan Earth and Ch Saritha, Director, Innomet Advanced Materials Pvt Ltd. The panel discussion was meant to spread awareness for Women Entrepreneurs and talk about workplace gender ratios post covid, balancing WFH lifestyle as an entrepreneur, impact of women in developing economy, and much more.

Fig 18: RRL Panelist

Innovative Adhesive Nano-formulation Based DuroKea Technology and Long-lasting Next Generation Hygiene Products

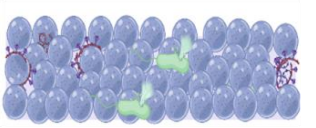
Dr Jyotsnendu Giri
Founder, Eaffocare Innovation Pvt. Ltd and Kea Biotech Pvt. Ltd.
iTIC Incubator, IITH and,
Associate Professor, Department of Biomedical Engineering

In view of the current pandemic, long-lasting hygiene products are the need of the hour. They provide non-stop protection, render repeated use, are cost-effective, and above all save time, energy, and money. Considering the importance of long-lasting hygiene products to combat the COVID-19 virus, and its future mutant variants or various other emerging pathogens, researchers from across the globe have been trying to develop such products and are yet to be successful in commercial translation. Scientists across the world have explored different silane derivatives (with positive charges) as molecules to develop long-lasting hygiene protects (surface disinfectant and hand sanitizer). However, the killing of the pathogen on the silane-coated surface normally takes a longer time > 15 min. Moreover, those products are aqueous-based only. The 'DuroKea' Technology was developed keeping in mind the current unmet need for long-lasting hygiene products in India. Unlike silane-based long-lasting technology, which has been commonly used to develop such products, our self-disinfecting DuroKea Nanotechnology is unique and powerful to kill pathogens instantly (within 60 sec) and provide protection for longer periods ranging several hours to days. 'Durokea' Technology is a platform wherein by changing the active molecules, there is a possibility of various products development in the future. This technology provides a unique platform for Nanotechnology or Nanomedicine for the masses.

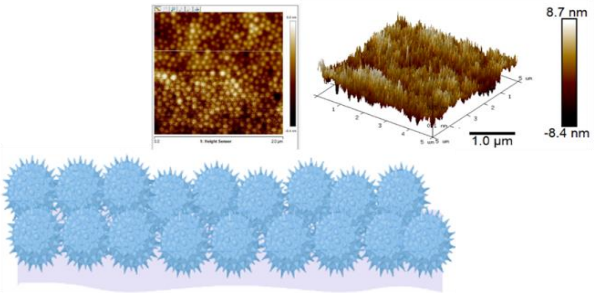
Dr Giri is the co-founder of two start-ups, Eaffocare Innovation Pvt. Ltd and Kea Biotech Pvt. Ltd. to facilitate the technology from bench to bedside. Using DuroKea technology, Kea Biotech Pvt Ltd has launched four innovative hygiene (long-lasting antimicrobial/antiviral) products, DuroKea S, DuroKea M, DuroKea H, DuroKea H Aqua specially to fight against COVID-19 virus and other germs in three different ways. In line with the Prime Minister's call for self-reliant India (Atmanirbhar Bharat), the indigenously developed world's 1st affordable and long-lasting hygiene product series- 'DuroKea', developed by IIT Hyderabad researchers was launched by Union Minister of Education Ramesh Pokhriyal 'Nishank' in an online ceremony held in April 2021.

How DuroKea works?

Step 1: Alcohol droplet on surface kills pathogens instantly

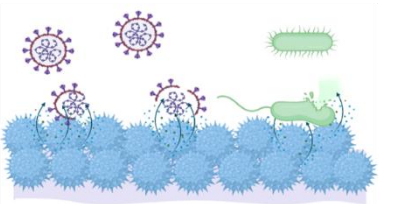


Step 2: Alcohol/liquid evaporate and leaving behind nano-formulation coating on the surface for long-lasting protection



(Nanoscale observation of DuroKea S coated surface by Atomic Force microscopy)

Step 3: Unique positive charges on the nanoformulation, electrostatically attract pathogen (normally negative charges) and kill instantly (<60 sec) by synergistic action of physical disruption by nano-topography, molecular needles, and chemically lysis from released molecules close vicinity of pathogen.



Step 4: Long lasting 360-degree protection to you and your family

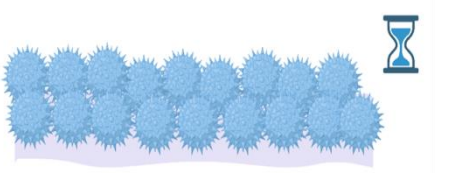


Fig 19: Functional diagram of DuroKea Technology

***Tested for DuroKea S surface disinfectant**

DuroKea S: Nano-formulation-based Ethanol surface disinfectant for frequently touched soft and hard surfaces such as tables, door handles, chairs, lift, dustbin, carpets, curtains, sofas, and any other dry surface. Application of DuroKea S makes a nanoscale coating on the surface and protects for up to 35 days. It kills 99.99% of germs instantly including the COVID-9 virus.

DuroKea H: Nano-formulation-based long-lasting ethanol hand sanitizer. Application of DuroKea H makes a nanoscale coating on the hand and protects it till you wash your hands or up to 24 hours (whichever is earlier). It kills 99.99% of germs instantly including the COVID-19 virus.

DuroKea H Aqua: Nano-formulation-based long-lasting hand sanitizer foam for alcohol-sensitive screen and child-friendly. Application of DuroKea H Aqua foam makes a nanoscale coating on the hand and protects it till you wash your hands or up to 24 hours (whichever is earlier). It kills 99.99% of germs instantly including the COVID-19 virus.

DuroKea M: Nano formulation-based long-lasting coating spray for masks. It kills 99.99% of germs instantly including the COVID-19 virus and makes the nanoscale coating on the mask surface for further protection till washed or discarded.

DuroKea Products are now available throughout India through different distributor channels as well as different e-commerce websites- www.keabiotech.com, Amazon, and Flipkart.

Fig 20: DuroKea Range of Products

ELKEMIE
MATERIALS & SOLUTIONS PVT. LTD.

Dr Suhash R. Dey
Professor, Department of Materials Science and Metallurgical Engineering, IITH

Ms Ch. L. P. Pavithra
Research Associate, IIH

Elkemie is working to bring the traditional electrodeposition technique into the domain of nanotechnology and scale it up to an industrially applicable level by fabricating new-age materials for various potential applications which are not fully exploited yet, especially in India. Properties of materials can be tailored through the introduction of multiple elements and controlling from atomic level arrangements to dimensions in bulk at various length scales. Therefore, they are focusing on introducing new multiple element alloy systems (multicomponent alloys) which can address a variety of challenges and can be an alternative to the existing conventional materials.

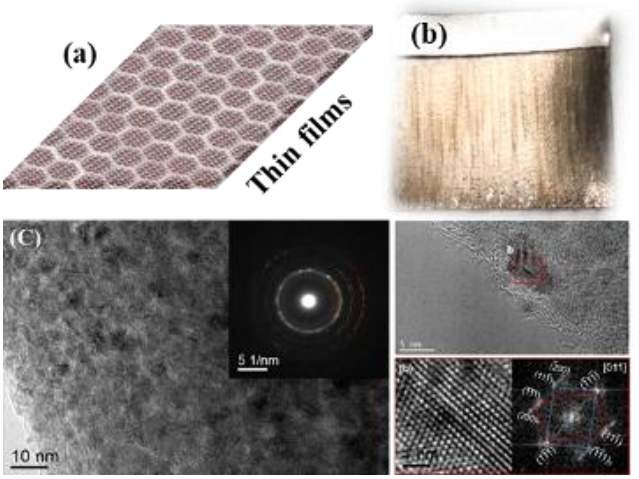


Fig 21: MCA thin film and its transmission electron micrograph

Elkemie derives its existence from the Archaic materials chemistry field called Alchemy and the nineteen-century started Electrochemistry. Elkemie's vision is to fabricate futuristic multi-functional nanomaterials which are directly implementable into the electronics, energy, environment, and healthcare industries. While some of the existing materials are toxic, expensive, suffer from high-temperature instability, difficult to nano-architect, and the majority of them are not multifunctional. With their experience in the electrochemical process, they are working on alloy structures, multicomponent alloys, composites in various dimensions and shapes at the nanoscale for various applications. Presently with their nanostructured multicomponent alloys at TRL-3, we are focussing on areas of energy, healthcare, and environment. Additionally, they are also working on antiviral coatings at nanoscale for filtration through a scalable single-step process that does not require several harmful chemicals, capping agents, etc. to make the nanomaterials.

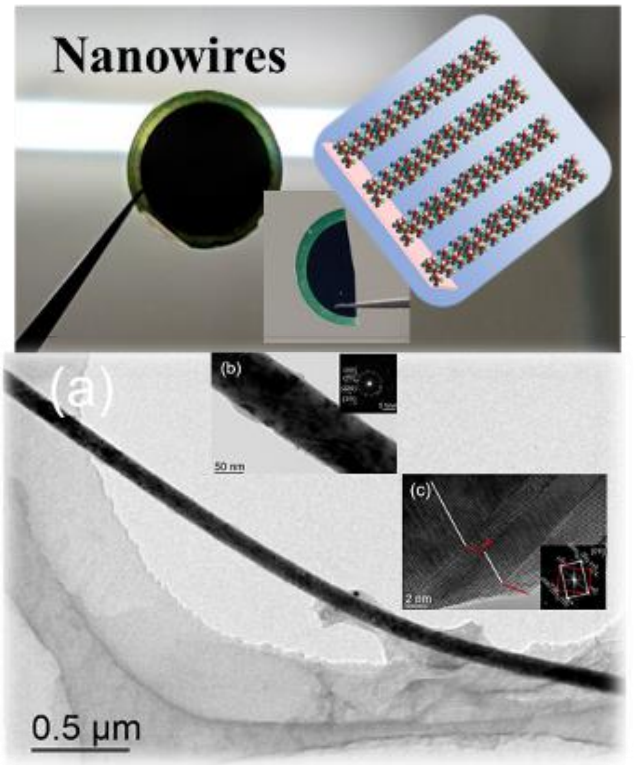


Fig 22: MCA nanowires and transmission electron micrographs

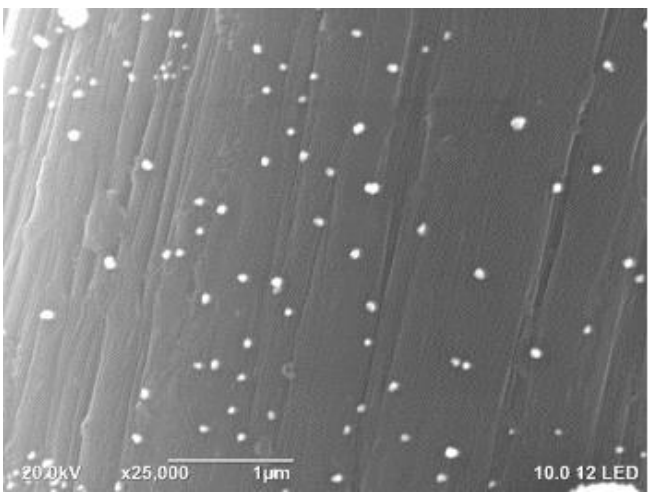


Fig 23: Electron micrograph of alloy nanoparticles for antiviral applications

Nanotechnology towards Rebooting Computing IC Design for Edge AI

Dr Santhosh Sivasubramani
MTech, PhD, Department of Electrical Engineering

The need for High-Performance Computing data centers is rapidly growing in order to cater to the growing demand in processing and storing Big Data arising due to Digital India and other initiatives.

We are working towards a vision of realizing resource-constrained magnetic chips for ultra-low power portable artificial intelligent applications. Nanomagnetic Logic (NML) based computation started emerging as a key alternative towards the Beyond CMOS-based Rebooting Computing paradigm.

Many modern systems such as speech and face recognition systems and IoT-enabled devices for remote health monitoring require highly computationally and energy-intensive neural networks. Hence, it is not practically affordable to perform these computations in portable hand-held devices. With these major limitations, all the machine learning algorithms used in these Artificial Intelligent applications run on remote systems.

These factors put forth a clear demand for low-power chip design in the area of Artificial Intelligence. To address these issues, highly intensive convolutions should be performed using ultra low power, least energy-consuming, and area-efficient devices, thus motivated us to explore the magnetic quantum-based nanomagnetic architecture designs for next-generation rebooting computing platforms.

“Performing AI computing on edge with approximate nanomagnetic logic deployed on the magnetic ICs is an attempt towards the futuristic computations.”

Traditionally, electronic phenomena are used for information processing (CMOS Devices) and magnetic phenomena are widely used for data storage (Hard Disks). However, the traditional CMOS devices consume power supply (standby power) to maintain its ‘logic states’ required for computing information, thus making it volatile.

On the contrary, the emerging next-generation electronic devices using coupled nanomagnets’ for computing and information propagation require no standby power to maintain its logic states thus making it non-volatile. Thus, the magnetic chip design started emerging as a potential alternative to CMOS-based computing which faces challenges with Moore's law approaching towards its end.

Modern AI systems and ML algorithms require high computation power and energy-intensive neural network. In most cases, these computations are run on remote systems. The major limitation is performing computations in portable hand-held devices. There is a clear demand for low-power chip design in AI.

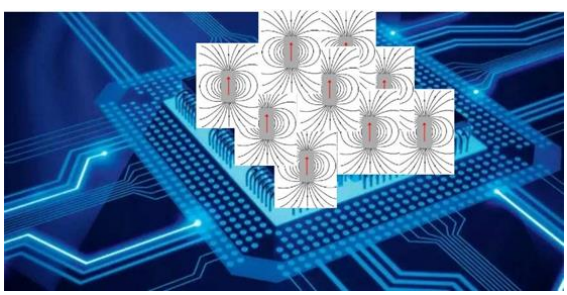


Fig 24: Graphene Nanomagnetic Microprocessor – Envisaged Conceptual Diagram

“With these demonstrations of basic building blocks becoming successful, we now aim for a bigger goal by porting some power-hungry AI applications on such an indigenously developed ultra-low-power computing platform.”

Intrinsic energy minimization nature and the non-volatility of nanomagnets aid MQCA based NML devices operate at ultra-low power in comparison to its CMOS counterpart enabling a power-hungry system design. Leveraging this inherent advantage of NML, it has been envisaged to possess significant potential in performing approximate computing with a tradeoff between accuracy and power consumption.

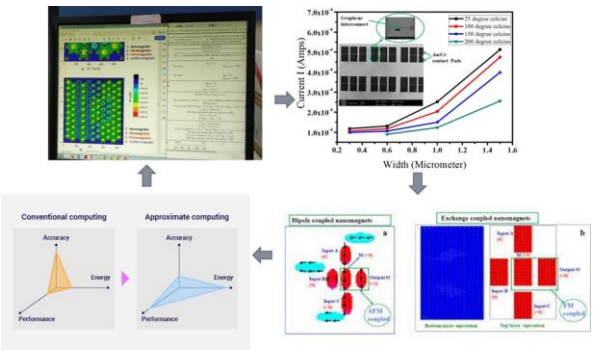


Fig 25: Intrinsic magnetism in Graphene to Fabrication of graphene nanoribbons and the design and development of nanomagnetic logic architecture exploiting dipole and interlayer exchange coupling by deploying approximate arithmetic leading towards energy efficient IC Design

Such approximate computing architectures are deployed to perform computationally intensive tasks under the resource-constrained platform. For example, emerging AI computing on edge devices for IoT applications, where a significant reduction in power consumption can be achieved with insignificant loss inaccuracy.

On the other hand, the growing popularity of digital devices has spurred the need for integrated circuits that are lightweight, consume ultra-low power, and are highly efficient. Technology companies are increasingly focusing on nanoelectronics for developing such devices but using nanomaterial like graphene is still challenging as there is little evidence of it showing intrinsic magnetism.

When your laptop or your mobile phone gets too heated up beyond the threshold, you would sometimes get panicky that chips inside the phone would have burnt out. That's why some phone manufacturers nowadays claim that their phone chipsets are based on 14nm finfet technology and that they have advanced thermal management. Yet, we are facing heating issues.

Just imagine a situation where the heat generated via the chipset could be harnessed to perform computations. Researchers proceeded with this interesting thought. What if the temperature and electric field can be utilized to induce magnetism in graphene nanoribbons? There are already reported instances in the scientific literature that electric field and temperature can be individually used for controlling or inducing magnetism.

In order to make 'graphene processors' a reality, the key issue to be addressed is thermal management. To achieve this, we need a mechanism that could harness excess heat generated in the operation of gadgets to induce magnetism. Our group envisaged a processor application using a single-layer zigzag graphene nanoribbon which could potentially harness the heat generated in the system, reduce the voltage requirement, and perform computations (information propagation) using spins. The work could pave the way for stretching the performance of integrated circuits and eventually lead to the realization of laptops powered by graphene-based microprocessors.

"The need for Rebooting Computing has been well established in the recent days and in particular the focus towards Beyond CMOS computing paradigm. Nanomagnetic logic (NML) based computing architecture design methodology started emerging as a potential candidate representing spintronics and nanomagnetics."

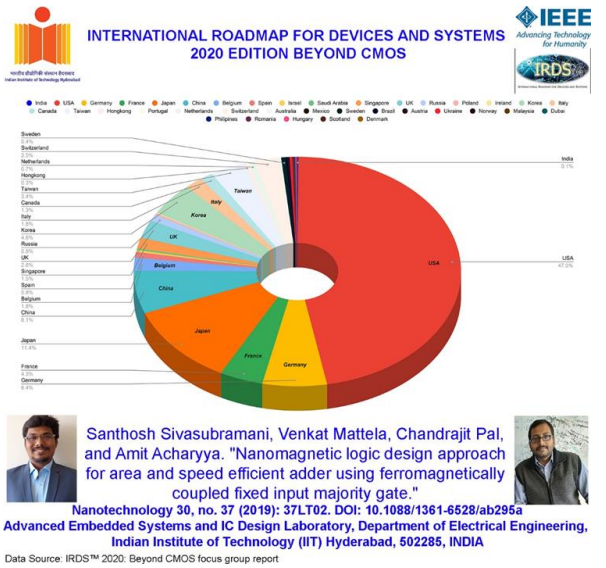


Fig 26: Work published in International Roadmap for Devices & Systems 2020 Edition Beyond CMOS

"We are glad that our work has been featured in the International Roadmap. International recognition of this scholarly contribution in the emerging field of Rebooting Computing motivates us further to perform translational research from fundamentals to its applications. Energy efficient computing is the need of the hour, and this work will certainly pave the way towards it". "This is the first step towards futuristic computation. We are proud to be in the 0.1% of the contribution from Indian Academia towards the global contribution for IRDS".

Dr Santhosh Sivasubramani received his Master's and Doctoral degrees from the Indian Institute of Technology (IIT) Hyderabad, India. His PhD thesis works on "Rebooting Computing: Nanomagnetic Logic-based Computing Architecture Design Methodology" was funded by Redpine Signals Inc., PhD fellowship in the Department of Electrical Engineering. His MTech Thesis is on "Simulation and Experimental Investigation on electronic transport and magnetic properties of graphene for its applications in nanomagnetic computing". The writer also possesses experience as an INUP Visiting Research Scholar at the Centre of Excellence in Nanoelectronics, Indian Institute of Technology Bombay, and as a Project Assistant - DEITY sponsored project on "IOT for Smarter Healthcare" Center for Cyber-Physical Systems & IoT, Department of Electrical Engineering, IIT Hyderabad. Also, a Nominee – INAE Innovative Student Projects Award 2018 for MTech Thesis and also awarded with the Certificate of Appreciation for Research in Electrical Engineering, IIT Hyderabad for the year 2018. The writer is also a selected participant for a fully sponsored onsite visit to IMEC Belgium and also a freelance science journalist who also reports for India Science Wire.

Dr Santhosh S is the currently elected Secretary of the IITH Alumni Association Governing Body 2021-2023. With respect to this position, he as a team aim to achieve:

- Enhance the existing IITHAA Mentorship program to a wide range of alumni-student
- Alumni networking sessions through local and global chapters
- Referrals and guidance through IITHAAconnect ASKAlumni for internships, jobs, visiting research positions, higher studies, UPSC preparation
- Building support infrastructure to pass through and beyond the ongoing pandemic
- IITH AA newsletter to build continuous interaction with the alumni's achievements and success story
- Active discussion channel among students, alumni, and the institute in general body meeting
- Active start-up ecosystem
- Funds generation for social responsibility and supporting institute-wide activities
- Translational research - from lab to fab
- Coordination with sunshine cell and help each other at times needed
- Frequent interactive meetings, local gatherings, informal events

Need your support. Open to collaborate, innovate and experiment

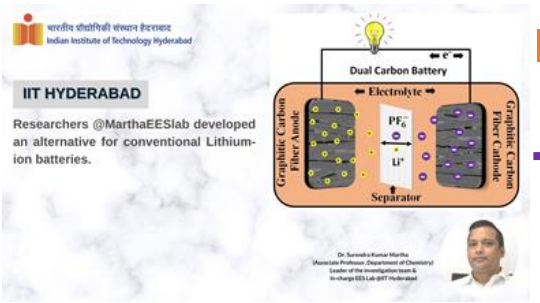
Let's work together and grow together for the betterment of ourselves, juniors, and the entire IITH fraternity

April 2021

iTIC incubator, IIT Hyderabad organized Clean-a-thon, a cleantech hackathon to find solutions. Best ideas were rewarded.

April 2021

IIT Hyderabad joined hands with GMR Hyderabad International Airport Ltd to collaborate in the space of Innovation & emerging tech areas during the Launch of GMRInnovex.

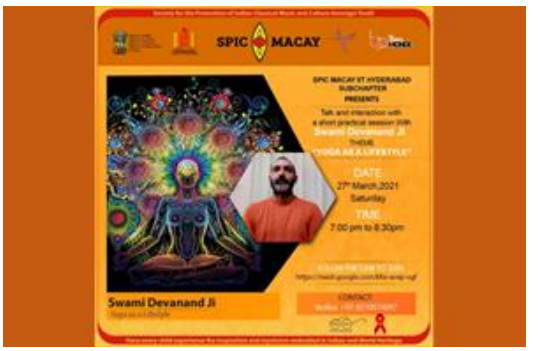


April 2021

IIT Hyderabad researchers developed an alternative for conventional Lithium-ion batteries.

April 2021

SPICMACAY at IIT Hyderabad Chapter had a talk & an interaction with Swami Devanand Ji, followed by a short practical session



April 2021

IIT Hyderabad, IIT Madras & Deakin South Asia organized an E-Symposium on Health Materials & Devices

April 2021

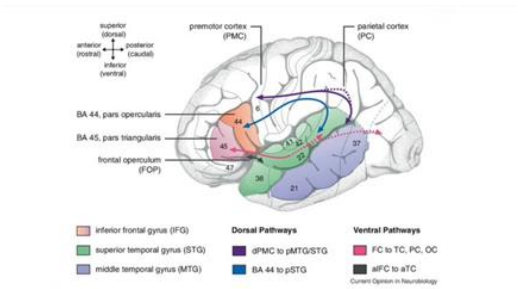
#GreenCampus, Students of IIT Hyderabad launched a new initiative, "CLEAN IITH CAMPAIGN", to clean the campus during the free time voluntarily. The objective is to instill the belief of self-responsibility of cleaning campus.

April 2021

"World 1st affordable & long-lasting DuroKea Series" developed by IIT Hyderabad, was launched by Hon'ble Minister of Education Shri Dr Ramesh Pokriyal Nishank

April 2021

Engineering & Technology × Industry-Academia Partnerships Results from IITH-Japan Collaboration, a nostalgic moment from the IITH-Japan Diary shared by JICA.



April 2021

IIT Hyderabad's Researcher Dr Prakash Chandra Mondal explored that, "Not all aspects of human language and cognition can possibly be united with neurobiology".

April 2021

IIT Hyderabad organized webinar, 'GYANTEEKA' with Speaker Dr Soumya Swaminathan,Chief Scientist.

May 2021

EBSB club at IIT Hyderabad has taken up an event 'Jal hi Jeevan hai' to reiterate the need to conserve water.

May 2021

IIT Hyderabad and GreenCampus organized plantation drive on Green Day. A step towards making greener estate & reduce IITH's carbon footprint.

May 2021

Culturals at IIT Hyderabad has organized CultCombat21. Various cultural activities were organized as a part of it.

May 2021

LafargeHolcim to collaborate with IIT Hyderabad for smart building solutions. The academic collaboration led by LafargeHolcim Innovation Centre will be supported by group companies ACC and Ambuja Cements in India. Study will explore smart sensing technology for continuous on-site strength evaluation of a concrete structure

May 2021

In view of the Covid-19 situation prevailing in the country and the need for better conditions required from each one of us, IIT Hyderabad & BDL have taken a decision to realign the upcoming BMI Program.

May 2021

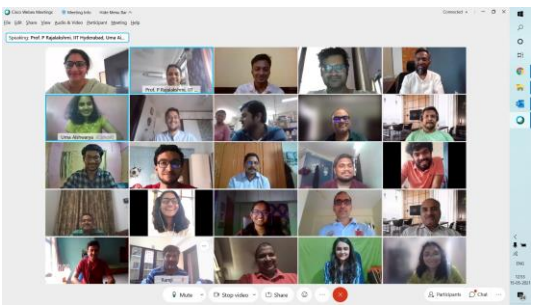
IIT Hyderabad's Women Association & Dr Shiva Ji, Assistant Professor, Department of Design created a movie about all mothers of IITH community & tribute to motherhood via calligraphy respectively On Mother's Day.

May 2021

NIMS, Japan & IIT Hyderabad launched Joint Research Center for Materials Science to achieve the best research results in the field of materials science.

May 2021

Parting ways with your dear ones is never an easy affair. With a heavy heart, IIT Hyderabad bid adieu to its 2021 graduates. It was a moment of equal happiness for their bright future ahead.



May 2021

Business Model Innovation is the need of the hour. IIT Hyderabad organized a Business Model Innovation program's 1st action webinar.

May 2021

IIT Hyderabad conducted an insightful and thought-provoking session of EML by Lieutenant General Madhuri Kanitkar, a soldier, a doctor, and a teacher, has taken on all these roles with great determination and pride.

May 2021

IIT Hyderabad welcomed the new IITH Alumni Association core team, 2021-2023.

May 2021

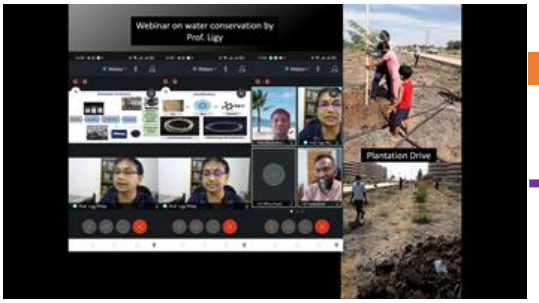
IIT Hyderabad Researchers made Oral solution for 'black fungus' ready for technology transfer.

June 2021

To keep the morale high of campus children in the given circumstances, IIT Hyderabad's Women Association has organized an interactive session b/w Prof B S Murty, Director, IITH & Children@IITH.

June 2021

IIT Hyderabad organized an incredible knowledge sharing session on World Environment Day with Prof Ligy Philip's (IIT Madras) on "Sustainable Water Management adopting Circular Economy Concept".



June 2021

IIT Hyderabad has organized the mass plantation near ACAD Block & new campus school on World Environment Day.

June 2021

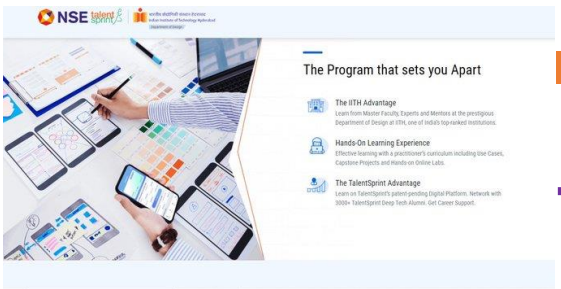
IIT Hyderabad has improved its QS World University Rankings to 591-600 in 2022. For the 2nd consecutive year, IITH has maintained its position within the Top 10 ranks among the technical institutes in the country & as the best among the 2nd generation IITs.

June 2021

IIT Hyderabad #IITHWoWomen are doing wonderful research and reaching newer heights in academics. We are proud of them & thought of sharing a piece of their wonderful journey to motivate many more. Here present Dr Kanchana V., 1st Women Faculty appointed as a Professor.

June 2021

iTIC Incubator announced winners of Clean-a-thon, a hackathon to find solutions for the most challenging problems.



June 2021

IIT Hyderabad in association with TalentSprint is offering a PG Certificate Programme in Visual Design and User Experience.

June 2021

IIT Hyderabad observed 7th International Day of Yoga 2021, with the theme “Stretch, smile and relax. Revive your spirit. Find your inner peace and tap into your soul and rediscover yourself” with Dr Tejaswini Manogna (Celebrated Yoga practitioner) as Chief Guest.

June 2021

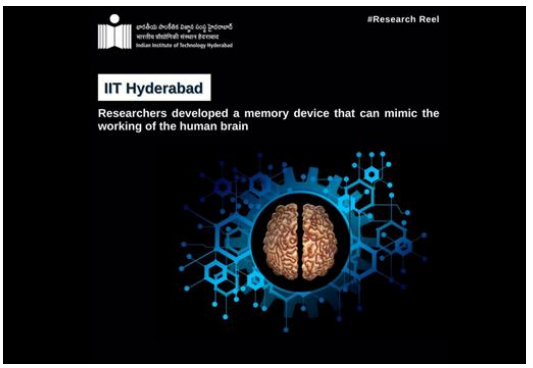
IIT Hyderabad celebrated its 13th Foundation Day with Prof. Krishnaswamy Vijay Raghavan, Principal Scientific Adviser to the Government of India as Chief Guest of the event.

June 2021

Prof B S Murty, Director IIT Hyderabad, has shared the recent work done at the institute to fight COVID-19 with AIR.

June 2021

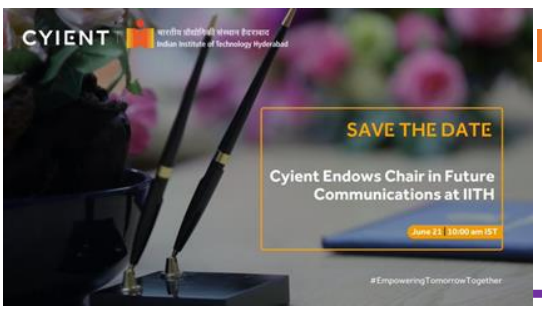
IIT Hyderabad researchers developed a memory device that can mimic the working of the human brain.



June 2021

Cyient Endows Chair in Future Communications at IIT Hyderabad.

Through our partnership with IIT Hyderabad, Cyient commits to innovation in the field of new-age communication.



June 2021

Muscope, world smallest Microscope developed by IIT Hyderabad. Scaled down to a few mm, this microscope will make medical devices low cost, mobile and automated.

June 2021

IIT Hyderabad and WiSig Networks announce 'Koala', India's first 5G SoC to drive NB-IoT Applications

To know more about latest happening, please visit: https://www.iith.ac.in/

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You can view all press releases/ notes from IIT Hyderabad at: https://pcr.iith.ac.in/pressrelease.html

The Indian EXPRESS

ADVERTORIAL

IIT-H Researchers Develop "DUROKEA" to fight COVID-19

'DuroKea' products ensure instant killing of germs & viruses and prolonged protection

In line with Prime Minister's call for Self-reliant India, the indigenously developed world's 1st affordable and long-lasting hygiene product series- 'DuroKea', developed by IIT Hyderabad researchers was launched by Union Minister of Education ***Ramesh Pokhriyal 'Nishank'*** *in an ceremony held in April 2021. This next generation antimicrobial technology product starts at Rs 189, kills 99.99% of germs instantly and leaves behind the long-lasting protective nanoscale coating up to 35 days or till next wash.*

PRODUCT DESCRIPTION

HOW DUROKEA WORKS? (UNDER THE SCIENCE PAGE)

HOW TO BUY

THE HANS INDIA

Tue, 06 Apr-21; The Hans India - Hyd; Size : 480 sq.cm.; Circulation:-; Page : 2

BREAKTHROUGH IN BATTERY TECHNOLOGY

IITH finds alternative to Lithium-ion batteries

- Rechargeable Lithium-ion batteries (LIBs) are projected to meet future electric mobility, electric aviation, and stationary grid energy storage targets within 2030. However, LIBs need toxic and costly metals like cobalt, nickel, manganese, etc., for functioning
- The more sustainable and low-cost dual carbon battery may find potential uses in high voltage applications, sophisticated battery-run medical devices, regenerative braking systems in electric vehicles, and stationary grids
- In the dual-carbon battery, both the electrodes consist of carbonaceous materials, and the ions from the electrolyte intercalate and de-intercalate into the electrode matrix. It has zero transition metal and is environmentally benign. It may cut overall costs by 20-25%

KANDI

THE Electrochemical Energy Storage (EES) Lab at IIT-Hyderabad, under the supervision of Dr Surendra Kumar Martha, Associate Professor, Department of Chemistry, has developed a 5V dual carbon battery, utilising self-standing carbon fiber mats as both electrodes (cathode and anode).

This new model sets aside the requirement of toxic, costly, and heavy transitional metals. Energy economy based on renewable sources has been put forward as a way out to shrug off the dependence on fossil fuel.

Rechargeable Lithium-ion batteries (LIBs) are projected to meet future electric mobility, electric aviation, and stationary grid energy storage targets within 2030. However, LIBs need toxic and costly metals like cobalt, nickel, manganese, etc., for functioning. Geologically, unsymmetrical distribution of Lithium and cobalt, along with geopolitics and unethical child labour on extraction mining, causes havoc fluctuations in raw material cost. It affects the market price stability of large LIB packs used in electric vehicles.

In the dual-carbon battery, both the electrodes consist of carbonaceous materials, and the ions from the electrolyte intercalate and de-intercalate into the electrode matrix. The novel dual carbon battery consisting of zero transition metal is environmentally benign. It may cut down the overall battery cost by 20-25% and is expected to curb the unpredictability in market price. The use of ubiquitous carbon as electrode active material as well as current collector replacing heavy metals brings in the aspects of lightness and flexibility. The fabricated 5.0 voltage (nominal voltage 4.6 V) cell provides an energy density of 100-watt hour per kilogram approximately and can be extended up to 150-watt hour per kilogram with further modifications.

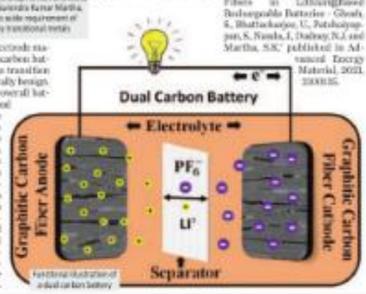
The team of PhD students Shuvajit Ghosh and Udita Bhattacharjee, led by Dr Surendra Kumar Martha, says the new model sets aside requirement of toxic, costly, and heavy transitional metals

The research team believes that developed cells may find potential uses in high voltage applications, sophisticated battery-run medical devices, regenerative braking systems in electric vehicles, and stationary grids.

The leader of the investigation team, Dr Surendra Kumar Martha, said, "The study will be extrapolated to push the energy density limits further, and their broad vision includes introducing the dual carbon system as a cheaper LIB alternative to the Indian market."

The research was carried out by Shuvajit Ghosh and Udita Bhattacharjee, PhD students at IIT Hyderabad, under the supervision of Dr Martha, in collaboration with Oak Ridge National Laboratory (USA) and Naval Materials Research Laboratory (Mumbai, India). Naval Research Board (DRDO) supported this project.

The detailed experiments and discussions can be found in the article entitled "Multifunctional Utilization of Pitch-Coated Carbon Fibers in Lithium-Based Rechargeable Batteries - Ghosh, S., Bhattacharjee, U., Patchaiyappan, S., Nanda, J., Dudney, N.J. and Martha, S.K." published in Advanced Energy Material, 2021, 2100135.



Functional illustration of a dual carbon battery

GMR Innovex looks to drive innovation across group

BUSINESS BUREAU
Hyderabad

GMR Group launched a new business vertical dedicated to fostering and driving innovation-GMR Innovex. It will focus on innovations across both digital and non-digital domains to deliver improved efficiency, better customer experience and higher value to all stakeholders. It will also create a structured mechanism to build creative ideas, nurture and foster them, and build a go-to-market strategy for all successful initiatives.

It will provide an avenue for its partners to work on their ideas and bring it to a forum to validate. The advantage that this exchange brings in is that collaborators can also try their products/services at GMR Innovex across airports, air cargo, MRO, logistics and other infrastructure sectors.

GMR Innovex will operate on an 'Open Innovation' model, acting as an 'Innovation Exchange' to partner with startups, corporates, innovation platforms, research institutions and academia to bring innovative ideas and solutions to life. A dedicated new facility for innovation has also been established at the Hyderabad Airport campus to act as a platform for various innovation activities by various collaborating startups, industry partners and GMR employees.

The group has announced partnerships with T-Hub, IIT-Hyderabad, Icrisat and Schulich Business School, Canada.

> We hope the diverse landscape of GMR Group will help our partners experiment on a wide canvas
>
> — GBS RAJU, BUSINESS CHAIRMAN, AIRPORTS, GMR

New partnerships

GMR Innovex also announced innovation-focused partnerships with multiple new partners including Airbus; Plug and Play, Swedish Institute; T-Hub, IIT-Hyderabad; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Schulich Business School (Business School of York University Located in Toronto, Canada).

Skilling avenue

Speaking on this occasion, Pradeep Singh Kharola, secretary, MoCA, said, "During Covid times the aviation sector was hard hit but has emerged stronger. Many new technologies took shape during this period and were all aimed at making the industry robust. The future of air travel is one of passengers just walking through an airport in a fully paperless way."

"GMR Airports has been the first airport to launch the e-boarding service and today 90 per cent of passengers use this method. GMR Innovex will become an excellent hub to train talent for various specialised jobs across the aviation industry," Kharola said in a statement.

Somesh Kumar, chief secretary, Government of Telangana, said, "Today innovation has become a necessity. In the ever changing and fast-moving world, we either invent or perish. Despite being a new State Telangana has a clear policy of innovation and is actively encouraging innovations. We are glad that GMR innovation is stationed in our State."

GBS Raju, Business chairman — Airports, GMR Group, said, "We hope the diverse landscape of GMR Group will help our collaborators to experiment on a wide canvas which is very essential in any creative domain. Through GMR Innovex, we wish to position GMR as an innovation thought leader and lay the foundation for the next phase of our growth journey."

THE HINDU
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May-21; Hindu - Hyderabad; Size : 14 sq.cm.; Circulation
Page : 8

Government gives nod for 5G trials

Stating that TSPs are encouraged to conduct trials using 5Gi technology in addition to the already known 5G technology, the statement said the International Telecommunications Union (ITU) has also approved the 5Gi technology, which was advocated by India, as it facilitates much larger reach of the 5G towers and radio networks. The 5Gi technology has been developed by the Indian Institute of Technology, Madras (IIT-M), Centre of Excellence in Wireless Technology (CEWiT) and IIT Hyderabad.

With 5G technology data, download rates are expected to be 10 times that of 4G while giving up to three times greater spectrum efficiency. The trials will be on a non-commercial basis.

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Page : 2

ఆసియా వర్సిటీ ర్యాంకింగ్స్‌లో ఐఐటీహెచ్‌కు 144వ ర్యాంక్

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Page : 3

కొత్తగా ఉమ్మడి పీహెచ్‌డీ ప్రోగ్రాం!

- అందుబాటులోకి తెస్తున్న ఐఐటీహెచ్, స్విన్‌బర్న్ వర్సిటీలు

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THE HINDU
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Tue, 06 Apr-21; Hindu - Hyderabad; Size : 76 sq.cm.; Circulation:191215; Page : 2

IIT-Hyderabad research team develops an alternative to lithium-ion batteries

5V Dual Carbon Battery utilising self-standing carbon fiber mats do away with the requirement of toxic, costly and heavy transitional metals

SPECIAL CORRESPONDENT
SANGAREDDY

The Electrochemical Energy Storage (EES) Lab at IIT-Hyderabad has developed a 5V Dual Carbon Battery utilising self-standing carbon fiber mats as both electrodes (cathode and anode). This new model sets aside the requirement of toxic, costly and heavy transitional metals.

Energy economy based on renewable sources has been put forward as a way out to reduce dependence on fossil fuel. Rechargeable lithium-ion batteries (LIBs) are projected to meet future electric mobility, electric aviation, and stationary grid energy storage targets by 2030.

However, LIBs need toxic and costly metals like cobalt, nickel, manganese and other materials to function. Geologically unsymmetrical distribution of lithium and cobalt along with geopolitics and unethical child labour centered on mining causes fluctuations in raw material cost. It affects market price stability of large LIB packs used in electric vehicles.

> Our broad vision includes introducing the dual carbon system as a cheaper LIB alternative to the Indian market.
>
> SURENDRA KUMAR MARTHA, Chemistry associate professor, IIT-H

In the dual-carbon battery, both the electrodes consist of carbonaceous materials, and the ions from the electrolyte intercalate and de-intercalate into the electrode matrix.

The novel dual carbon battery consisting of zero transition metal may cut down the overall battery cost by 20-25% and is expected to curb the unpredictability in market price.

The use of ubiquitous carbon as electrode active material as well as current collector replacing heavy metals brings in the aspects of lightness and flexibility. The fabricated 5.0 voltage (nominal voltage 4.6 V) cell provides an energy density of 100-watt hour per kilogram approximately and can be extended up to 150-watt hour per kilogram with further modifications.

The research team believes that developed cells may find potential use in high voltage applications, sophisticated battery-run medical devices, regenerative braking systems in electric vehicles, and stationary grids.

"The study will be extrapolated to push the energy density limits further, and our broad vision includes introducing the dual carbon system as a cheaper LIB alternative to the Indian market," said chemistry associate professor Surendra Kumar Martha, who led the research team.The research was carried out by Shuvajit Ghosh and Udita Bhattacharjee, PhD students at IIT Hyderabad, under the supervision of Mr Martha, in collaboration with Oak Ridge National Laboratory (USA) and Naval Materials Research Laboratory (Mumbai). Naval Research Board (DRDO) supported the project.

THE TIMES OF INDIA
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Sun, 23 May-21; Times Of India - Hyderabad; Size : 686 sq.cm.; Circulation:267065; Page : 5

10,000 US9 masks sold in 9 months

Barely nine months of launching US9 respiratory mask, Indian Institute of Technology, Hyderabad (IIT-H) incubated startup U-Safe has made a sale of almost 10,000 masks.

Launched in August, 2020, the US9 respiratory mask was said to be better than the N95 mask in protection. It was commercialized as the world's most affordable respirator mask that is highly durable and adheres to the highest safety standards for operating in hazardous environments.

Today, the US9 respiratory mask is being used by several doctors and nurses in top hospitals across the city. "When we launched the mask, we received feedback from several users that the mask was making it slightly difficult for them to breathe. Subsequently, we improvised and came up with two more variants with better filtration and easy to breathe masks," said Swamli Sharma, head of marketing, USafe Healthcare Pvt Ltd.

Following brisk business in the market, the start-up also reduced the cost of the mask. "When we launched, the price was Rs 599 for 10 filters. Now, we have reduced the cost to Rs 200 for 10 filters. This is cheaper than an N95 mask. Doctors change three-four N95 masks in a day. Our mask lasts for three days, making is a much more affordable option," said Sharma.

Hyd's brightest step up in BATTLE AGAINST VIRUS

From masks to ventilators, startups from the city put forth innovations to help the world, **Swati Bharadwaj; Swati Rathor & Preeti Biswas** *explain some of these initiatives*

Briefcase size non invasive ventilator helps people catch a breath

SUNDAY SPECIAL

At a time when the country is gasping for breath due to the surge in Covid-19 cases, Hyderabad-based Apollo Computing Laboratories, a defence & aerospace design and development solutions provider, has developed a briefcase-like portable non-invasive ventilator – SwasthVayu.

Swasthvayu ventilators are being used in various hospitals in Hyderabad and Delhi. The company is manufacturing around 300-500 units of these ventilators per day and can ramp it up to 500 based on demand.

SwasthVayu delivers Oxygen through a non-vented mask tightly fitted to the face, doing away with the need for tracheal intubation or a tube being inserted through the mouth into the windpipe.

The device has an LCD display and user interface buttons on the front panel to operate the machine. It also has a SD card slot, where a SD-card can be inserted to store information generated by the machine.

The in-built Li-ion battery provides two-to-four hours battery back-up to overcome any power transmission exigencies and the device is programmed to generate six alarms to alert the medical attendants for patient breath cycle deviation.

Blockchain solution helps safe movement of Covid-19 vaccines

As per World Health Organisation data, one out of four vaccines get spoiled in the supply chain. One of the major reasons for this wastage is cold chain failures.

The other major concern is theft and black marketing of drugs and vaccines that have become precious cargo during this Covid-19 pandemic. StaTwig, a T-Hub incubated start-up, which recently shifted its base to Singapore, has developed a blockchain solution 'Vaccine Ledger' that is being used by government authorities and vaccine manufacturing companies to ensure safe delivery of Rs saving Covid-19 vaccines to far-off places as well as prevent its black marketing. It captures serial numbers, expiry dates, other manufacturing data using 2D Bar codes and uses them to scan the vaccines at various touch points along the journey of the vaccine.

It helps to not only monitor vaccines but also alerts the suppliers about any glitches during the journey helping them to take corrective actions.

Today, StaTwig's solution is being used not just by the Telangana government for CSIR Group as well for its airports handling pharmaceutical and vaccine cargo. Soon, it will be deployed in certain countries in Africa and Latin America.

IoT-enabled ventilator awaits device certification

A low-cost ventilator that can be controlled via a phone app developed by an Indian Institute of Technology, Hyderabad (IIT-H) incubated start-up is in the process of getting necessary certifications and approvals ahead of it's commercial launch.

When the Covid-19 pandemic hit us early 2020, the startup Aerobiosys Innovations had developed a low-cost, portable, emergency use ventilator titled 'Jeevan Lite'. It is an internet of things enabled ventilator and can also be battery operated, enabling its deployment in areas without assured power supply.

After spending a year on research and development of the product and it's design, the startup is in the process of securing device certification from British Standards Institution, a standards body based in the UK and a no objection certificate from the Central Drug Standard Controls Organization, India's national regulatory body for pharmaceuticals and medical devices.

"Pursuant to device certification and CDSCO approval, we intend to start the production of the ventilator with an industrial partner. We are yet to finalise the price for the commercial launch," said Rajesh Yadav, founder and chief executive officer of Aerobiosys Innovations.

Simultaneously, they are also tying up with hospitals to conduct a final check of the ventilator for its efficacy.

Contactless AI-IoT device scans temperature, analyses data

A homegrown startup BlueSemi, which develops low power devices, to come up with a contactless AI/IT (Artificial Intelligence and Internet of Things) solution called SENS.

Developed just three months into the pandemic in May 2020, the sleek, contactless temperature sensing device is about 15 cm x 3cm in size and weighs just 120 gms.

It gives a medically accurate temperature reading of a person, holding up their palm in front of it, within just 3 seconds.

The device is paired with its own mobile app and desktop dashboard that raise risk alerts if the temperature is above a certain level, helping the security guard on the other side of the door decide whether a person should be granted entry.

The solution also includes advanced data analytics that helps analyse the data logs generated by the device to help users make informed and timely decisions.

SENS, which has so far done over two crore scans, learns with each scan and adjusts accuracy on a daily and weekly basis. What's more, being a very low power device, it needs to be charged only once in 15 days.

After being pilot tested at over eight railway stations last year, today it is today being deployed by corporates, including ITC, and is also being exported to Germany as well as Middle East and North Africa. Next on the radar is other countries in Europe and South-East Asia.

IIT-H, SWINBURNE LAUNCHES JOINT DOCTORAL PLAN

DC CORRESPONDENT
HYDERABAD, APRIL 20

Indian Institute of Technology, Hyderabad (IIT-H) entered into an engagement with Swinburne University of Technology, launching a joint doctoral programme in a new format with an enrolment of 10 PhD students. The programme is expected to commence in July 2021.

The students admitted to the JDP will have an opportunity to spend up to one year at SUT, Australia, supported by Swinburne University Postgraduate Research Awards scholarship from SUT.

These students will receive a fellowship as per the ministry of education norms while at IIT Hyderabad. Besides, students will receive a top-up scholarship (150 AUD) from SUT while at IIT-H. While at SUT, they will receive a scholarship identical to the Swinburne University Postgraduate Research Awards (SUPRA) from SUT for up to 12 months.

Further details can be obtained from https://www.iith.ac.in/inr/IITH-SUT/.

THE HANS INDIA
Sat, 17 Apr-21; The Hans India - Hyd; Size : 272 sq.cm.; Circulation:-; Page : 4

IIT-H scholar develops UV disinfectant tube

T KARNAKAR REDDY
Sangareddy

With Covid-19 pandemic continuing to wreak havoc across the world, many restrictions have been imposed to contain the spread of the virus, but its spread continues unabated. Since purchase of essentials such as groceries, vegetables, fruits and online orders are mandatory for living, an IIT-H (Indian Institute of Technology-Hyderabad) research scholar has identified there is a chance of these goods can carry viruses into residential areas causing infection.

To prevent the spread of virus, Priyabrata Rautray, a PhD student at the Department of Design, has developed an Ultra Violet disinfection tube which was placed at the main entrance gate of the IIT-Hall.

Ultra Violet disinfection tube being inaugurated by IIT-H Director Prof BS Murty at the institute's main entrance on Monday.

The employees and students, who enter the institute, can simply keep their things in the tube to sterilise them that will restrict the possibility of carrying the virus into the institute. Director of IIT-H, Prof BS Murty and Head Department of Design Prof Deepak John Mathew, who examined the facility, have appreciated the idea and efforts of the Priyabrata.

Since the Covid-19 is expected to stay here for a long time, Priyabrata said this technology would be very useful if such tubes are placed at the entrance of hospitals, offices, industries, residential colonies, shopping complexes and institutes to restrict the spread of Covid-19.

IIT-H innovates with hygiene products

Union Education Minister Ramesh Pokhriyal e-launches DuroKea series product

HANS NEWS SERVICE
HYDERABAD

UNION Minister of Education Ramesh Pokhriyal on Friday has launched 'Nishank' world's first affordable and long-lasting hygiene product DuroKea Series, developed by Indian Institute of Technology Hyderabad (IIT-H) researchers during an online event.

This new product is an antimicrobial technology, priced at Rs 189, kills 99.99 per cent of germs instantly and leaves behind the long-lasting protective nanoscale coating up to 35 days till the next wash.

Expressing delight over the novel innovation the Union Minister said that Prime Minister Narendra Modi has given us a powerful tool of Aatmanirbhar Bharat, Shashakt Bharat and Shreshtha Bharat.

"The IIT, Hyderabad being a young institute is making a mark by its remarkable research. Durokea Product launch is one such important step to establish IIT Hyderabad in the world and bring laurels to the nation," the Minister lauded.

He also appreciated IIT Hyderabad researchers for their notable research for the society and environment like mask, metal-CO2 battery, dual carbon Battery. Meanwhile, he also congratulated the Durokea technology team for this attainment and urged the researchers and students to continue doing great work and bring the name to the country.

Speaking on the occasion, Director of IIT Hyderabad, Prof BS Murty said that the institute is always at the forefront of cutting-edge research. It has proven time and again, especially during this pandemic time.

"IITH has delivered many solutions, including low-cost ventilators, effective mask, mobile apps and fast Covid-19 test-kit. Durokea is one such unique invention to fight against the ongoing pandemic," he added.

Researchers from the IIT-H led by Dr Jyotsnendu Giri, Associate Professor in Biomedical Engineering and founder EuffoCare Innovation Pvt Ltd incubating at iTIC, have developed innovative DuroKea long-lasting technologies. Durokea S, DuroKea M, DuroKea H, and DuroKea H Aqua using innovative "Durokea Technology", is an adhesive Nano formulation. "Durokea Serious products provide instant killing with prolonged protection against a wide range of germs including Covid-19 Virus. Each product has been extensively tested through field trials and validated in different Indian Government accredited laboratories.

The novel product was e-launched during an online event by Ramesh Pokhriyal in the presence of B V R Mohan Reddy, Chairman, Board of Governors, IIT Hyderabad, Prof M Srinivas, Founder Dean ESIC Medical College and Hospital, Hyderabad, and other officials from the Ministry and IIT Hyderabad.

ఈనాడు
Date : 30/05/2021 EditionName : TELANGANA PageNo : 03

నోటి మాత్రతో బ్లాక్ ఫంగస్‌కు చికిత్స!

- సాంకేతికత బదలాయింపునకు ఐఐటీ హైదరాబాద్ సిద్ధం
- ఉత్పత్తి చేసేలా ఔషధ పరిశ్రమలు ముందుకు రావాలని విజ్ఞప్తి

THE HANS INDIA
15 May-21; The Hans India - Hyd; Size : 218 sq.cm.; Circulation:-; Page : 4

IIT Hyderabad & NIMS launch joint centre for materials research

HANS NEWS SERVICE
HYDERABAD

THE HANS INDIA

Tue, 22 Jun-21; The Hans India - Delhi; Size : 149 sq.cm.; Circulation:-; Page : 5

Cyient Endows Chair in Future Communications at IIT Hyderabad

HANS NEW SERVICE
HYDERABAD

CYIENT, a global engineering, manufacturing, and digital technology solutions company, on Monday announced that it has established an endowed chair in the field of new-age communications at the Indian Institute of Technology Hyderabad (IITH). Prof. P. Rajalakshmi, Department of Electrical Engineering at IITH, was chosen as the first appointee of the Cyient Chair in Future Communications. The Cyient Chair will endow the professorship with an honorarium of Rs 25,000 and a contingency grant of Rs 1,00,000 per year for three years to further research and development in the field.

A selection committee comprising IITH Director Prof B S Murty, Chair Professor Ranjan Mallik, IIT Delhi, and Prabhakar Atla, Senior VP & Business Unit Head – Communications and Utilities, Cyient, picked P Rajalakshmi for her significant contributions in the field of new-age communications technology.

Prof. P. Rajalakshmi, IITH Chair Professor, Cyient Chair in Future Communications, said, "It is indeed a moment of pride to be recognized and picked for this Chair. I am thankful to the selection committee for appreciating my work in the field of communications. This recognition will surely result in more good research in the future to come."

Conveying his wishes on the occasion, Krishna Bodanapu, Managing Director and Chief Executive Officer, Cyient, said, "The Cyient Chair is a significant step forward in deepening the relationship between academia and enterprise to accelerate innovation. Helping attract the best minds and providing opportunities to experiment with new ideas and incubate technologies is exciting for Cyient. This is another important step of delivering on our vision of applying technology imaginatively to solve problems that matter."

21; Eenadu - Hyderabad; Size : 108 sq.cm.; Circu
Page : 13

మ్యూస్కోప్... ఇది అతి చిన్న మైక్రోస్కోప్!

నమూనాను సిద్ధం చేసిన ఐఐటీ హైదరాబాద్ పరిశోధకులు

మ్యూస్కోప్ నమూనా (ప్రోటోటైప్)
■ డాక్టర్ శిశిర్‌కుమార్

ఈనాడు, సంగారెడ్డి: ప్రపంచంలోనే అతి చిన్న మైక్రోస్కోప్‌ను ఐఐటీ హైదరాబాద్ పరిశోధకులు సిద్ధం చేస్తున్నారు. మ్యూస్కోప్‌గా పిలుస్తున్న దీని నమూనాను వీరు అభివృద్ధి చేశారు. ఐఐటీ హైదరాబాద్‌లోని ఎలక్ట్రికల్ ఇంజినీరింగ్ విభాగంలో పనిచేస్తున్న డాక్టర్ శిశిర్‌కుమార్ తన పరిశోధక విద్యార్థులు ఏక్తా ప్రజాతి, సౌరవ్‌కుమార్‌ల సహకారంతో దీన్ని రూపొందించారు. "ప్రస్తుతం ఉపయోగిస్తున్న మైక్రోస్కోప్‌లతో పోల్చితే ఇది చాలా చిన్న పరిమాణంలో ఉంటుంది. ఖర్చు తగ్గడంతో పాటు ఎక్కడికైనా సులభంగా తీసుకెళ్లవచ్చని" పరిశోధకులు తెలిపారు. ఈ సాంకేతికతను వాణిజ్యపరంగా అందుబాటులోకి తెచ్చే అంశమై దృష్టి సారించామని ఐఐటీ డైరెక్టర్ ఆచార్య బీఎస్ మూర్తి అన్నారు. "మ్యూస్కోప్‌లో తొలిసారిగా మైక్రో ఎల్ఈడీ డిస్‌ప్లే, ఇమేజ్ సెన్సర్లు, మైక్రోఫ్లూయిడిక్ చిప్‌ను ఉపయోగించాం. బయోమార్కర్స్, మినియేచర్ అనాలిసిస్ సిస్టమ్స్, మెషిన్ లెర్నింగ్ పద్ధతులను వినియోగిస్తూ ఈ సాంకేతికతను వ్యాధి నిర్ధారణ కోసం వాడేలా కసరత్తు చేస్తున్నాం. పర్యావరణంలో మార్పులను పరిశీలించేందుకు, వ్యవసాయ, పశుసంవర్ధక రంగాల్లో ఉపయోగిస్తే మంచి ఫలితాలు ఉంటాయి" అని డాక్టర్ శిశిర్‌కుమార్ తెలిపారు.

THE HANS INDIA

Wed, 23 Jun-21; The Hans India - Hyd; Size : 51 sq.cm.; Circulation:-; Page : 4

IITH celebrates its 13th Foundation Day

HANS NEWS SERVICE
HYDERABAD

IIT Hyderabad celebrated its 13th Foundation Day on Tuesday in virtual mode and telecased live on YouTube. Prof Krishnaswamy Vijay Raghavan, Principal Scientific Adviser to the Government of India, has graced the occasion with his kind presence as Chief Guest and delivered the Foundation Day Speech.

Congratulating IIT Hyderabad on having a wonderful year, Dr. B. V. R. Mohan Reddy, Chairman, Board of Governors, IIT Hyderabad said, "IIT Hyderabad is a fairly young institute and yet making it to Top 10 technical institutes in the country from the last 3 years. It has significantly improved its QS Ranking being among the top 46 % institutes and being the best among the second generation IITs. It is an amazing achievement and contribution by the Director, Faculty, Students & best of supporting staff of the IITH. I share a strong bonding with IITH.

Talking about what the 2050 spaceship earth will look like, Prof Krishnaswamy Vijay Raghavan, Principal Scientific Adviser to the Government of India said, "From Economy 2050, we should look at Environment 2050. We need to restore our interaction with the environment in a constructive manner. To conclude, I urge we should focus on connecting India & Bharat, women empowerment, women in leadership roles and bridge the gap between knowledge and power and technology and understanding to change the world and attend to the important matter of Climate change, biodiversity loss, and the environment."

Various Academic, Research & Administrative Excellence Awards were also announced on the occasion. It includes the Research Excellence award for the students, given for the first time.

Business Line

Wed, 05 May-21; Business Line - Hyderabad; Size : 179 sq.cm.; Circulation:- ; Page : 1

DoT clears 5G trials sans Chinese vendors

Allows Reliance Jio to conduct tests with its indigenous tech

OUR BUREAU
New Delhi, May 4

The Department of Telecommunications on Tuesday permitted Telecom Service Providers (TSPs) to conduct 5G technology trials.

Interestingly, none of the Chinese vendors — Huawei or ZTR — has been given the approval to conduct the tests. The duration of the trials is set at six months, with two months for procurement and setting up of equipment.

A DoT statement said: "The applicant TSPs include Bharti Airtel, Reliance Jio Infocomm, Vodafone Idea and MTNL. These TSPs have tied up with original equipment manufacturers and technology providers which are Ericsson, Nokia, Samsung and C-DOT. In addition, Reliance Jio Infocomm will also be conducting trials using its own indigenous technology."

The DoT has given permission for technology partners identified by TSPs themselves. The experiments will cover various bands, including the mid-band (3.2 GHz to 3.67 GHz), millimeter wave band (24.25 GHz to 28.5 GHz) and sub-Gigahertz band (700 GHz). "The TSPs will also be permitted to use the spectrum hey own (800 MHz, 900 MHz, 1,800 MHz and 2,500 MHz) for the 5G trials," it said.

The DoT has also specifically asked each TSP to conduct trials in rural and semi-urban settings besides urban areas so that the benefit of 5G technology proliferates across the country.

The experimental spectrum is being given in various bands

5Gi tech

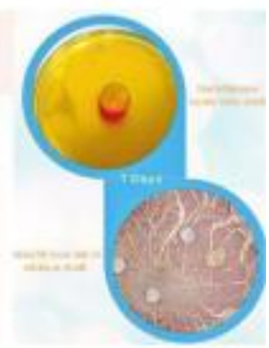
"The TSPs are encouraged to conduct trials using 5Gi technology in addition to the already known 5G Technology. It will be recalled that the International Telecommunications Union (ITU) has also approved the 5Gi technology, which was advocated by India, as it facilitates much larger reach of the 5G towers and radio networks. The 5Gi technology has been developed by IIT Madras' Centre of Excellence in Wireless Technology and IIT-Hyderabad," the DoT said.

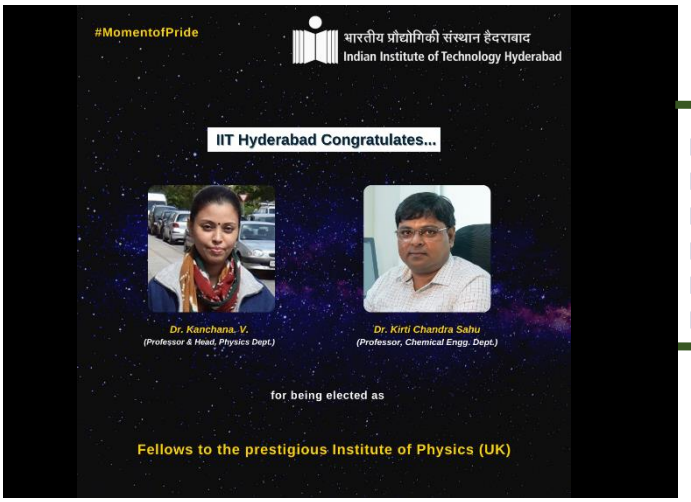
The objectives of conducting the trials include testing the 5G spectrum propagation characteristics especially in the Indian context; model tuning and evaluation of chosen equipment and vendors; testing of indigenous technology; testing of applications (such as tele-medicine, tele-education, augmented/virtual reality, and drone-based agricultural monitoring); and testing 5G phones and devices, the DoT said. The trials will be on non-commercial basis and the data generated during the trials shall be stored in India.

Sun, 30 May-21; Andhra Prabha - Hyderabad; Size : 284 sq.cm.; Circulation:78244; Page : 6

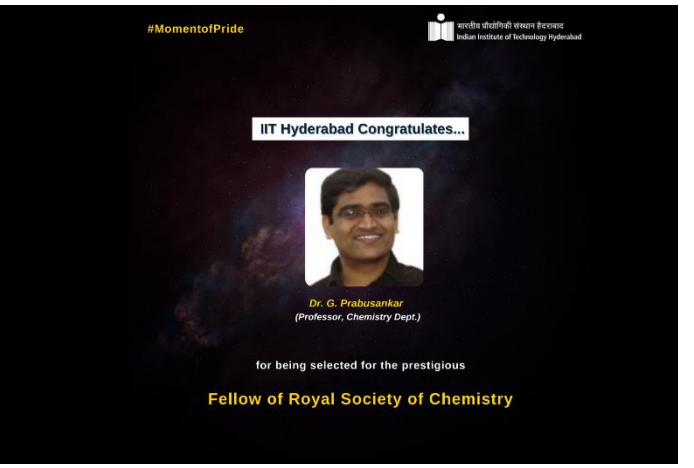
ఇక ఆంఫోటెరాసిన్ ట్యాబ్లెట్లు

అందుబాటులోకి తీసుకురానున్న ఐఐటీ-హైదరాబాద్

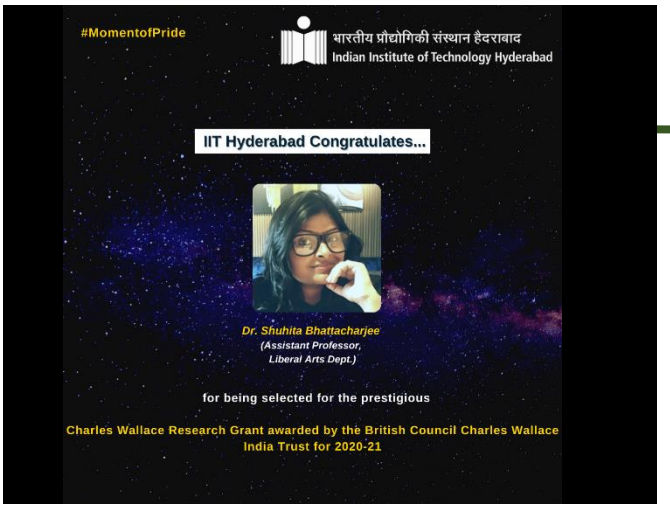




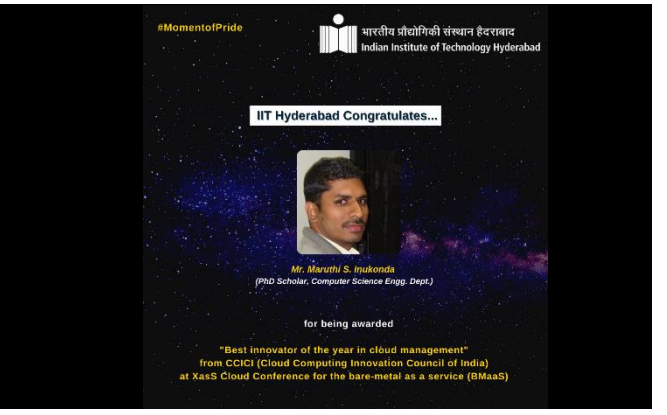
Dr Kanchana V,
Professor & Head,
Department of Physics &
Dr Kirti Chandra Sahu,
Professor,
Department of Chemical Engineering



Dr G Prabu Sankar,
Professor,
Department of Chemistry



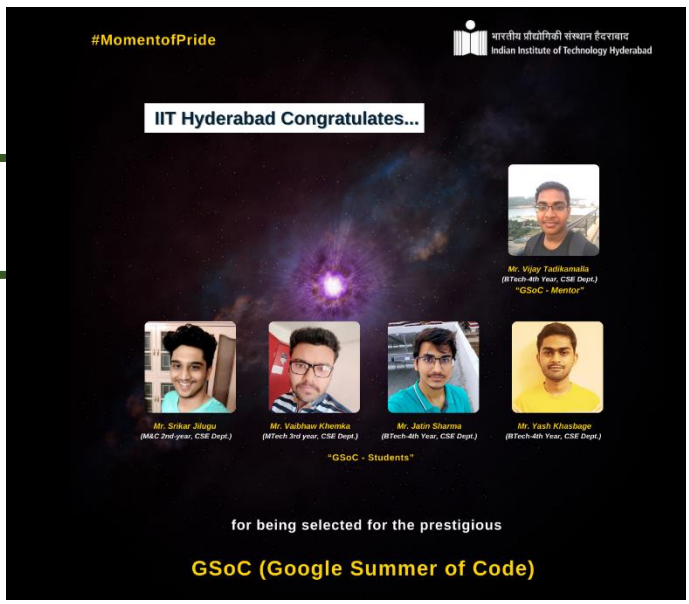
Dr Shuhita Bhattacharjee,
Assistant Professor,
Department of Liberal Arts

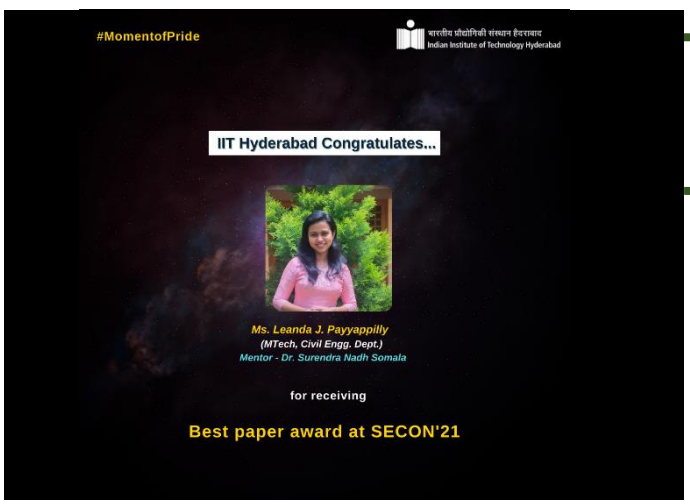


Mr Maruthi S Inukonda,
PhD Scholar,
Department of Computer Science Engineering

Mrs Pushpalatha A,
Multi Skill Assistant,
Hostel Office
Employee of the Month, April 2021

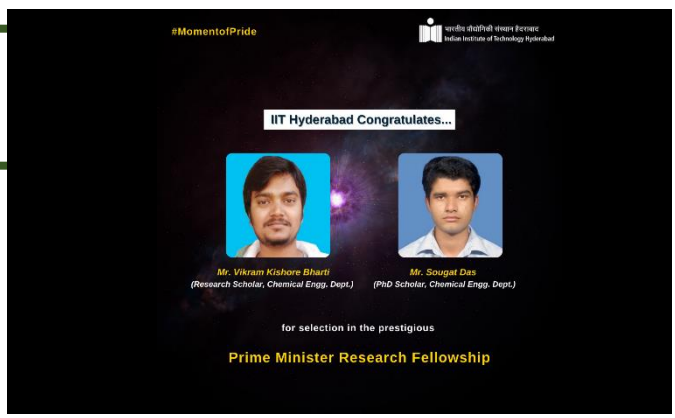
Mr Srikar Jilugu, Mr Vaibhaw Khemka, Mr Jatin Sharma & Mr Yash Khasbage
Department of Computer Science Engineering





Ms Leanda J Payyappilly,
MTech,
Department of Civil Engineering

Mr Vikram Kishore Bharti & Mr Sougat Das
Department of Chemical Engineering



Ms Ruby Singh,
PhD Scholar,
Department of Biomedical Engineering.

Mr Kalyan Kumar N,
Assistant,
Finance & Accounts Section
Employee of the Month, May 2021

Dr Shiva Ji,
Assistant Professor,
Department of Design

Dr P Rajalakshmi,
Professor,
Department of Electrical Engineering

Ms Kuppa Venkata Mridula,
Department of Mechanical & Aerospace Engineering

Dr Saket Asthana,
Professor
Department of Physics

Dr Santhosh Sivasubramani ,
MTech '18 & PhD '20,
Department of Electrical Engineering.

Mr K Velmurugan,
Junior Assistant,
MS Section

Dr Anamika Bhargava,
Associate Professor,
Department of Biotechnology

Teaching Staff (April 2021)

Dr Jyothi Vedurada

Assistant Professor, Department of Computer Science and Engineering

Prior to joining IIT Hyderabad, she was a post-doctoral researcher at Microsoft Research Lab India. She received her PhD + MTech from IIT Madras, supported by the TCS PhD fellowship. Before that, she worked as a Software Engineer at Hewlett Packard, Chennai. Her research interests are program analysis, program understanding, automated concurrency testing, and high-performance computing. She is on the program committee of HiPC'21 and ISEC'22 and has served as the Artifact Evaluation Committee (AEC) chair of SAS'20, and as AEC member of OOPSLA'19 and ASPLOS'20. She has been awarded 'Distinguished Reviewer Award' at OOPSLA'19.

Life@IITH: My experience at IITH so far: I am happy that we have a positive environment in our department and cheerful colleagues to interact with. My colleagues greatly helped me with setting up my initial things. I am thankful to each one of them. It is encouraging to work with enthusiastic students having fresh ideas. A new dimension that has been added at IITH to my work is: being part of various department committees. I am learning new things. Life at faculty apartments here is peaceful and my family is also liking this place. Looking forward to having a productive time and contributing to the institute, students, and the research community.

Dr Shwetabh Yadav

Assistant Professor, Department of Civil Engineering

Prior to joining IITH, he worked as a post-doctoral research associate at Texas A&M University, USA. He received his PhD in Civil Engineering from the Indian Institute of Science, Bangalore. His research is predominantly experimental and uses image-based measurement techniques. His research interests include experimental solid mechanics, rock mechanics, mechanics of large strain deformation, in situ measurement techniques, and fracture mechanics.

Life@IITH: I joined IITH during the peak of the second wave of COVID19 and hence did not get much opportunity to interact with people here. However, whatever less interaction I had, I found people here to be really friendly and warm and have made me feel at home in a very short time span.

Teaching Staff (May 2021)

Dr Sai Sidhardh

Assistant Professor, Department of Mechanical and Aerospace Engineering

Prior to joining IIT Hyderabad, Dr Sidhardh worked as a post-doctoral research associate at the Ray W. Herrick Laboratories, Purdue University, USA. He received his PhD in 2019 from the Dept. of Mechanical Engineering, Indian Institute of Technology, Kharagpur, after completing a Dual Degree (Btech + MTech) from the same department. His research interests are in theoretical and computational solid mechanics, with a special focus on the modeling and applications of multiscale and multi-physics interactions across the structure.

Life@IITH: I must thank my colleagues and other staff members of IIT Hyderabad who have been very friendly and helpful. This has thoroughly helped me with a smooth transition and settling down in the institute. Even with limited interactions possible currently, I am happy to be a part of the environment that promotes a vibrant and collaborative research culture. I look forward to contributing to the growth of the institute.

Teaching Staff (June 2021)

Dr Nakul Parameswar

Assistant Professor, Department of Entrepreneurship and Management

Prior to joining IIT Hyderabad, Dr Nakul Parameswar was an Assistant Professor in the Strategic Management area at the Institute of Rural Management Anand (IRMA), Anand, Gujarat, India. He received his PhD in 2018 from the Indian Institute of Technology Delhi. His doctoral thesis was on "Post Termination Dynamics of Partner Firms in International Joint Ventures (IJV): Emerging Market Context", a scantly explored area in Strategic Alliance/Joint Venture literature. Dr Nakul's broad research interests include dynamics in strategic alliances, organizational ambidexterity, competitive strategy, and start-up management. Earlier, Dr Nakul has worked with the Indian Institute of Management Jammu, Bennett University, and Vellore Institute of Technology (Deemed to be University). Further, Dr Nakul had a brief corporate experience with Havells India Ltd. prior to his PhD Apart from work, he enjoys traveling, playing badminton, nature photography, and reading.

Life@IITH: I have joined IIT Hyderabad in June 2021 and the support extended by colleagues and staff members has ensured smooth onboarding to the institute. The campus is vibrant and I am looking forward to teaching the students at IIT Hyderabad and engaging with the fraternity.

Dr Lohithaksha Maniraj Maiyar

Assistant Professor, Department of Entrepreneurship and Management

Before joining IIT Hyderabad, Dr Lohithaksha Maniraj Maiyar was a Research Fellow in the Business and Management Research Institute, University of Bedfordshire, United Kingdom. He was a Research Associate in the Department of Automatic Control and Systems Engineering, The University of Sheffield, prior to joining the University of Bedfordshire. He received his PhD in 2019 from the Department of Industrial & Systems Engineering, Indian Institute of Technology Kharagpur. He has applied supervised and unsupervised machine learning, evolutionary optimization, and multi-criteria techniques for solving problems from a wide range of applications from aerospace, manufacturing, online fashion markets, and food supply chains. On the lighter side, he enjoys playing cricket, Indian classical music, and visiting new places.

Life@IITH: I have been in constant interaction with the IIT Hyderabad management and staff since the time I have been recruited. They have been extremely friendly and helpful to understand, clarify and overcome all the challenges I was facing in successfully traveling from abroad and joining the Institute amidst the pandemic. I am honored and humbled to join the team of world-class faculty at IIT Hyderabad and look forward to having a prosperous and meaningful career at the institute.

Non-teaching Staff (April 2021)

Ms Saimatha Gannabathula

Junior Technician, Department of Materials Science and Metallurgical Engineering

Prior to joining IIT, Saimatha worked for the Indian Institute of Science (IISc), Bangalore. In IISc, She worked for 6 years for the BS program in Research where she gets to learn various techniques and involve in world-class research. Her expertise is in 2D and 3D cell culture, Immunology, and Microbiology. Prior to IISc, she was teaching for graduate and post-graduate students in Andhra University-affiliated Government college, AP. She has also worked for a COVID project funded by BIRAC for a startup named Oncoseek Bio. Overall, she has 10 years of research and teaching experience. She did her masters from Sri Satya Sai University, Prashanthi Nilayam.

Life@IITH: It`s a great work experience with good faculty and students around. I am happy to be a member of the IIT fraternity.

Ms Yukti Rastogi

Psychological Counselor, Counselling Cell

Yukti Rastogi is a licensed clinical psychologist. She is having a total experience of 10 years in the field of Clinical Psychology. At the academic front, she is a gold medalist in master's (Applied and clinical psychology); thereafter, did her MPhil in Clinical Psychology (RCI accredited) in 2012-2014. she has done paper presentations and won few awards for the same. At the professional front, she has worked with children, adolescents, adults, and geriatric population and have experience of over 6000+ patients; she is well versed with psychological assessments (IQ, EQ, psycho-diagnostics, personality assessments). She is having rich experience in psychotherapies like, CBT, DBT, MET, BT, and Marital therapy.

She has experience working as a faculty of clinical psychology for 3 years at Gautam Buddha University, Greater Noida; she had worked as a consultant clinical psychologist at Jaypee Hospital Noida, and Deen Dayal Upadhyay Hospital, Govt of NCT, New Delhi. She has been a part of the disability certification board at NIEPID, Noida (Ministry of SW&J). Along with this, she has been conducting workshops for professionals, corporate (MNC's), and students. In the field, her personal interest lies in—addiction (substance, multimedia), clinical disorders, and Emotional Regulation.

Life@IITH: I have had joined IITH on 1 April 2021. To date I came across many brilliant minds (students and faculty); who are cooperative, have rich experience, and zest to do good in life. I aspire to include my experience and help the students understanding emotional and social intelligence well, which would help them in keeping their mental health intact.

IITH's Bank of Knowledge

Mr Beera Suresh Kumar

Executive Assistant, Office of the Registrar

Mr Beera Suresh Kumar did his PG in MBA (HR) from Andhra University. He has started his career as a customer care executive in IBM and later associated with other reputed MNCs such as Patra (India) and HSBC as AML Executives. Prior to joining IIT Hyderabad, he worked with Dredging Corporation of India Limited, a Public Sector Undertaking (Ministry of Shipping) in various capacities.

Life@IITH: I feel very fortunate to be associated with such a National Importance Institute and also giving me an immense exposure and opportunity to enhance my knowledge & abilities. The staff at this institute are very supportive, friendly with helping nature. It is my privilege to be a part of such a wonderful fraternity and looking forward to putting all my efforts towards the growth of the institute.

Non-teaching Staff (June 2021)

Mr Naveen Srivastava

Junior Hindi Translator, Hindi Cell

Naveen Srivastava done his graduation BSc (MPC) as well as PG MA (Hindi Literature) from Osmania University, Hyderabad, and also done PG Diploma in Translation Studies from the University of Hyderabad. Before joining IIT Hyderabad, he worked with the central government organization Sardar Vallabhbhai Patel National Police Academy, Hyderabad(Under Ministry of Home Affairs, Govt. of India) as a Junior Hindi Translator for nearly 6 years.

Life@IITH: I recently joined the institute, and I am fortunate enough for getting a chance to work for IIT Hyderabad and I feel that the working environment is excellent here and also getting all the support from staff & colleagues especially from my faculty in-charge. I am feeling honored to be a part of the great institute.

Please send your suggestions to:

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Kandi, Sangareddy - 502284, Telangana, India
Contact: **+91 40-2301 6099, +91 83310 36099**
E Mail: **pro [at] iith [dot] ac [dot] in**

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Cover page image courtesy:
Ms Mandira V R,
BDes, 3rd year, Department of Design,
IIT Hyderabad