



భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
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Indian Institute of Technology Hyderabad

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किरIITH

the crowning glory

A quarterly e-newsletter of IITH

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*Waste-2-Wealth
(Waste Management Initiatives) @IITH*



किरIITH observes - Kargil Vijay Diwas (July 26), to honour the indomitable spirit and dedication of the Indian Armed Forces in safeguarding the nation's sovereignty!



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IITH Bank of Knowledge



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Theme Design Courtesy

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Editorial Epistle

Dear Readers,

Hope you are doing well!

We have been overwhelmed by the support we have received so far and would like to offer sincere thanks to everyone who has been involved in these fourteen issues of किरIITH. This Newsletter marks a significant milestone in our journey towards fostering stronger connections and sharing valuable insights with our esteemed community that serves as the bridge that connects us, enables us to exchange ideas, and empowers us to stay informed and engaged.

Within these virtual pages, you will find a treasure trove of thought-provoking articles, informative features, event highlights, and much more. Our dedicated team has put in tireless efforts to curate content that is not only informative but also captivating, ensuring that every reader finds something of interest and value.

Alike every time, this issue is also being dedicated to one of the thrust research areas of IITH.

Following this precedence, we are back with yet another critical area of research at IITH, "Waste-2-Wealth (Waste Management Initiatives) @IITH" - Issue - 15 (Vol-5, Issue-2). Effective waste management is essential to protect the environment, conserve resources, safeguard public health, mitigate climate change, and promote sustainable development.

We trust this issue will be an elucidating source of exceptional research work being carried out by the IITH fraternity in the theme area.

This issue of किरIITH observes - Kargil Vijay Diwas (July 26), to honour the indomitable spirit and dedication of the Indian Armed Forces in safeguarding the nation's sovereignty.

We will be back next quarter with another significant research area.

Stay connected.

We wish everyone a safe and healthy stay.

Have a great year ahead...

Happy Reading...

“

"It's not just about reducing waste; it's about changing the way we think about waste."

- Kathryn Kellogg



Dr Mudrika Khandelwal
(Dean - Alumni & Corporate Relations)
{Editor-in-Chief}



Prof C Krishna Mohan
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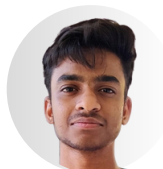
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(Media & PR Secretary, Student Gymkhana)



“The future belongs to those who understand that doing more with less is compassionate, prosperous, and enduring.”

- Paul Hawken

Dear friends,

Hope you are doing great in all your endeavours,

It is with great pleasure and excitement that I present to you the latest edition of our Institute's Newsletter, KirIITH. This publication serves as a testament to the vibrancy and intellectual vitality that defines our community of scholars, researchers, and learners.

On this momentous occasion of unleashing the publication, I am elated to share with you that IITH has retained its overall NIRF Ranking at 14. For the 8th consecutive year, IITH has maintained its position within the Top 10 ranks (Rank 8 this year) among the technical institutes in the country and as the best among the second-generation IITs. This year IITH is ranked 3 in NIRF Innovation (Erstwhile ARIIA- Atal Ranking of Institutions on Innovation Achievements).

In the dynamic realm of IITH, ideas are nurtured, boundaries are pushed, and novel solutions to complex problems are crafted. To unlock the untapped potential of knowledge and shape a future brimming with possibilities, IITH organized an Innovation Fair for School Students, Future Inventors Fair (FIF) 2023. A DRDO-Industry-Academia Centre of Excellence (DIA-CoE) has been inaugurated at IITH to take up futuristic projects toward Long-term Directed Research needed for DRDO. On the eve of the G20 Digital Economic Working Group (DEWG) meetings in Hyderabad, delegates were hosted to a unique experience at IITH, showcasing a range of cutting-edge 5G products. The institute also unveiled an innovative chip that facilitates Internet of Things (IoT) connectivity through both terrestrial 5G base stations and satellites.

IITH, in association with TIFAC, a technology think tank under the DST, GoI, hosted a two-day brainstorming workshop as a part of preparing the Technology Vision 2047 (TV 2047) document. IITH organized a two-day all-IITs Dean's (R&D) conclave to deliberate on how all IITs can come together to enhance the overall Research & Development Ecosystem. Dept of HST, IITH organized Yoga Tech Conclave - 2023. IITH also hosted the Conference on "Complexity and Nonlinear Dynamics in Science, Engineering, and Technology (CNLDS-2023)".

iTIC Incubator at IITH, in collaboration with Greenko Group, has launched a new program called Bold & Unique Ideas Leading to Development (BUILD) on the emblematic occasion of World Environment Day that Supports 75 student-led innovations across India and grants financial aid up to INR 1 lakh per innovator.

Collaboration lies at the heart of our endeavours, fuelling innovation and fostering a diverse exchange of ideas that is evident from the fact that IITH has signed MoU with Ten NITs for Faculty-Students Exchange & other mutually beneficial contributions; IITH also signed pacts with Nuclear Fuel Complex, Hyderabad, and Atomic Minerals Directorate for Exploration and Research (AMD), Hyderabad; Information Technology, Electronics, and Communications Department (Telangana Secretariat, Government of Telangana); Visvesvaraya National Institute of Technology Nagpur; Sree Chitra Tirunal Institute for Medical Sciences and Technology 'SCTIMST'. TiHAN, IITH collaborated with Tata Technologies, National Automotive test tracks (NATRAX).

IITH celebrated its 15th Foundation Day with Dr Krishna Ella, Founder & Chairman of Bharat Biotech, as Chief Guest. IITH has been awarded five ISO Process Excellence on this Occasion by HYM International Certification. It was a proud and admirable moment for the entire IITH community when Ms Uma Harathi N, a BTech (2017) Graduate, bagged the AIR-3 position in UPSC 2022, followed by Mr Jayasimha Reddy Ravula (AIR-217), and Mr Bollam Umamaheshwar Reddy (AIR-270). PALS Hyderabad Hub was launched at IITH.

Sunshine, the Counselling Cell of IITH, unleashed the celebrations of Happiness Day to receive and spread joy on the International Day of Happiness. Diesta, an annual Interdepartmental sports & cultural fest of IITH, was joyously celebrated with fervour and enthusiasm. Student Gymkhana, IITH eulogized Gymkhana Day 2023. The Department of Sports, IITH, organized a 9-day - Yoga Camp with the motive of celebrating the 9th International Yoga Day.

Together, we can unleash the full potential of our Institute, fostering innovation, cultivating transformative ideas, and nurturing the next generation of leaders and change-makers. May this Newsletter serve as a catalyst for inspiration, engagement, and meaningful dialogue, propelling us toward a future where "sustained excellence, creativity, and impact intertwine"! Thank you for your unwavering support and for being an integral part of our journey toward a brighter tomorrow.

Wishing you a great time filled with happiness, fulfilment, and endless possibilities.

-B S Murty

The Triple Helix of Innovation at IITH



KID: 20230201

One common question we keep getting is: what is innovation, and how exactly is it different from, say, research or invention? The short answer to it would be the market. The emphasis of innovation is not merely to do something novel but to commercialize it too. So the contemporary meaning of innovation emphasizes taking technological advancement from lab to market.

With this vision in mind, IIT Hyderabad has been striving to create a holistic atmosphere for innovation, supporting the entrepreneur through all these stages with the help of various enabling cells and centres: iTIC Incubator, eCell, BUILD Projects, Center for Healthcare Entrepreneurship, Department of Entrepreneurship & Management, TiHAN, Technology Research Park, Intellectual Property Facilitation Center, to name a few.

These initiatives can be categorized into three interrelated sets of activities, characterized in the form of the triple helix model, with each set interacting and furthering the other.



The representation of Triple Helix of Innovation

Academic Initiatives: The Institute facilitates multiple options for the students to pursue their entrepreneurial ambitions in the form of various credited courses and programs. Students can take up a minor in Entrepreneurship or register for Innovation and Entrepreneurship Project (IEP) or convert to Dual Degree with MTech in Techno-Entrepreneurship. This help exposes students to innovation and entrepreneurship activities at their early stage and supports the pathway from ideation to innovation to market.

Industry Needs: The technology transfer process involves the transfer of technology from the laboratory to the industry, thus enabling the transition towards newer technological advances. These are aimed at understanding the Industry's needs and pursuing relevant research. While the Intellectual Property Facilitation Centre (IPFC) helps in the patenting process, the Technology Transfer Office (TTO) helps take it to Industry through technology licensing. While events like Innovation Day facilitate interactions with the Industry and Technology Research Park (TRP), allowing this Industry to set a footprint on campus.

Startups: The incubation centres of IITH help handhold the student or faculty in embarking on their entrepreneurial journey and give them the necessary support for prototyping, market understanding, testing, certifications, etc. These have been aided further with the formulation of the "Institute Innovation and Startup Policy", synchronizing the various innovation activities at IITH and giving them the necessary policy framework. The Startup activities are not just limited to IITH but are open to all entrepreneurs at a pan-India level. With the inclusion of Jai Anusandhan to Jai Jawan, Jai Kisan, and Jai Vigyan bandwidth, the Startup ecosystem of India is a happening space, and IITH is keeping pace with it.

A welcome development this year has been IITH's performance in the Innovation category of NIRF ranking, where it secured 3rd Rank. The innovation category assesses institutes on the number of startups, prototyping facilities for startups, funding they received, the number of technologies developed and tech transfer in the institute, TRL levels of tech, IP, and patents filed, etc. While these rankings and indicators give us the occasional boost of confidence to move ahead in a manner typical of academicians, let us remember that the long-term goal is to create a nurturing and facilitating ecosystem and culture. Seeking the support and participation of all in that journey.

Prof S Surya Kumar

Dean (Innovation, Translation & Startups)

Waste-2-Wealth



KID: 20230202

“Waste does not exist in nature. Because ecosystems reuse everything that grows in a never-ending cycle of efficiency and purpose”.

-Frans van Houten

In the world of consumerism, when the production and use of materials are encouraged, it is obvious that the Earth ends up in waste when the purpose of materials is no longer served. The waste may be of solid, liquid, or gaseous state. Again, in solid waste, municipal solid waste can be sourced from residential, commercial, institutional, and industrial (non-process waste) activities. The other types of solid wastes are obtained from construction and demolition sites, water and wastewater treatment facilities, industrial treatment processes, industrial waste, agricultural waste, and special wastes such as e-waste, biomedical waste, fecal waste, etc.

Waste Dump (Representation Image)



Waste Management Awareness Mascot (Inset)

Worldwide, a person generates 0.11-4.54 Kg of municipal solid waste per day. Hence, the global generation of municipal solid waste is approximately 2.01 billion tonnes in 2022 which is equivalent to the weight of 2,00,000 Eiffel Tower. The generation of municipal solid waste is steadily increasing at a minimum increment of 33% per annum and is expected to reach 3.4 billion tonnes by 2050. Here, the high-income nations produce around 34% of the world's waste, although having just 16% of the world's population. The East Asia and Pacific region accounts for 23% of global waste, whereas the Middle East and North African region produce the least 6%, however, these numbers are predicted to change in the fastest growing regions. Similarly, agricultural waste, industrial hazardous and non-hazardous waste, biomedical waste, and e-waste are holding their increasing trend in the waste production sector.

More than half of this waste is currently disposed of openly, and the rising pattern of waste generation will have significant impacts on the environment, human health, and economic growth, necessitating immediate action. The integrated waste management practices in India involve steps of source reduction and reuse, recycling, composting, waste to energy, and landfills.

For instance, IIT Hyderabad has a two-bin door collection system to collect biodegradable and non-biodegradable waste. The biodegradable waste is sent to the composting unit inside the campus, and the resultant compost is used for horticulture activities. The plastics, glass, and paper wastes were segregated in the solid waste management site inside the campus Resource Recovery Park, and the leftover was sent for dumping.

In Addition, IITH has a Biogas Digester for treating left-over food from the Mess (that generates 20 Cubic meters of Biogas daily, which is again used back by the IITH Mess) and a Zero-Liquid Discharge Plant.

IITH's Resource Recovery Park (RRP)



IITH's Biogas Digester



Waste Segregation at IITH's RRP and vermicompost facility (Inset)

At this moment, if we look at the description of “waste”, it is defined as any substance that is in the wrong place and/or available at the wrong time and/or in the wrong person's hand who does not know its use. Hence, when any substance of such nature can be shifted to the right place and/or at the right time to the right person's hand who knows its application/value, then it will be considered a “resource”. **This changing perspective of seeing waste as a resource shifted the research pathway from waste management to “Waste-2-Wealth”.**

The Waste-2-Wealth mission in any nation aims for zero waste and zero dumpsites. At this point, the Waste-2-Wealth approach has two options, firstly, “waste to energy” and secondly “waste to useful materials”. Based on the physical, chemical, and biological characteristics of the waste, the option will be selected, and the conversion techniques will be fixed. This approach makes the materials and resources in cyclic use, though their forms and states may change, aiming for the best use. This way of expanding the life cycle of resources for their use is the main concept in the “Circular Economy” model. The three basic principles of circular economy are the elimination of waste and pollution, the circulation of products and materials at their highest value, and the regeneration of nature. For an effective waste management system, the circular economy-based “Waste-2-Wealth” approach is a resilient solution that further develops business opportunities and mitigates the impact on the planet and people. Thus, the resultant circular economy from Waste-2-Wealth addresses the three pillars of “Sustainability” – Economy, Environment, and Society.

The Sustainability Development Goals (SDGs), which are formally articulated and adopted in the United Nations General Assembly (UNGA), have 17 goals containing 169 targets. Though all the goals relate to the theme of Waste-2-Wealth, the most important goal which must be achieved to have an effective Waste-2-Wealth mission is “SDG 12: Responsible Consumption and Production”. By managing the most frontage of consumerism – consumption by creating awareness, the production can be controlled.

Representation Image



At IIT Hyderabad, the faculties of Civil, Chemical, Climate Change, Mechanical, Design, Electrical, and Materials Science, Metallurgical Engineering, and Chemistry are majorly working on the various aspects of Waste-2-Wealth aspects. Some of them are highlighted in this issue. Among these, the Environmental Engineering group in Civil Engineering focuses on Waste to Materials, Waste to Energy, Circular Economy involved, and Sustainability Assessment and Framework Creation. The research findings are published in top journals in Nature, ACS, RSC, Elsevier, etc. In addition, the group provides various academic courses on solid, liquid, and gaseous waste management and actively participates in various rural and industrial waste management projects. Besides, the IITH-CMET joint MTech E-Waste Resources Engineering and Management program specifically focuses on the academic and research activities on the extended life scenarios of resources in e-waste.

As a whole, to have an effective Waste-2-Wealth, the best practices consider the following points: Firstly, the consumer decides the production and the waste generation, hence, the people’s roles in achieving Waste-2-Wealth, Circular Economy, and Sustainability are significant and needs study. In addition, during the Waste Wealth conversion, the technology that is used needs to be analyzed for its complete life cycle to understand the material use, energy consumption, and secondary waste generation. The secondary waste may be a solid matter, aqueous stream, or gaseous emissions however has the potential impacts that may end up in a negative feedback loop. Also, the business market for the Wealth that is generated from Waste must be well studied to convert it as a business model to be on the gaining side of the economy. Besides, the policies, rules, and laws of the intra and inter-nations should support the Waste-2-Wealth movements in terms of monetary benefits such as business loans and subsidies, research grants for researchers, startup funds, tax exemptions, etc., and administrative support from the local authorities, and across different states of the country.

Link to IITH's Waste Management Systems Video Abstract: <https://youtu.be/Nlf81-xkhME>

In summary:

- (i) Careful techno-economic analysis followed by lifecycle-based impact analysis for the technology selection,
- (ii) awareness among the people on eco-safe consumerism,
- (iii) extensive and deep market survey, and
- (iv) Legal and monetary support from the government is the base requirement of a successful implementation of Waste-2-Wealth, Circular Economy, and Sustainability Nexus.



Prof B S Murty, Director IITH with Dr N R Murithnam, Former Director of CMET during IITH-CMET MoU signing ceremony in 2020 for MTech in EWREM

Dr Ambika S

Program Coordinator, MTech E-Waste Resources Engineering and Management and Management, and Assistant Professor, Environmental Engineering, Department of Civil Engineering, IIT Hyderabad

कचरे से धन



KID: 20230203

"कचरा प्रकृति में मौजूद नहीं है।
क्योंकि पारिस्थितिकी तंत्र हर चीज़ का पुनः
उपयोग करता है
जो दक्षता और उद्देश्य के कभी न खत्म होने वाले चक्र में
बढ़ता है।"

-फ्रैंस वैन हाउटन

उपभोक्तावाद की दुनिया में, जब सामग्रियों के उत्पादन और उपयोग को प्रोत्साहित किया जाता है, तो यह स्पष्ट है कि जब सामग्रियों का उद्देश्य पूरा नहीं होता है तो पृथ्वी पर बेकार हो जाता है। कचरा ठोस, तरल या गैसीय अवस्था का हो सकता है। पुनः, ठोस कचरा में, नगरपालिका ठोस कचरा को आवासीय, वाणिज्यिक, संस्थागत और औद्योगिक (गैर-प्रक्रिया कचरा) गतिविधियों से प्राप्त किया जा सकता है। अन्य प्रकार के ठोस कचरा निर्माण और विध्वंस स्थलों, पानी और गंदे पानी उपचार सुविधाओं, औद्योगिक उपचार प्रक्रियाओं, औद्योगिक कचरा, कृषि कचरा और विशेष कचरा जैसे ई-कचरा, बायोमैडिकल कचरा, मल कचरा आदि से प्राप्त होते हैं।

कचरा ढंप (प्रतीकात्मक छवि)



कचरा प्रबंधन जागरूकता शुभंकर (इनसेट)

दुनिया भर में, एक व्यक्ति प्रतिदिन 0.11-4.54 किलोग्राम नगरपालिका ठोस कचरा उत्पन्न करता है। इसलिए, 2022 में नगरपालिका ठोस कचरे का वैश्विक उत्पादन लगभग 2.01 बिलियन टन है जो 2,00,000 एफिल टॉवर के वजन के बराबर है। नगरपालिका ठोस कचरे का उत्पादन प्रति वर्ष न्यूनतम 33% की वृद्धि के साथ लगातार बढ़ रहा है और 2050 तक 3.4 बिलियन टन तक पहुंचने की उम्मीद है। यहां, उच्च आय वाले देश दुनिया के लगभग 34% कचरे का उत्पादन करते हैं, हालांकि केवल 16% ही पैदा करते हैं। विश्व की जनसंख्या का पूर्वी एशिया और प्रशांत क्षेत्र वैश्विक कचरे का 23% हिस्सा है, जबकि मध्य पूर्व और उत्तरी अफ्रीकी क्षेत्र सबसे कम 6% का उत्पादन करते हैं, हालांकि, सबसे तेजी से बढ़ते क्षेत्रों में इन संख्याओं में बदलाव की भविष्यवाणी की गई है। इसी प्रकार, कृषि कचरा, औद्योगिक खतरनाक और गैर-खतरनाक कचरा, बायोमैडिकल कचरा और ई-कचरा, कचरा उत्पादन क्षेत्र में अपनी बढ़ती प्रवृत्ति बनाए हुए हैं।

इनमें से आधे से अधिक कचरे का वर्तमान में खुले में निपटान किया जाता है, और कचरा उत्पादन के बढ़ते पैटर्न का पर्यावरण, मानव स्वास्थ्य और आर्थिक विकास पर महत्वपूर्ण प्रभाव पड़ेगा, जिसके लिए तत्काल कार्रवाई की आवश्यकता होगी। भारत में एकीकृत कचरा प्रबंधन प्रथाओं में स्रोत में कमी और पुनः उपयोग, पुनर्चक्रण, खाद बनाना, कचरा से ऊर्जा बनाना और लैंडफिल के चरण शामिल हैं।

उदाहरण: आईआईटी हैदराबाद में बायोडिग्रेडेबल और गैर-बायोडिग्रेडेबल कचरे को इकट्ठा करने के लिए दो-बिन दरवाजा संग्रह प्रणाली है। बायोडिग्रेडेबल कचरे को परिसर के अंदर कंपोस्टिंग इकाई में भेजा जाता है, और परिणामी खाद का उपयोग बागवानी गतिविधियों के लिए किया जाता है। प्लास्टिक, कांच और कागज के कचरे को कैंपस रिसोर्स रिकवरी पार्क के अंदर ठोस कचरा प्रबंधन स्थल में अलग किया और बचे हुए को डंपिंग के लिए भेजा जाता है।

इसके अलावा, आईआईटीएच के पास मेस से बचे भोजन के उपचार के लिए एक बायोगैस डाइजेस्टर है जो प्रतिदिन 20 क्यूबिक मीटर बायोगैस उत्पन्न करता है जिसे फिर से आईआईटीएच मेस और एक जीरो-लिविड डिस्चार्ज प्लांट है।

आईआईटीएच का रिसोर्स रिकवरी पार्क (आरआरपी)



आईआईटीएच का बायोगैस डाइजेस्टर



आईआईटीएच की आरआरपी और वर्मीकम्पोस्ट सुविधा में कचरा पृथक्करण (इनसेट)

इस समय, यदि हम "कचरा" के विवरण को देखें, तो इसे ऐसे किसी भी पदार्थ के रूप में परिभाषित किया जाता है जो गलत जगह पर है, या गलत समय पर उपलब्ध है, या गलत व्यक्ति के हाथ में है जो इसका उपयोग नहीं जानता है। इसलिए, जब ऐसी प्रकृति के किसी भी पदार्थ को सही स्थान पर, या सही समय पर सही व्यक्ति के हाथ में स्थानांतरित किया जा सकता है जो इसके अनुप्रयोग या मूल्य को जानता है, तो इसे एक "संसाधन" माना जाएगा। कचरे को एक संसाधन के रूप में देखने के इस बदलते परिप्रेक्ष्य ने अनुसंधान मार्ग को कचरा प्रबंधन से "कचरे से धन" की ओर स्थानांतरित है।

हिंदी डायरी (थीम)

किसी भी राष्ट्र में कचरे से धन मिशन का लक्ष्य शून्य कचरा और शून्य डंपसाइट्स का लक्ष्य है। इस बिंदु पर, कचरे से धन दृष्टिकोण के दो विकल्प हैं, पहला "कचरे से ऊर्जा" और दूसरा "कचरे से उपयोगी सामग्री"। कचरे की भौतिक, रासायनिक और जैविक विशेषताओं के आधार पर विकल्प का चयन किया जाएगा और रूपांतरण तकनीक तय की जाएगी। यह दृष्टिकोण सामग्रियों और संसाधनों को चक्रीय उपयोग में लाता है, हालांकि सर्वोत्तम उपयोग के उद्देश्य से उनके रूप और स्थिति बदल सकती हैं।

संसाधनों के उपयोग के लिए उनके जीवन चक्र का विस्तार करने का यह तरीका "सर्कुलर इकोनॉमी" मॉडल में मुख्य अवधारणा है। चक्रीय अर्थव्यवस्था के तीन बुनियादी सिद्धांत हैं कचरे और प्रदूषण का उन्मूलन, उत्पादों और सामग्रियों का उनके उच्चतम मूल्य पर संचलन, और प्रकृति का पुनर्जनन। एक प्रभावी कचरे प्रबंधन प्रणाली के लिए, चक्रीय अर्थव्यवस्था-आधारित "कचरे से धन" दृष्टिकोण एक लचीला समाधान है जो व्यापार के अवसरों को और विकसित करता है और ग्रह और लोगों पर प्रभाव को कम करता है। इस प्रकार, कचरे से धन तक परिणामी चक्रीय अर्थव्यवस्था "स्थिरता" के तीन स्तंभों - अर्थव्यवस्था, पर्यावरण और समाज को संबोधित करती है।

संयुक्त राष्ट्र महासभा (यूएनजीए) में औपचारिक रूप से व्यक्त और अपनाए गए स्थिरता विकास लक्ष्यों (एसडीजी) में 17 लक्ष्य हैं जिनमें 169 लक्ष्य हैं। हालांकि सभी लक्ष्य कचरा से धन की थीम से संबंधित हैं, सबसे महत्वपूर्ण लक्ष्य जिसे प्रभावी कचरा से धन मिशन के लिए हासिल किया जाना चाहिए वह है "एसडीजी 12: जिम्मेदार उपभोग और उत्पादन"। उपभोक्तावाद के सबसे अग्रभाग-उपभोग को जागरूकता पैदा करके प्रबंधित करके, उत्पादन को नियंत्रित किया जा सकता है।

प्रतीकात्मक छवि



सतत उपभोग और उत्पादन पैटर्न सुनिश्चित करें

आईआईटी हैदराबाद में, सिविल, केमिकल, क्लाइमेट चेंज, मैकेनिकल और मैटेरियल्स साइंस मेटलर्जिकल इंजीनियरिंग और केमिस्ट्री के संकाय कचरे से धन के विभिन्न पहलुओं पर प्रमुख रूप से काम कर रहे हैं। इनमें से, सिविल इंजीनियरिंग में पर्यावरण इंजीनियरिंग समूह कचरे से सामग्री, कचरे से ऊर्जा, सर्कुलर इकोनॉमी शामिल, और स्थिरता मूल्यांकन और फ्रेमवर्क निर्माण पर केंद्रित है। शोध के निष्कर्ष नेचर, एसीएस, आरएससी, एल्सेवियर आदि शीर्ष पत्रिकाओं में प्रकाशित होते हैं। इसके अलावा, समूह ठोस, तरल और गैसीय कचरा प्रबंधन पर विभिन्न शैक्षणिक पाठ्यक्रम प्रदान करता है और विभिन्न ग्रामीण और औद्योगिक कचरा प्रबंधन परियोजनाओं में सक्रिय रूप से भाग लेता है। इसके अलावा, आईआईटीएच-सीएमईटी संयुक्त एमटेक ई-वेस्ट रिसोर्सिंग इंजीनियरिंग और प्रबंधन कार्यक्रम विशेष रूप से ई-कचरे में संसाधनों के विस्तारित जीवन परिदृश्यों पर शैक्षणिक और अनुसंधान गतिविधियों पर केंद्रित है।

समग्र रूप से, प्रभावी कचरे से धन प्राप्त करने के लिए, सर्वोत्तम प्रथाएं निम्नलिखित बिंदुओं पर विचार करती हैं: सबसे पहले, उपभोक्ता उत्पादन और कचरे उत्पादन का निर्णय लेता है, इसलिए, कचरे से धन, परिपत्र अर्थव्यवस्था और स्थिरता प्राप्त करने में लोगों की भूमिका महत्वपूर्ण है।

और अध्ययन की जरूरत है। इसके अलावा, कचरे से धन रूपांतरण के दौरान, सामग्री के उपयोग, ऊर्जा खपत और द्वितीयक कचरे से उत्पादन को समझने के लिए उपयोग की जाने वाली तकनीक का उसके संपूर्ण जीवन चक्र के लिए विश्लेषण करने की आवश्यकता है।

द्वितीयक कचरे से एक ठोस पदार्थ, जलीय धारा, या गैसीय उत्सर्जन हो सकता है, हालांकि इसके संभावित प्रभाव होते हैं जो नकारात्मक प्रतिक्रिया पाश में समाप्त हो सकते हैं। इसके अलावा, कचरे से उत्पन्न होने वाले धन के व्यापार बाजार का अच्छी तरह से अध्ययन किया जाना चाहिए ताकि इसे अर्थव्यवस्था के लाभ पक्ष में एक व्यापार मॉडल के रूप में परिवर्तित किया जा सके। इसके अलावा, आंतरिक और अंतर-राष्ट्रीय नीतियों, नियमों और कानूनों को मौद्रिक लाभ जैसे व्यापार ऋण और सब्सिडी, शोधकर्ताओं के लिए अनुसंधान अनुदान, स्टार्टअप फंड, कर छूट, स्थानीय अधिकारियों और देश के विभिन्न राज्यों से प्रशासनिक सहायता इत्यादि के संदर्भ में कचरे से धन आंदोलनों का समर्थन करना चाहिए।

आईआईटीएच के कचरा प्रबंधन प्रणाली वीडियो सार के लिए लिंक: <https://youtu.be/Nlf81-xkhME>

संक्षेप में:

- प्रौद्योगिकी चयन के लिए जीवनचक्र-आधारित प्रभाव विश्लेषण के बाद सावधानीपूर्वक तकनीकी-आर्थिक विश्लेषण,
- पर्यावरण-सुरक्षित उपभोक्तावाद पर लोगों के बीच जागरूकता,
- व्यापक और गहन बाजार सर्वेक्षण, और
- कानूनी और सरकार से मौद्रिक सहायता वेस्ट टू वेल्थ - सर्कुलर इकोनॉमी - सस्टेनेबिलिटी नेक्सस के सफल कार्यान्वयन की आधार आवश्यकता है।



सीएमईटी के पूर्व निदेशक डॉ. एनआर मुनिरत्नम के साथ प्रोफेसर बीएस मूर्ति, निदेशक आईआईटीएच इंडब्ल्यूआरईएम में एमटेक के लिए 2020 में आईआईटीएच-सीएमईटी समझौता सापन पर हस्ताक्षर समारोह के दौरान

डॉ अंबिका एस

कार्यक्रम समन्वयक, एमटेक ई-वेस्ट रिसोर्सिंग इंजीनियरिंग एंड मैनेजमेंट एंड मैनेजमेंट सहायक प्रोफेसर, पर्यावरण इंजीनियरिंग, सिविल इंजीनियरिंग विभाग, आईआईटी हैदराबाद

E-Waste Resource Engineering & Management: Waste-to-Wealth initiatives



KID: 20230204

Electrical and electronic devices have become an integral part of modern lifestyles. Due to high obsolescence, consumers often replace their electronic gadgets at an alarmingly fast rate, which leads to the generation of electronic waste. India ranked as the third-largest e-waste generator in the world. However, most of the e-waste generated in the country is handled by the informal sector, and rudimentary methods are followed for the recovery of valuable metals from e-waste. Since e-waste contains many toxic materials, improper disposal, as well as recycling practices, pose serious threats to human health and the environment. On the other hand, e-waste is often referred to as an 'urban mine' due to the presence of valuable metal contents in it. The recovery and reuse of these valuable metals from e-waste provide an opportunity to create resource efficiency and a circular economy for a sustainable future.

To address the problems related to e-waste management and also to promote resource recovery and circular economy, a Centre of Excellence (CoE) on E-waste management has been established at C-MET Hyderabad. It aims to build a sustainable e-waste management ecosystem across the country with the vision to establish a self-sustainable technology hub capable of effectively managing India's e-waste. The CoE operates in five different verticals, which include: i) PCB recycling; ii) lithium-ion battery (LIBs) recycling; iii) spent permanent magnets recycling; iv) spent solar cell recycling; and v) skill development and awareness (Fig. 1).

In order to recover precious metals from spent PCB, environmentally benign recycling technology has been developed through a pyrometallurgical route with a processing capacity of 1000 Kg PCB per day (Fig.2). All the process equipment required for recycling have been designed and fabricated indigenously, and CoE is offering turnkey solutions to industries for PCB recycling.

Similar to PCBs, a cost-effective technology has also been developed for the selective recovery of various metal contents from the discarded LIB. The assorted battery recycling process is patented, and the technology is being transferred to more than 20 industries for commercial exploitation.

Furthermore, the CoE has achieved a technology readiness level (TRL) of 4 for the recovery of rare earth present in spent permanent magnets through the hydrometallurgical route. Scalable technology for the recovery of valuables from the end of Si solar cells is also developed at 10 Kg solar cells/batch, and 5N pure silicon is recovered for further usage.

CoE has also inked a pact with M/s Greenko Energies Pvt. Ltd. Hyderabad, one of the largest renewable energy companies in India, for scaling up the technologies developed under CoE.

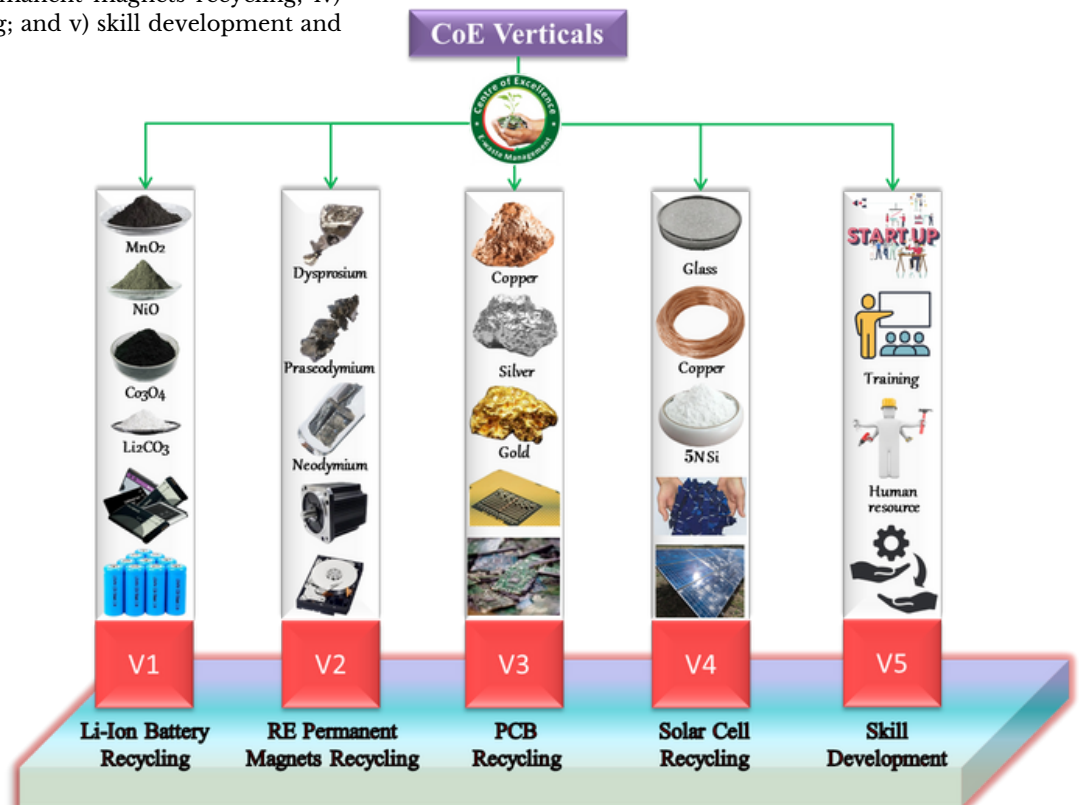


Fig. 1: Different verticals in CoE on E-waste Management



Fig. 2a): Rotary tilting furnace for PCB recycling



Fig. 2b): Recovery of metal fractions

In addition to recycling efforts, the CoE also provides skill development and awareness training to informal sectors, SMEs, start-ups, and industries, formalizing the informal sector and empowering the development of e-waste management infrastructure. To create expert manpower in the e-waste field, C-MET and IIT Hyderabad have jointly initiated a regular MTech course in 'E-waste Resource Engineering & Management (EREM)' in the academic year 2020.

This course not only generates expert manpower but also facilitates collaborative research projects, providing further insights into R&D activities such as the application of artificial intelligence (AI) for the collection and sorting of e-waste and its components. These collaborative efforts have also led to the development of novel spin-off technologies for effective e-waste management. The ground-breaking M. Tech. program, resulting from the dynamic collaboration between IITH and C-MET, aims to revolutionize e-waste management on both national and global levels.

It aligns with the visionary goals of Swachh Bharat, Make in India, Aatma Nirbhar Bharat, and Waste-to-Wealth initiatives. By nurturing a new generation of innovative minds and equipping them with the necessary knowledge and skills, this program has the potential to reshape the management of e-waste to achieve the goals of a sustainable and prosperous future.

Dr R Ratheesh
Director
C-MET, Hyderabad

Biofuel from Microalgal Biomass & Fuel Property Characterization: Way Forward to a Microalgal Biorefinery

KID: 20230205



The current global energy crisis is driving the search for alternative clean energy sources like biofuels, promising substitutes for fossil fuels. In 2018, the Indian Ministry of Petroleum and Natural Gas published the “National Policy on Biofuels” to reduce the import of petroleum products by fostering domestic biofuel production. And on 15th March 2023, the Indian Ministry of Road Transport & Highways issued a notification to promote eco-friendly means of transportation and to decarbonize the transport sector. Biofuels are produced from renewable feedstocks and, upon combustion, emit less amount of GHGs than fossil fuels.

Biofuels produced by current biochemical and thermochemical processes contain small amounts of cyclic hydrocarbons, which are identified as critical components of petroleum fuel. These cyclic hydrocarbons help in the efficient combustion of fuel, resulting in more energy release and less production of CO. These biofuels can provide the requisite performance characteristics upon blending with petroleum fuels by enhancing the lubricity and octane number. With a higher octane number, there is very less probability of knocking or detonation.

Our research focuses on biofuel from microalgae, as many microalgal strains accumulate higher amounts of lipids with faster biomass growth and higher photosynthetic yield, can be cultured in non-arable land and offer opportunities for mitigating global climate change, allowing wastewater treatment and carbon dioxide sequestration. Several challenges remain in this domain, like a robust microalgae strain, low lipid yield under limiting growth conditions, and slow growth in high lipid content strains. **This study aims to enhance microalgae lipid production, efficient lipid extraction for converting into biofuel, and diesel engine tests using diesel-microalgae biodiesel blends.**

We started working with incorporating the application of nanoparticles to microalgae, growing in synthetic wastewater, to check the impact of nanoparticles on lipid accumulation in microalgae. Seeing a positive impact, we are trying to optimize factors that influence lipid accumulation in microalgal cells (Fig. 1).



Biofuel from microalgae, set-up at IITH

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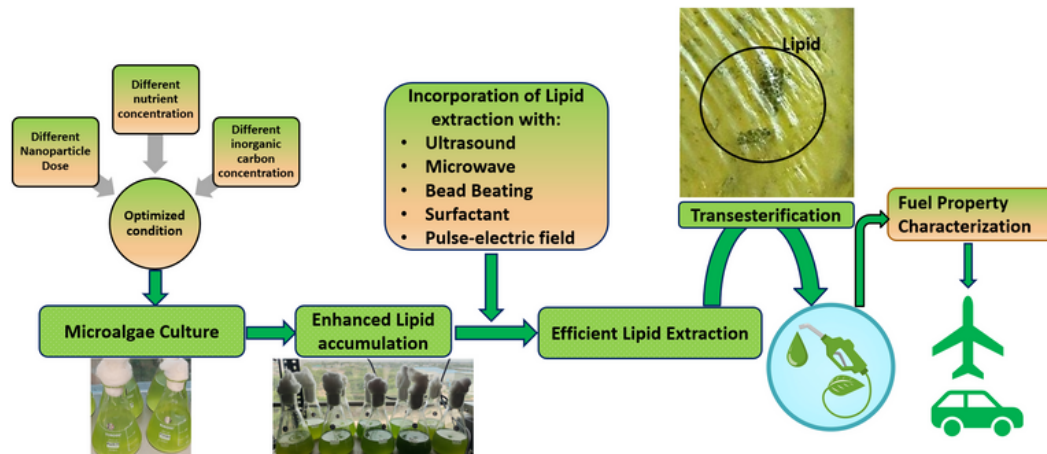


Fig. 1: Graphical Illustration of the work process

Carbon capture and utilization in bioelectrochemical systems: Enhancing Microbial Electrosynthesis of value-added chemicals from carbon dioxide

KID: 20230206

The rise in global temperatures due to increased CO₂ emissions is a major concern for environmentalists. CO₂ is the most prevalent greenhouse gas, accounting for over 63% of all GHG emissions. As a result, there has been a growing interest in carbon capture and utilization technologies in recent years. Microbial electrosynthesis (MES) is a promising technology for converting CO₂ into chemicals using electricity as an energy source. In a typical MES setup, water molecules are split into protons, electrons, and oxygen at the anode, while electrons and protons are combined to form hydrogen at the cathode (Fig. 1).

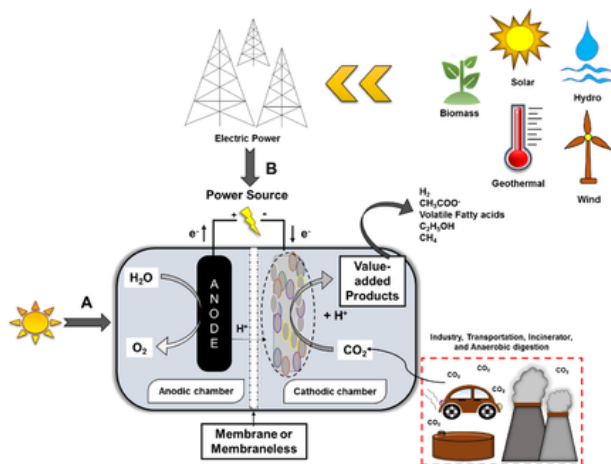
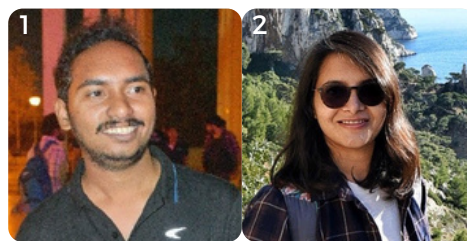


Fig. 1: Microbial Electrosynthesis power supply with (A) Direct and (B) Indirect source

The electroactive bacteria in the cathodic chamber use hydrogen and CO₂ to produce volatile fatty acids (VFAs), such as acetate (C2), butyrate (C4), and caproate (C6). These VFAs have found application as platform chemicals in diverse industrial processes.

However, the current state of MES technology is limited by the low market value of acetate, the main product of MES. In order to make MES more scalable and economically viable, it is necessary to produce higher-value VFAs, such as butyrate and caproate.

Our research group focused on the optimization of operational conditions and parameters for the production of VFAs in serum bottles. The optimal conditions for VFA production were found to be pH 7.15, ethanol concentration 2.3 g L⁻¹, and headspace gas pressure 1.1 atm. The effect of applied voltage on chain-elongated product synthesis from CO₂ was studied at these optimal conditions in MES 2.



The higher production rate of propionate was achieved at -1.0 V, with a rate of 0.32 g L⁻¹ d⁻¹. In another investigation, at the same optimal values using long-running reactor culture used and achieved caproate as a major product (1.5g L⁻¹, at a cathode voltage of -1.0V).

Currently, an investigation on the integration of an anaerobic process with MES was started, which could help to simultaneous treatment of waste/wastewater (at the anode) and reduce the external energy requirement for cathodic reactions. In addition, the anodic effluents (liquid and gas) could be fed to the cathode for further reduced production and hydrogen purification.

Overall, the above results suggest that the optimization of operational parameters is important for the enhancement of MCFAs production in MES systems. Additionally, industrial wastewater like distillery and brewery wastewater, which contains ethanol in its effluent, could be upgraded to caproate using MES technology.

This research has the potential to make MES a more scalable and economically viable technology for the production of high-value VFAs. The findings of this study could also be used to develop new applications for MCFAs in industrial processes.

References

- Chaitanya, N. K., Thulluru, L. P. & Chatterjee, P. Optimization of Long-Chain Fatty Acid Synthesis from CO₂ using Response Surface Methodology. 27, (2023).
- Chaitanya, N. K., Rajpurohit, A., Nair, P. S. & Chatterjee, P. Electrochemical synthesis of propionic acid from the reduction of ethanol and carbon dioxide at various applied potentials. Biochem. Eng. J. 194, 108896 (2023).
- Quraishi, M. et al. Valorisation of CO₂ into value-added products via microbial electrosynthesis (Mes) and electro-fermentation technology. Fermentation7, (2021).

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Enabling Circular Economy and Sustainability through “Waste-2-Wealth” and Applications

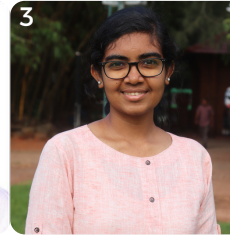
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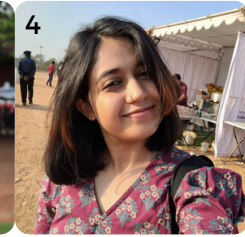
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KID: 20230207

Introduction

To extend the life of any extracted materials from planet Earth and to maintain its circularity, waste management follows the vital principle of the 3Rs - reuse, recycle, and recovery. Reuse is defined as using the substance for the same/different purposes without any further processing. Recycling involves techniques that convert the waste substance to a useful one. Recovery is defined as the extraction of materials or energy from the waste. Our group works on the elements of recycling and recovery on waste management and its applications in the energy and environmental sector. Our GREENS group, led by Dr Ambika S in the Environmental Nanotechnology Laboratory, Environmental Engineering, Department of Civil Engineering, is actively engaged in multiple “Waste-2-Wealth” projects along with applications and assessments on their circularity and sustainability development. This kind of study involves multiple steps such as waste sample collection, characterization, figuring out the options in recycle and recovery, technical analysis in recycle/recovery and possible applications, laboratory trials, purity analysis of resultant materials, and applications-related experiments to understand the optimum conditions to obtain the best efficiency.

Most of these studies were tested for their efficiency to work under solar-based energy to eliminate fossil fuel-based greenhouse gas emissions. Besides, life cycle analysis was carried out in the aspects of impact assessment of waste on the environment and the sustainability and circularity analysis of the resultant recycled and recovered materials during their extended life.

Recycling the Waste Management into Valuables and its Environmental and Energy Applications

Paper Sludge to Foam for Sorption and Separation Processes

In this work, the solid sludge from the pulp and paper industry was recycled to get the foam-based product, as shown in Fig. 1.

Further, the composition of the foam was modified, and its surface was functionalized with specific chemicals to exhibit desirable characteristics. Then, the final products were experimented with for the focused separation of selective substances from the passage stream, which needs to be processed or treated. This way of recycling paper waste to foam gives it a new life, thus cutting the materials cost in the process and treatment industries.



Fig. 1: Conversion of paper sludge to foam

Waste Plastics to Useful Products

The types of plastics that were obtained from different sources of waste were tested for their conversion to useful such as thin films and particles of various sizes, as shown in Fig. 2. Various physicochemical techniques were trailed to find the best possible methods for attaining the most beneficial recycled materials out of the plastic waste. The resultant materials were tested for characterization, fate, and transport in various scenarios of soil-aqueous media. These materials were further converted to membranes, adsorbents, electrodes, etc., to test their workability on the laboratory scale. Currently, the group is working on the perspectives of applying these useful products in environmental pollution abatement, energy, and implying in product manufacturing industries.



Fig. 2: Waste plastics to useful products

Agricultural Residue to Biochar-based Materials

In this study, the agricultural residue such as leaves, stems, etc, which were about 50%-80% of the agricultural waste, was converted to useful biochar materials through the modified chemicothermal process, as shown in Fig. 3. The obtained biochar was tested for its efficiency in aqueous pollutants removal applications such as adsorption, photocatalysis, and filtration. The material was further value-added by embedding it with functionalizing groups and catalytic materials. Besides, it was studied for efficiency enhancement to fit the latest applications. This direction of using agricultural waste to solve water pollution problems is a perfect example of the effective use of eco-safe resources that are considered waste.



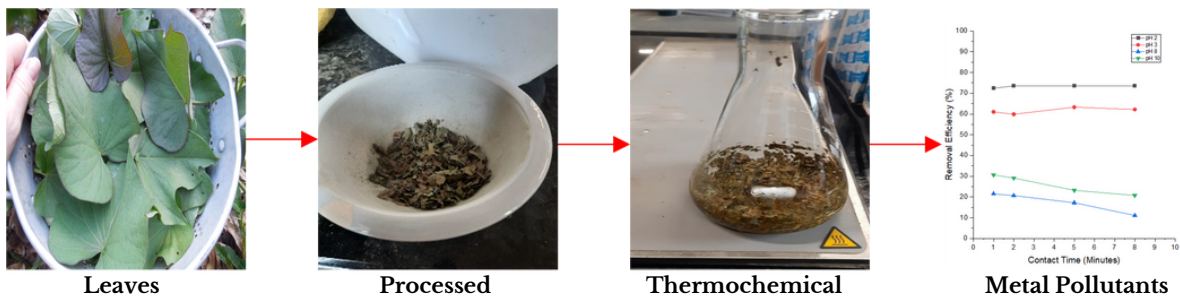


Fig. 3. Agricultural residue to biochar-based materials and pollution removal studies

Spent Graphite to Graphene-based Materials

A diverse group of industries uses graphite due to its versatile applications, say, as a lubricant. In this study, the collected graphene from industry has been experimented with for its conversion to useful materials such as graphene oxide, reduced graphene oxide, expanded graphite, composite materials, and functional materials as shown in Fig. 4. The obtained materials were tested for environmental pollution removals such as water and air pollutants, and energy-related applications. This route of using industrial waste to tackle another problem of industry, not only solves that industry's problem but also ceases another.

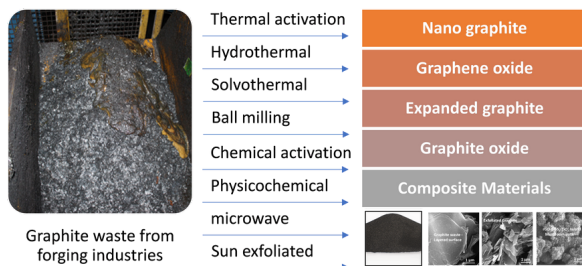


Fig. 4: Graphite Waste to Graphene-based Materials

Recovery of Chemicals and Water from Electroplating Rinse Water

This project focused on using solar thermal energy for extracting the spent chemicals and recovering deionized water by following the evaporation and distillation process, as given in Fig. 5. Different solar thermal reactor setups were studied to obtain the best configuration utilizing all the influencing factors. Also, the operating conditions were optimized to match the changing weather conditions to utilize the maximum thermal energy for the highest resource recovery. Here, the circularity of the materials was obtained to be 88% to 95%, depending on the composition of the feed stream.



Fig. 5: Solar Thermal-based Resource Recovery Unit

Life Cycle-based Sustainability and Circular Economy Analysis

To understand the actual effects of recycling and resource recovery on the economy, society, and environment, a life cycle analysis was followed considering the entire processes involved in the selected recycling and recovery techniques. At each stage, the emissions and waste utilizations were incorporated into the analysis to calculate the improvisation in terms of materials circularity and sustainable development. Furthermore, the studies were analyzed to check the degree of their addressal of the 17 sustainable development goals that were developed by the United Nations. This kind of analysis is important as it involves all the energy and material balance from the beginning to its applications.

Summary

Our works on the types of wastes and their conversion to useful products and extraction of valuables through eco-safe techniques are the need of an hour. After obtaining the resultant products and materials, the same were tested for their diverse applications. Further, life cycle analysis-based sustainability and circularity assessment were carried out to understand the actual improvement in terms of sustainable development in the selected sectors. These studies could prove that utmost wastes with known characteristics and with the help of available techniques, can be converted to their useful form and thus their life can be extended. Similarly, recovery of valuables from the waste can lead to cyclic use of it which subsequently reduces the negative impact on the planet Earth by limiting the mining and the extraction processes. To have these findings to be implemented on a practical scale, through policies, the government must emphasize the industries and research sectors to invest in the research, development, and applications.

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How we play with wastewater! A story



KID: 20230208

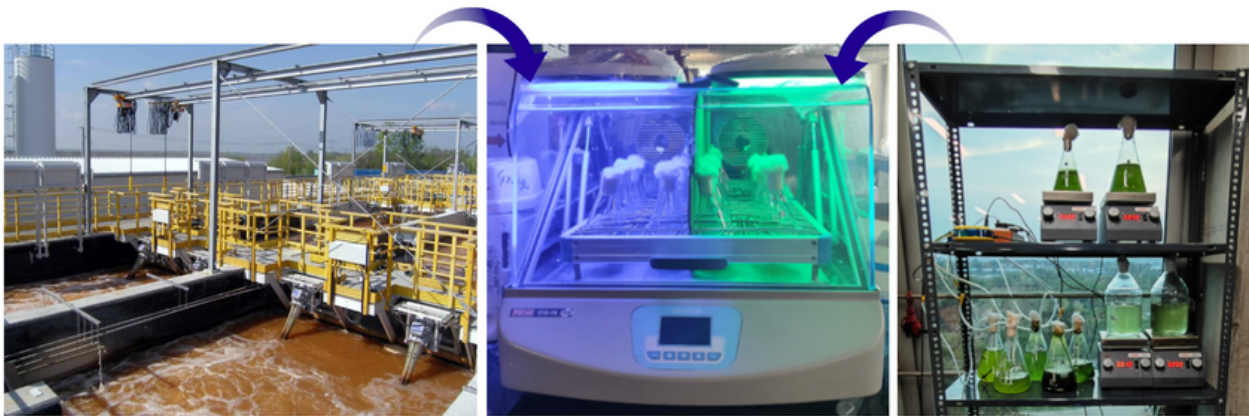
Industrialization is a term that is being used nearly everywhere these days. Like every reaction has an opposite response, industrialization has some adverse effects on the environment and us. Though it eradicates poverty and brings development, its effluents are too toxic. Here, the word toxic means a colossal concentration of pollutants directly harming the Earth, mainly the water bodies. Let us also brief a small statistic, 19% of freshwater is used by industries for their various operations from the Earth's property which is only 3% of total water [1]. Moreover, the water is used for industrial purposes, not giving it back entirely as it was. That means the whole Earth's water would be contaminated in just a matter of time. However, to prevent the scenario, we manage a system called a wastewater/ effluent treatment plant (WWTP). Here another problem arises, we need a massive amount of electricity as energy for it to operate, and who knows, the electricity that we use here is generated from a coal/ fossil power plant and releasing air pollution! In contrast, there is no doubt that we need a system with minimum energy requirements and impressive efficiency.

These compounds threaten the environment, highlighting the need for efficient wastewater treatment to eliminate or reduce their presence.

Based on the motivation from mentioned scenarios, we are attempting to treat wastewater as effectively as possible while simultaneously valorizing byproducts like biofuel, such as biodiesel, biohydrogen, and biomethane. Though it's not an entirely new area of research, it has much scope to bring it up to the industries. We have created a design using statistics and are treating the undiluted industrial effluent on a lab scale. Additionally, we manipulate a few abiotic factors that affect cell activity to maximize the value of microalgal metabolisms for maximum treatment efficiency and biofuel resources. This is how we make wealth from waste.

References

[1] U. Nations, "The United Nations World Water Development Report 2023: Partnerships and cooperation for water." UNESCO, Paris, pp. 20–21, 2023.



Industrial Wastewater, Lab-scale reactor, Microalgae pure strain

Here we develop biorefinery, a technique Earth developed for her remediation. A hero, named microalgae, plays a key role here, we feed the wastewater to it, and it consumes nearly all the toxicity for its growth and gives us a source of energy as a gift. The story summarizes that the hero will purify the wastewater, reduce air pollution, increase oxygen saturation in the air, and resources for energy extraction.

Heavy metals, organic pollutants (pesticides, pharmaceuticals), pathogens (bacteria, viruses), excessive nutrients (nitrogen, phosphorus), and petroleum hydrocarbons are among the toxicants that are often found in wastewater [2].

[2] H. M. Amaro, E. M. Salgado, O. C. Nunes, J. C. M. Pires, and A. F. Esteves, "Microalgae systems - environmental agents for wastewater treatment and potential biomass valorization," *J Environ Manage*, vol. 337, Jul. 2023, doi: 10.1016/J.JENVMAN.2023.117678.

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Microalgae-microbial fuel cell (m-MFC): an integrated process for removal of pharmaceuticals in sewage and simultaneous electricity generation



KID: 20230209

The scarcity of resources has changed the global production and management system and shifted worldwide attention from residual treatment towards resource recovery to building a self-sufficient bio-based economy and sustainable technological community. The recovery of resources from different waste streams has been considered a prominent solution to deal with the paucity and to enhance the economic and environmental performance of wastewater treatment. The biotechnological processes offer a versatile and economical pathway to transform and concentrate constituents of wastewater into valuable products for the development of a circular economy. Therefore globally, researchers are focussing on the assessment and application of environment-friendly technologies and energy sources to tackle burning issues such as increased disposal of untreated effluents, rising level of GHGs, and escalating energy demand.

In this regard, the bio-electrochemical System (BES) and microalgal biofuel have shown great potential and emerged as a sustainable and efficient technology for the treatment of emerging contaminants and to meet the future energy demand. For biofuel production, algal biomass is a future attractive source because of its potential to produce up to 10 times more oil per acre than traditional biofuel crops and it has been suggested that the utilization of this source as fuel feedstock in relation to various processes such as the production of biodiesel connected with hexane extraction, production of bioethanol by fermentation, biohydrogen, and biomethane production. On the other hand, BESs is gaining significant attention because of their prominence for electricity generation and in wastewater treatment efficiency, remediation of contaminants, nutrient recovery, and value-added products generation.

Microalgae has huge potential in bioremediation of waste, carbon dioxide sequestration, and as a renewable fuel source. They are currently used to bioremediate numerous pollutants of different characteristics and properties. Also, they show great potential for biofuel production. Pharmaceuticals and personal care products (PPCPs) are a group of xenobiotics present in the environment, mainly due to their stable structure and the inefficiency of conventional wastewater treatment plants to remove them. Microbial fuel cell (MFC) is a BES technology that utilizes microorganisms to convert biochemical or light energy into electricity through metabolic reaction and photosynthesis. Microalgae-Microbial fuel cell systems have recently gained increasing attention as a flourishing technology of wastewater treatment and energy recovery.

In m-MFC systems, a syntrophic interaction happens between bacterial populations and algal biomass, and this system functions with minimal net energy input. By incorporating microalgae into MFC, microalgae-microbial fuel cell (mMFC) integrates electricity generation, wastewater treatment, CO₂ sequestration, and biomass production in a single, self-sustainable technology. Our research group has been studying the degradation of pharmaceuticals in both the anode and cathode chambers of mMFC. Started the study by comparing the effect of antibiotics in the anode and cathode chambers of m-MFC. A 90% removal efficiency could be observed for the antibiotic. The antibiotic degradation is efficiently done in 1-2 days. The maximum power density obtained was 70-140 mW/m² which is comparable with the existing microbial fuel cell reactors.

Currently, a mixture of pharmaceuticals is trying to degrade using m-MFC while generating bioelectricity. The effluent from the anode chamber will be recirculated to the cathode chamber for more efficient removal of the pollutants. CO₂ generating from the anode chamber will be recirculated in the cathode chamber (Fig. 1). Also, the microalgae biomass collected from the cathode chamber will be used as a substrate in the anode chamber and also as an electrode material and will be explored for the potential of biofuel generation. This integrated mMFC can be a breakthrough in the field of algal-mediated removal of PPCPs in waste water treatment processes.

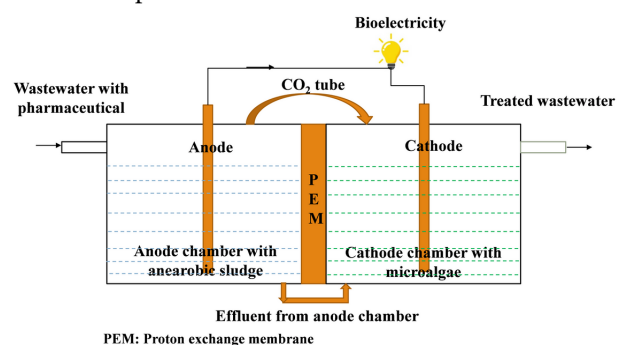


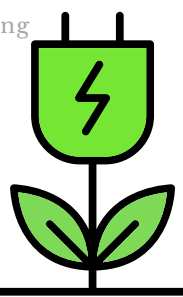
Fig. 1: Schematic of microalgae microbial fuel cell for pharmaceutical treatment and bioelectricity generation

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Recycling of precious & critical materials from end-of-life Solar Panels



KID: 20230210

The transition of humanity from the Iron Age to the Digital Age has happened due to development in electronics. Due to quick development in technology and shortened product lifetime, rate of electronics being produced and used (e-wastes) are at the rise. To improve the functionality, performance, and miniaturisation of electronics, many precious materials as well as hazardous elements are employed in them. A significant quantity of resources from the earth's core are needed to create these electronic products.



Fig. 1: End-of-life Solar Panels
(picture taken from the internet)

It is necessary to treat these devices properly after they reach the end of their useful lives. The concentration of metals in many components is significantly higher than present in their natural ore, therefore it may be more practical and environmentally friendly to extract them from the e-waste. Additionally, if not correctly handled, heavy metals and poisonous substances can pollute the environment and endanger human health.

Earth's resources are also finite, so it is important to reintegrate them into the economy. This could be achieved by recycling. But the research on cost-effective and environmentally safe recycling technologies is still in its infancy. Here at the combinatorial materials lab, research on developing cost-effective and environmentally safe recycling techniques on end-of-life solar panels is successfully carried out.

Crystalline solar panels have a lifespan of 25-30 years. It is projected that 12.3 million metric tonnes of solar panel waste would have reached their end-of-life by 2040. Generally, the solar panel contains very high-grade silicon (5N or more), high-quality glass, and useful metals like copper, silver, etc. Solar panels consist of critical and precious metals which could be recycled to promote Circular Economy and Urban Mining.

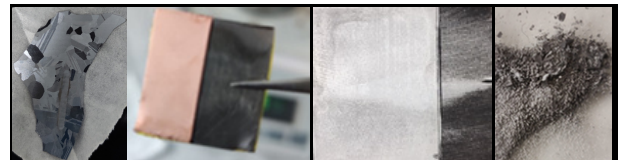


Fig. 2: Recovered metals from EOL solar PVs. In the Combinatorial Materials Lab, MSME, IITH

Combinatorial Materials Lab mainly focuses on metals recovery from end-of-life solar panels and interconnects. The lab could successfully be able to recover high-grade silicon and other materials from EOL solar chips and copper, silver, tin, and lead systematically from the photovoltaic interconnects (or PV ribbon) of spent crystalline solar modules through sequential hydrometallurgical and electrowinning methods with minimum or no wastage.

Our work could recover high-grade silicon, pure copper, and silver with >99.9% purity from the end-of-life solar panels as well as the segregation of critical materials like lead and tin. This work was also presented in 2 conferences: IIM-ATM 2022 at Hyderabad and Met-waste2023 at IIT-BHU and at Innovation Day 2023 of IIT Hyderabad. Recycling and recovery of these end-of-life solar panels is crucial and important to address the 'Waste-2-Wealth' initiative. Moreover, under India Semiconductor Mission (ISM), to make India a global hub for electronics manufacturing and design, the recycling of end-of-life solar panels can provide significant contributions towards resource management, especially in producing high-grade silicon and recovery & reuse of precious and critical materials for specific applications.

Proper e-waste resource engineering and management is required to address the challenges of end-of-life solar photovoltaics. A technology (TRL 4) on sequential recoveries of tin, silver, copper, lead, and silicon is achieved through combined Hydro- & electro-metallurgical routes from the EOL Si PVs and their Interconnects.

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Selective recovery of valuable materials from spent lithium-ion batteries

KID: 20230211

With the increase in the demand for energy, recently energy storage devices have become the key components in day-to-day life. As a result, several types of batteries, particularly lithium-ion batteries (LiBs), have been widely used in modern day electronic devices.

LiBs are considered the first choice for automotive power due to their high energy and power density, high load, and long life. With this enormous demand for LiBs, it is expected that the market size will reach 100 billion USD by 2025. However, Irreversible phase changes in cathodes due to repeated charging and discharging process leads to limited life of LiBs of about 3-8 years. The limited life cycle of these batteries results in more battery production which results in huge spent battery waste. If these spent batteries are not treated/discarded properly, they may bring severe health and environmental hazards, while valuable materials like lithium and cobalt might be lost.



Fig. 1: Spent Lithium-ion batteries (picture from <https://thewest.com.au/business/public-companies/lithium-australia-perfecting-battery-recycling-tech-c-396990>)

Therefore, recycling and recovery of these spent LiBs is a major concern. Addressing recycling of spent LiBs can significantly reduce the environmental pollution and simultaneously the extracted valuable metals from the spent LiBs help in the circular economy of our country.

Combinatorial Materials Lab focuses on Electrochemical Materials Processing and works on metals recovery from e-wastes like spent LiBs. The lab could successfully recover copper, cobalt, nickel sequentially from spent LiBs through hydrometallurgical and electrowinning methods with minimum or no wastage.

Our work could recover all metals with high purity (>98%). This work was selected among the top eight technologies in TATA Steel Material NEXT 3.0 (2022). It is also presented at the Innovation Day 2023 of IIT Hyderabad.

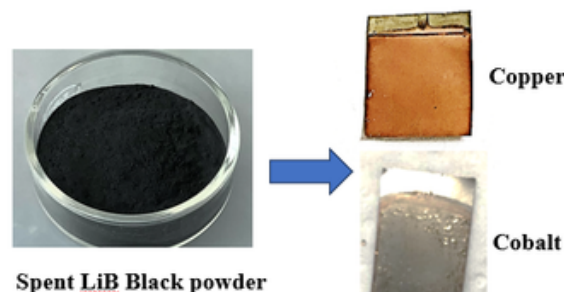


Fig. 2: Recovered metals from the spent LiBs in the Combinatorial Materials Lab, MSME, IITH

With India targeting to become a global hub for electronics manufacturing and design, recycling and recovery of spent LiBs are crucial and important to address e-waste management and can provide significant contributions towards resource management on recovery & reuse of precious and critical materials for specific applications. In addition, recycling and recovery of valuables from spent LiBs contributes to develop a sustainable method for a circular economy while contributing towards Atmanirbhar Bharat.



Fig. 3: Felicitation of Combinatorial Materials Lab members at TATA Steel MaterialNEXT 3.0 (2022).

A technology (TRL 4) on sequential recoveries of copper, cobalt, nickel, and manganese is achieved through combined Hydro- & Electrometallurgical routes from the spent lithium-ion batteries.

[1] Prof Suhash Ranjan Dey

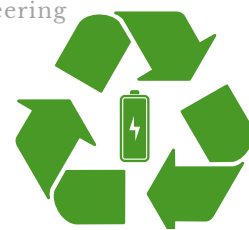
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MTech 2020-22, E-waste Resource Engineering and Management



Sustainable development of road infrastructure using recycled waste aggregates



KID: 20230212

The global issue of waste management calls for innovative solutions that not only reduce environmental pollution but also promote sustainable development. Accordingly, this research focuses on utilizing two types of waste materials, namely recycled construction and demolition (C&D) waste, and mine waste overburden soil, along with fly ash, in road pavement applications. By exploring these alternatives, we aim to address the environmental challenges posed by waste generation and provide cost-effective solutions for the construction industry.

Utilization of Recycled Construction and Demolition Waste: Construction and demolition activities generate a significant amount of waste each year. Statistics indicate that an enormous volume of waste is produced through the construction and demolition of old infrastructure.

The generated C&D waste are typically dumped into the landfill, causing severe threat to the environment due to the leaching of harmful pollutants. On the other hand, generated C&D wastes can be recycled in recycling plants to produce recycled aggregates. Fig. 1. shows the typical composition of generated C&D waste in India.

Road construction activities are growing rapidly around the world and require a large volume of natural aggregates for their construction. Recycled C&D waste aggregates can be used as a sustainable alternative to natural aggregates in road pavement construction, thus reducing the burden on landfills and decreasing the demand for natural resources. Additionally, the use of recycled materials may provide economic and environmental benefits by reducing the costs associated with sourcing and transporting conventional aggregates and reduction in transportation-related emissions. Fig. 2. shows the Ramky C&D waste recycling plant located in Hyderabad, India.

Typical C&D waste composition in India

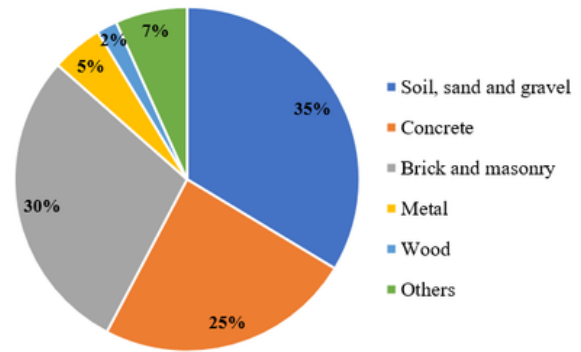


Fig. 1. Typical C&D waste composition in India as per the data published by Central Pollution Control Board



Fig. 2: Ramky C&D waste recycling plant in Hyderabad and recycled aggregates derived from construction and demolition wastes



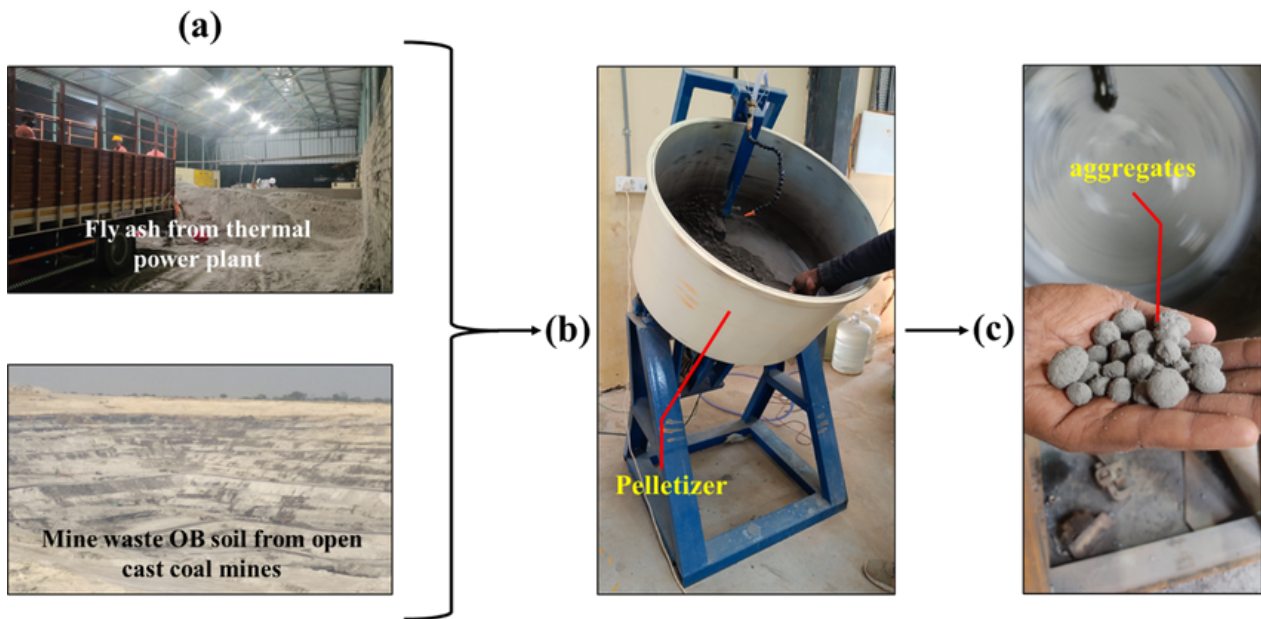


Fig. 3: Manufacturing aggregates from mine waste and fly ash: (a) material collection, (b) pelletization, and (c) pelletized aggregates

Utilization of Mine Waste Overburden Soil and Fly Ash: Mining operations, particularly open-cast mining, generate substantial amounts of waste rock and soil, known as mine waste overburden. This waste poses significant environmental challenges, including air pollution, unproductive land use, and potential ecological damage.

Moreover, the thermal power industry generates substantial quantities of fly ash, which is a by-product with limited utilization. In this research, we propose utilizing mine waste overburdened soil, and fly ash as alternative materials for pavement construction.

By integrating these waste materials into the construction industry, artificial aggregates from the mine wastes may be generated (refer to Fig. 3).

The availability of coal reserves worldwide, coupled with the extensive reliance on thermal power generation, necessitates efficient and sustainable management of these waste materials. By converting them into valuable resources of aggregates for pavement applications, we promote a circular economy and contribute to the reduction of greenhouse gas emissions.

Conclusion: The utilization of waste materials in road construction offers a promising avenue for solid waste management, sustainable development, and environmental conservation. By recycling construction and demolition wastes and, or incorporating mine waste overburden soil and fly ash in road construction, we can reduce environmental pollution, minimize landfill load, and provide cost-effective alternatives for sustainable road construction.

This research not only contributes to mitigating the environmental challenges associated with large volumes of waste generated but also offers a valuable and sustainable solution for addressing the scarcity of natural aggregates. By adopting these sustainable practices, we pave the way for a greener future, where waste is transformed into a valuable resource, benefiting both the construction industry and the environment.

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Waste-2-Wealth generation using biomass and e-waste: Feasibility analysis for a way towards sustainable India



KID: 20230213

One of the ways towards waste-to-wealth (W2W) creation is optimal extraction and utilization of bio-fuels from bio-waste. India is yet to tap the full potential of the bioenergy sector despite 70% population depending on forest and agriculture. The national initiatives towards blending 20% biofuels with fossil fuels are a catalyzing fact for research in this direction. Though significant progress in research has been achieved while devising novel routes for bio-energy conversion from different biomass resources, a novel approach has been adopted by GOKUL to provide holistic solutions to these problems from the supply chain (SC) network designer point of view. Similarly, another research direction towards W2W creation by GOKUL is to design of smart city through e-Waste management, which talks about the utilization of electronics waste to the best extent possible before disposal, leading to minimization of pollution to mother nature and optimum utilization of usage of otherwise very scarce resources.

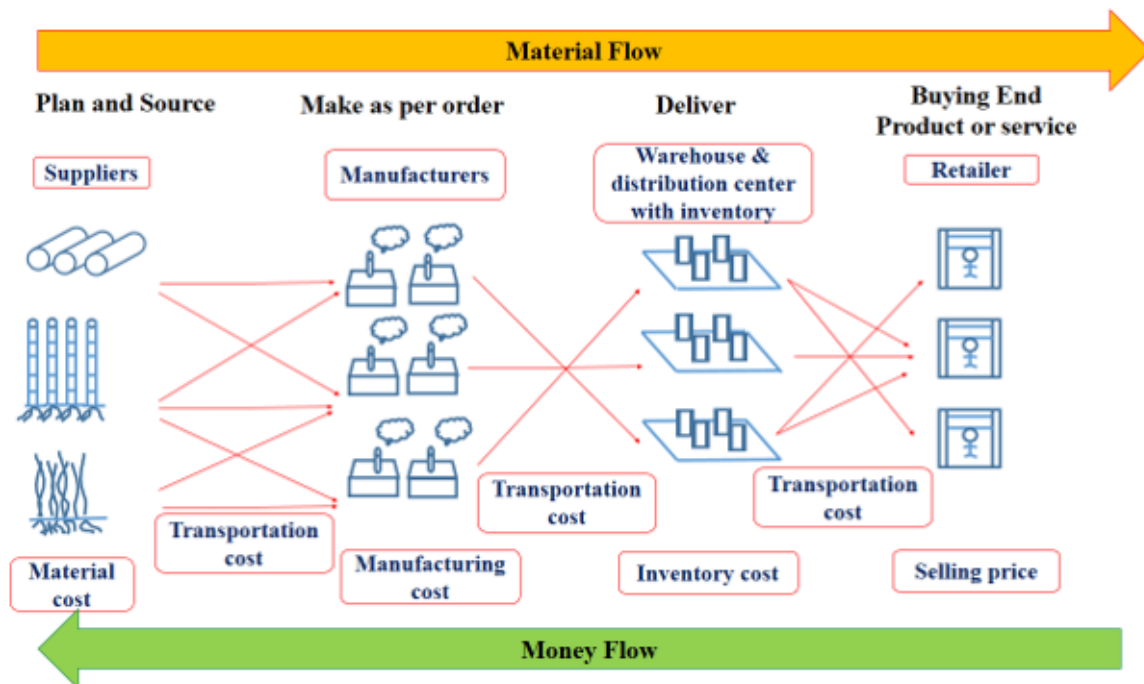


Fig. A: Bio-Supply Chain Network Design

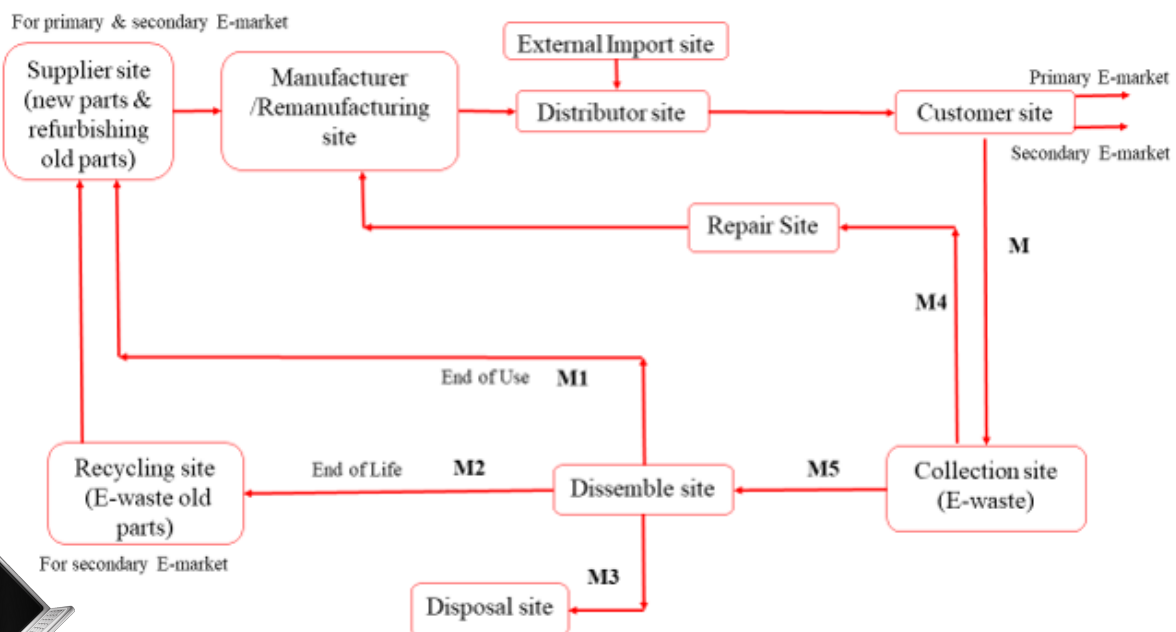


Fig. B: Closed-loop Supply Chain for e-Waste



A forward SC integrates several stakeholders in different echelons (material supply, manufacturing, distribution, and collection – see Fig. A & B) who help in reaching the finished goods to the customers, manufactured from raw materials, with an endeavour of improving the whole product life cycle. Such an effort for designing country wide supply chain network has been successfully attempted for the first time considering the target of blending 20% of both bioethanol and biodiesel for a future time horizon (2018-2026) using 2nd generation biomass. Aiming the dual objective of maximizing net present value and minimizing greenhouse gas emissions (GHGe) production (covering technology, economy, and environment), the target has been achieved through mixed integer linear programming, which is NP-hard to solve.

Further, to make the SC design realistic, stochasticity in biofuel demand, import price, and biomass feed supply has been modeled using a robust data-driven optimization approach. To mitigate electronic pollution and overcome the imbalance of the demand-supply ratio of electronic products, namely laptops, mobile phones, etc., the design of novel closed-loop SC has also been attempted for a 12-year time horizon (2014-2025) following 5R (refuse, reduce, reuse, repurpose, and then recycle) principle.

Here, the target of the mixed integer non-linear programming model is to find the exact site locations of various nodes in different echelons of forward and reverse SC (collection centres, repairing centres, dismantling points, recycling points, and waste disposal points in addition to nodes of forward SC - see Fig. A & B) to perform the techno-economic-environmental analysis. For the first time, such a scenario for Pune city is considered with a ten-layered pull-based closed loop SC network for a smart city development scenario involving end-of-life and end-of-use.

The multi-period, multi-feed, multi-product, multi-site, and multi-echelon model has been shown to save 98.49% of electronic waste carbon emissions.

In addition to being bestowed with the best paper award by the International Federation of Automatic Control Conference (ACODS 2020), the results are published in the prestigious International Journal of Cleaner Production and many other leading forums on several occasions.

GOKUL is extremely happy to acknowledge the collaborations with IIM, Jammu, and CMET, Hyderabad in some of these research activities through the IITH-CMET joint Master's program on E-Waste Resource and Engineering Management.

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Dr Kishalay Mitra (R) and IIT-Hyderabad research scholar Kapil Gunte



Prof Kishalay Mitra

Professor & HoD, Department of Chemical Engineering



Activities at iTIC Incubator

KID: 20230214

ABCD Cohort 1 Graduation and Showcase

On May 29, 2023, iTIC organized the graduation ceremony for ABCD Cohort 1 startups. The event was held in a physical format throughout the day, serving as a platform for startups to highlight their progress and accomplishments.

The first half of the event featured a closed-door dialogue involving the leadership teams of IIT Hyderabad, CDM, and the startups. Esteemed individuals, including the Director and Registrar of IIT Hyderabad, the Dean of Innovations at IIT Hyderabad, the Head of Faculties at CDM, mentors from CDM, and the startups, attended this session. Its purpose was to gather feedback from the startups and mentors about Cohort 1 and identify areas for further improvement.

The second half of the day was dedicated to the startup showcase, where all seven graduating startups presented their innovations to over 150 defense officers participating in CDM courses. The startups had the opportunity to demonstrate their prototypes and engage in discussions with the defense officers, showcasing the potential of their technologies.



Launch of pan India BUILD program

The BUILD Program launch witnessed the pivotal moment of the MoU signing between iTIC Incubator at IIT Hyderabad and Greenko Group, cementing their partnership in supporting studentpreneurs. Prof B S Murty, Director of IIT Hyderabad, articulated the BUILD program's vision, highlighting its emphasis on nurturing innovative ideas and fostering successful startups. Dr Anil Kumar, MD and CEO of Greenko Group, along with Dr A S Kiran Kumar, former Chairman of ISRO, delivered impactful keynote addresses, offering valuable insights and inspiration. Additionally, the event showcased the collaboration with 13 partner incubators across India, crucial in scouting, shortlisting, and supporting 75 innovators for the program's success.

The list of partner incubators is as follows:

- GITAM University
- IIT DRISHTI CPS Foundation, IIT INDORE
- VNR VJIE
- KIET Group of Institutions, Ghaziabad
- ACIC-BMU Foundation
- Foundation for Innovators in Science and Technology (FIST)-TBI, IIT Patna
- AIC-NITF
- SR Foundation (SRiX)
- Vinayaka Mission's Research Foundation
- Vishnu Foundation
- Munjal Birmingham City University
- AIC Banasthali Vidyapith, Foundation
- Sandip Institute



One-to-one mentoring on Intellectual Property

Rahul Bagga, an esteemed expert in Intellectual Property (IP), conducted a one-to-one mentoring session with 8 participating startups on the 19th and 20th of May 2023.

Rahul Bagga, leading a team at Aumirah IP and Aumirah Analytics, shared valuable insights on IP, including its types (patents, trademarks, copyrights, trade secrets), legal compliance, and strategic approaches.

The interactive sessions, spanning an hour each, provided startups with a deeper understanding of IP's significance, legal landscape navigation, and strategies for the identification, protection, and monetization of IP assets.

The outcome of the session empowered startups with increased IP knowledge, legal awareness, and strategic insights, and enabling effective protection and leveraging of their IP assets.



[1] Mr Keyur Punjani

Manager - Programs, iTIC Incubator, IITH

[2] Ms Ritu Chaturmutha

Executive - Programs, iTIC Incubator, IITH

Startup Stories

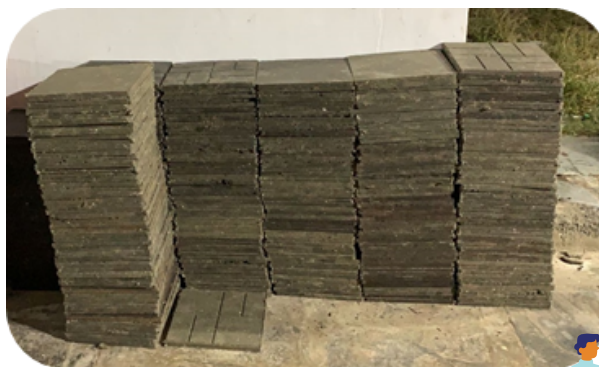
Once Is Not Enough

ONCE IS NOT ENOUGH was established to tackle the challenge of plastic pollution in society. Co-founded by Khushbu Baid and Vijay Baid, the company firmly believes in the possibility of recycling and upcycling plastic materials in a commercially viable manner.

A significant amount of plastic waste ends up in landfills or is burned in industrial kilns. Plastic recycling activities often lack profitability and certain plastics cannot be recycled.

Their work on 3D Printing technology allows for high-value addition to recyclable plastics, while their EcoTiles transform economically non-viable plastics into 100% waste material floor tiles.

Currently, they are producing 500 tiles daily, preventing 15-20 tons of plastic waste per month from entering landfills. The company is also developing a 3D Printer extruder that can directly print granular forms of plastics reducing down costs. They also aim to 3D print scrap plastics and recycle them into unique products.



Develop Multitasking Skills

KID: 20230215

I am Shivananda, pursued my MTech in E-waste Resource Engineering and Management at IIT Hyderabad (2020-2022). I did my MTech thesis under the supervision of Prof Ch Subrahmanyam. During MTech, I worked on the "Recovery of Rare Earth Elements from Spent Neodymium based rare earth (NdFeB) magnet."



I recently worked as a PGET at Cube Bio Energy Pvt. Ltd. (2022- 2023). The comprehensive research-focused curriculum and industry-oriented master's programs approach at IIT Hyderabad attracted me to join their unique master's program. I thoroughly enjoyed studying Global E-waste policies and practices, especially under the guidance of Dr Sandip Chatterjee, Senior Director at the Ministry of Electronics and Information Technology, Government of India, and Dr R Ratheesh, Director at C-MET Hyderabad. The course delved into the exploration of the finest e-waste policies and practices at both global and national levels.



At IITH, I actively engaged in Hockey, Athletics, and contributed to tree plantation initiatives, nurturing my passion for sports and the environment. I am specialized in the recycling of Spent NdFeB magnets, focusing on their efficient and sustainable reuse.

I cherish two remarkable moments from my time at IIT Hyderabad. Firstly, I had the honour of working under the guidance of Prof Ch Subrahmanyam from the Department of Chemistry. His support and freedom in the lab allowed me to gain research expertise and develop multitasking skills.



Secondly, I had the privilege of leading the Varahamihira (H Block) hostel Hockey team in the Milan inter-hostel general championship event. We secured the gold medal and contributed to lifting the sports championship trophy, making it an unforgettable experience.

The message I want to convey to the existing student folk @ IIT Hyderabad is to Embrace the mantra of studying hard, playing hard, and fully living each day, cherishing every moment and opportunity.

IIT Hyderabad has undoubtedly excelled in academics and research, as evident from its impressive NIRF ranking. I like the infrastructure of IIT Hyderabad, especially the hostel block. I really miss radiant cooling in the hot summer at IIT Hyderabad.

If asked to suggest an improvement area for the betterment of IITH, I would say there is a need for significant improvement in sports infrastructure and cultural development programs to enhance the overall sports and cultural activities on campus. Investing in these areas would promote holistic and well-rounded development among the students.

I can contribute to my alma mater by offering guidance and mentorship to current students and sharing my experiences and knowledge to help them navigate their academic and personal journeys effectively.

The best way to contact me is either by call or WhatsApp, and this is my phone number: 8861999468

Mr Shivananda

MTech in E-waste Resource Engineering and Management(2022),

Golden Time of my Life!

KID: 20230216

I'm Rajesh Kumar, an alumnus of Batch'22- EWRM. IITH has unique features like top-notch faculty, practical exposure, world-class lab-infra, industry lecture series, competitive research environment, diverse culture, good hostel facility, and amazing food; these qualities attracted me to join IIT Hyderabad.

During my study tenure at IITH, I enjoyed all the subjects but Computational Math and Design Concept of Project capacity to viable a scale because these subjects provided me with out-of-box thinking and provided me the ability to solve new and complex problems.

I was involved in

- Milan: worked as a Sponsorship Manager
- Mess council: Active member of the mess council



I got training in research work & technology scale-up, knowledge delivered by means of technical presentation.



I am currently working in the technical domain, where I am implementing my course knowledge in practical problems and my MTech project- C-MET Hyderabad Training is directly reflecting my current work.

I spent the “golden time” of my life in IIT-Hyderabad, never forget 2 years of IIT life.

I received two awards from the hands of Director Sir B S Murthy which was a memorable day.

Also, I was invited by TATA Steel in Jamshedpur where I represented the IITH and met the TATA Steel CEO which was also a great day for me it happened due to IITH only.

I can be contacted at: +919569831389;
Mail Id: rajeshkumarrmr@gmail.com &
rajeshkr@alumni.iith.ac.in.

Mr Rajesh Kumar

MTech in E-waste Resource Engineering and Management(2022)





Abhishek Ganesh



Akuluru Rakesh Kumar



Himanshu Jha



IIT Hyderabad, in collaboration with INYAS under the aegis of the Ministry of Education, GOI, organized exhilarating **Debate Competitions (Stage-2)** as part of **Model G20 Initiative's**



Stage-2, Zone-1 (North), IIT Delhi



Stage-2, Zone-2 (East), IIT Bhubaneswar



Stage-2, Zone-3 (West), IIT Bombay



Stage-2, Zone-4 (South), IIT Hyderabad



Stage-2, Zone-5 (Central), IIT Indore



Stage-2, Zone-6 (North East), IIT Guwahati

वसुधैव कुटुम्बकम्

ONE EARTH • ONE FAMILY • ONE FUTURE

IIM student chapter, IITH, organized a visit to DAV Campus school to spread awareness and also make young students interested in the field of MSME



The Chemistry Department Hosted an in-house symposium that encompassed a wide range of topics Related to Chemistry and its applications



Represented by Prof Chandrashekar Sharma, Dean (SRC) IITH is delighted to be a part of a high-level Youth 20 Consultation at KIIT - Bhubaneswar, India

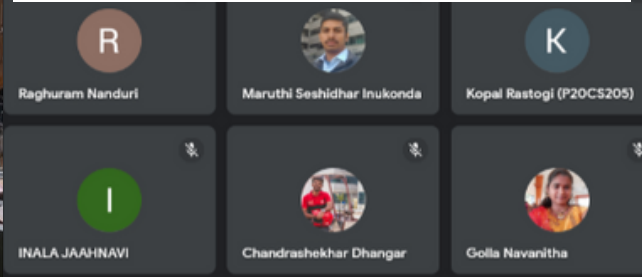


Two Days Brainstorming Workshop towards Technology Vision 2047 has been held at IIT Hyderabad
Read More: <https://pr.iith.ac.in/pressrelease/V47.pdf>

EM, Under aegis of IIC, conducted a session to celebrate World Creativity & Innovation Day facilitated by Dr M P Ganesh, HoD, EM & Entrepreneurship Coordinator, IIC, IITH



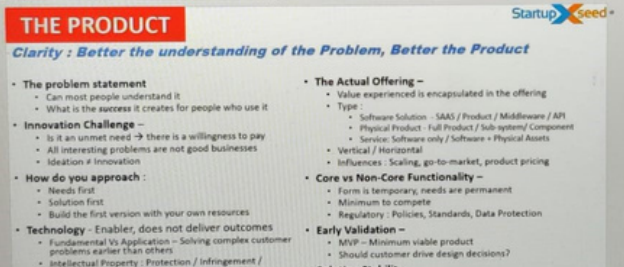
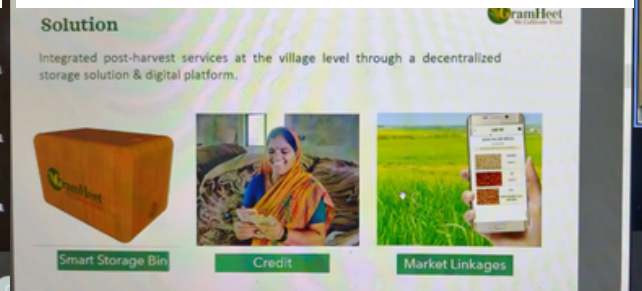
In view of "World IP Day" on April 26 IPFC, under the aegis of IIC-IITH, has planned a webinar on "Insights Into Software Patentability"



Guest Lecture by Mr Suresh Susurla, CEO & MD, Startoon Labs Pvt. Ltd. As a part of the Entrepreneurship Talk series



Guest Lecture by Ms Shweta Thakare, Co-Founder & COO, 'Gramheet' as a part of the Entrepreneurship Talk series



Guest Lecture by Mr Srinivasa Raghavan N, CTO 'StartupXseed' as a part of Entrepreneurship Talk series



EM Dept hosted E-waste Resource Eng & Management Industry Lecture series by Dr Arnab Banerjee, Director, Micron Technology

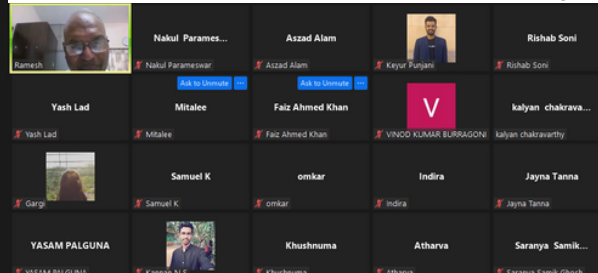
IITH organized a two day all IIT's Dean's (R&D) conclave
Read more: <https://pr.iith.ac.in/pressrelease/ADC.pdf>



Hyderabad Soft Matter Day 2023 at IIT Hyderabad



Commemorating National Technology Day IIC, IITH has organized an Online Talk on by Mr K Ramesh, Vice President at Innomet Advanced Materials Pvt. Ltd., Hyd



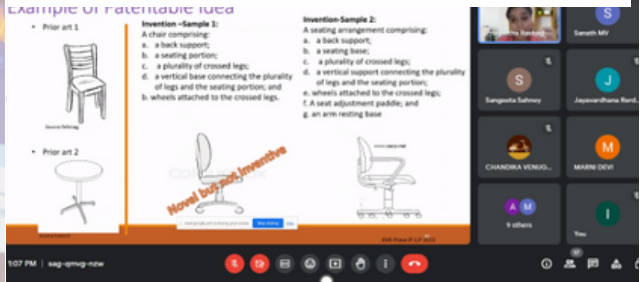
The Dept of HST, IITH organized the Yoga Tech conclave to deliberate on the technology pathways for Yoga



IITH hosted the Conference on "Complexity and Nonlinear Dynamics in Science, Engineering, and Technology (CNLDS-2023)"



IPFC, under the aegis of IIC, IITH, hosted a webinar on "Patents: Claims Drafting" by Ms Praneetha K Rasbag, Founder(Prasa IP)



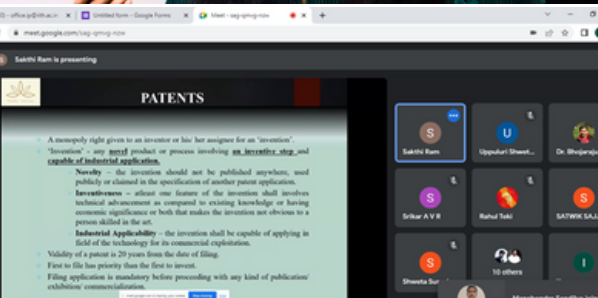
IITH hosted Yoga session on "Enabling oneself in the age of AI through Yoga" by Ms Srishti Malpath on occasion of International Day of Yoga 2023



A Talk and Book Launch Session by Dr Ajai Chowdhry, Co-founder of HCL and a pioneer in the Electronics Industry



Webinar on "IIPRs & IP Management for Startup" Organized by IPFC, IITH, under the aegis of IIC by Ms R Sakthiya Dakshi, Partner and Co-Founder, Taru Legal



#IITHResearchReel

Physical Review Letters Publication

What is common between coupled optical cavities with gain and loss and a metallic wire? They are both governed by 2×2 matrices, which share similar symmetries. It is fascinating how simple mathematics can reveal deep connections between very different physical situations.

	$T_A(\mu)$	$G(\mu)$
μ in system bands	$\lambda_{\pm} = e^{\pm i\mu}$ asymmetric broken regime	$G(\mu) \sim N^2$ ballistic transport
μ outside system bands	$\lambda_{\pm} = e^{\pm i\mu}$ symmetric regime	$G(\mu) \sim e^{-N/4}$ "Swakland" localization length ℓ
μ at band edges	$\lambda_{\pm} = 1$ Exceptional point	$G(\mu) \sim N^{-2}$ subdiffusive transport

Dr Archak Purkayastha
Assistant Professor,
Department of Physics

A recent publication by Dr Archak Purkayastha, Dept of Physics, IITH in Physical Review Letters PRL, exquisitely explains "how simple mathematics can reveal deep connections between very different physical situations."

Know more:
<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.130.187101>



Plantation Drive April 2023



Plantation Drive May 2023



Plantation Drive June 2023



Gymkhana Day 2023



Future Innovators Fair 2023

<https://pr.iith.ac.in/pressrelease/FIF23.pdf>



Open Day for JEE Aspirants 2023

<https://pr.iith.ac.in/pressrelease/OD23.pdf>



First edition of "Ayaam", A two-day Annual Design Fest



Fire Awareness Program on campus



An inspiring & energetic 9-day - Yoga Camp



International Yoga Day Celebrations



Hindi Workshop on "Official Language Implementation and Noting & Drafting"



Warm farewell to Registrar Commodore Manohar Nambiar (Retd)



First Aid Training Program



Cycling Event on the World Bicycle Day



Inauguration of DRDO Industry Academia CoE.
<https://pr.iith.ac.in/pressrelease/DIAH2.pdf>



Launch of a new BUILD program.
<https://pr.iith.ac.in/pressrelease/BUILD75.pdf>



Inauguration of Co-developmental Technology Innovation Centre (CTIC).
<https://pr.iith.ac.in/pressrelease/CTIC.pdf>



IITH retained its place in the Top 10 in NIRF-Engineering
<https://pr.iith.ac.in/pressrelease/NIRF23.pdf>



Bridge 2023
by Indian Institution of Bridge Engineers



Launch of PALS Hyderabad Hub



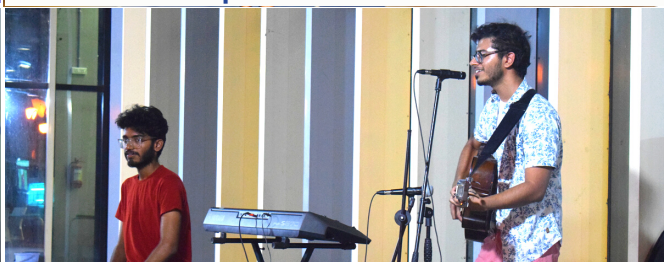
15th Foundation Day
<https://pr.iith.ac.in/pressrelease/FD23.pdf>



Diesta, an annual Interdepartmental Sports & Cultural Fest Felicitations



Inauguration of Hybrid Classrooms in BT & BME and CHY Buildings



Sunshine, the Counseling Cell of IITH unleashed the celebrations of Happiness Day



IITH organized the "Season-2" of the Foster2023, with Ms Uma Harathi N, AIR-3, UPSC-2022 and BTech, Civil Engineering, IITH



IITH Alumni Association extended its support to ZPHS Rudraram through upgrading the infrastructure

President



Prathyusha Thammineni
BTech, EE, 2018

Secretary



Palkesh Ashok Saklecha
MTech, CHE, 2020

Treasurer



Divya Anand
MTech, MSME, 2015

VP India



Anjanna Matta
PhD, Mathematics, 2016

VP Foreign



Gayatri Srujana Banda
MTech, EE, 2018

**Congratulations to IIT Hyderabad Alumni Association Officer Bearers
(2023-2025)**

THE TIMES OF INDIA

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Fri, 14 Apr-23; Times Of India - Hyderabad; Size : 78 sq.cm.; Circulation:267065; Page : 4

ZP school students top IIT-H innovation fest

Youngsters Make Green Sanitary Pads And Fire Fighting Robots

Nirupa.Vatyam
@timesgrop.com

Hyderabad: Young innovators flooded the Future Inventors Fair (FIF) with out-of-the-box solutions for daily problems on Thursday. The event was organised by the Indian Institute of Technology, Hyderabad (IIT-H) where 22 teams comprising students aged between 12 and 16 years from schools across Telangana showcased their prototypes, ranging from environment-friendly sanitary pads to a multi-tasking robot. There was also an automated drainage cleaner, corn gripper-cum-rotator and a smart wheelchair.

The final 22 were selected from over 130 nominations that the institute had received. Class 8 students of a zilla parishad school in Isaipet took home the top prize

FIRST PRIZE Solar hand dishwasher



Innovators: D Saketh, K Rakshith, V Pranay, P Harsha Vardhan, Ch Naveen (class 8 students of ZPHS, Isaipet)

Mentor: Swarna Latha Thatikonda **Problem:** Struggle of cleaning big utensils with hands

Solution: Hand-held dishwasher made with 12-volt motor, pipes and scrubber. Students spent ₹100 on device. You only have to pour dishwashing liquid on utensils, switch on machine

Way forward: Students plan to add more chambers in the device to hold water and dishwashing liquid

SECOND PRIZE Biodegradable sanitary pads



Innovators: A Akshaya, V Hansika, V Vakula Manasa, P Akshaya (class 10 students of Pallavi Model School, Boduppal)

Mentor: T Madhuri

Problem: Girls suffer from skin problems due to usage of sanitary napkins containing chemicals

Solution: Students used banana fibre, cotton and cloth to make pads that are easy on skin. These come in different sizes. "T"-shape pads prevent leakages for six-seven hours

Way forward: Students will collaborate with IIT-H team, which is also working on creating biodegradable pads

THIRD PRIZE

Calamity control droid

Innovators: Boorugu Suraj Guptha, Yenumula Lalit Karthikeya, Rishik R (class 10 students of Hyderabad Public School, Ramanthapur)

Mentor: K Madhavi

Solution: Robot can detect and extinguish fires without human intervention. The robot has a small tank which can hold 200 ml water. It uses solar power to recharge

Way forward: Device to be improvised by connecting it to a mobile so that people are notified in case of fire



THE HINDU

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May-23; Hindu - Hyderabad; Size : 26 sq.cm.; Circulation: 267065; Page : 2



Tech innovation centre inaugurated at IIT-H

The Indian Institute of Technology in Hyderabad (IIT-H) has joined hands with Indian Navy Weapons and Electronics Systems Engineering Establishment (WESEE) for strategic collaboration. As an outcome, a Co-Developmental Technology Innovation Centre (CTIC) was inaugurated at IIT-H on Friday by Vice-Admiral Sandeep Naithani, in the presence of IIT-H director B.S. Murty, dean (Sponsored Research and Consultancy) Chandrashekhar Sharma, WESEE officers and IIT faculty. The centre, being steered by WESEE, aims to collaborate with IIT-H on innovative and pioneering projects related to contemporary and emerging technologies in maritime domain. Joint projects in the fields of wireless networks, 5G/6G, IoT, AI/ML and other related areas were identified for technological advancement as an initial step. Mr. Sharma spoke about IIT-H's academic and research excellence.

THE TIMES OF INDIA

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23 Apr-23; Times Of India - Hyderabad; Size : 29 sq.cm.; Circulation:267065; Page : 2

IIT-Hyd leads way in promoting Indic arch

TIMES NEWS NETWORK

Hyderabad: The Indian Institute of Technology-Hyderabad, in partnership with the Architecture and Design Foundation, organised a two-day Indic Architecture conclave to promote and preserve traditional Indian architecture, on Saturday.

Scholars with diverse expertise met to develop a comprehensive curriculum covering different architectural forms from various regions and periods in India.

One of the speakers from Bhubaneswar, Padma Vibhushan Shilpi Shri Sudarshan Sahoo, shared his vast knowledge of sculpting with wood and stone. Other scholars in attendance included Kannipayyur Krishna Nambodripad from Thrissur and



Sashikala Ananth from Coimbatore. The primary objective of the event was to create course content for Indic architecture, bringing together shilpis, historians, architects, Indic knowledge scholars, and academicians.

This is the first-of-its-kind initiative that aims to revive and preserve traditional knowledge. Over the two-day conference, scholars discussed bringing this architectural knowledge into mainstream academia to facilitate higher education, research, internships, and conferences.

THE TIMES OF INDIA

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Wed, 12 Apr-23; Times Of India - Hyderabad; Size : 35 sq.cm.;
Circulation:267065; Page : 2

T-AIM startups to get access to NSM AI computing infra

TIMES NEWS NETWORK

Hyderabad: The Telangana AI Mission (T-AIM), a joint Telangana government and NASSCOM initiative, on Tuesday said it has facilitated two MoUs between Telangana government and the Centre for Development of Advanced Computing (C-DAC) and Indian Institute of Technology Hyderabad (IIT-H).

The MoUs will provide the 142 AI startups being supported by T-AIM through its accelerator programme called Revv Up with affordable ac-

cess to high performance AI computing (HPAIC) through the public infrastructure set up under the National Supercomputing Mission (NSM).

The MoU was signed with C-DAC will allow Revv Up startups to access India's largest and fastest AI scalable supercomputing infrastructure with 410 AI Petaflops at no cost for a certain period in a benefit that translates to Rs 10 crores in economic value created for T-AIM startups. After that, startups can continue to utilise facilities at rates that are a third lower than

those offered by private cloud infrastructure providers.

The MoU signed with IIT-H will offer PARAMSEVA computing infrastructure of 833 teraflops, which was also built by C-DAC under the aegis of NSM, at discounted rates for Revv Up startups.

Citing a recent report by OpenAI, which states that cost of training large models is expected to rise five-fold by 2030, state government said both MoUs are significant as startups can immediately benefit from partnership by reducing cost of operations.

THE TIMES OF INDIA

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Thu, 15 Jun-23; Times Of India - Hyderabad; Size : 108 sq.cm.;
Circulation:267065; Page : 2

BTech students at 9 NITs can study their final year at IIT-H

TIMES NEWS NETWORK

Hyderabad: B Tech students of nine National Institute of Technology (NITs) across the country will be able to spend their fourth year at Indian Institute of Technology, Hyderabad (IIT-H) as part of a collaboration programme.

NIT students who have a CGPA higher than 8.5 will get admission into PhD at IIT-H without any selection process. The nine NITs include NIT Sikkim, Silchar, Agartala, Nagaland, Meghalaya, Srinagar, Calicut, Nagpur, and Rourkela.

Explaining the strategy behind this alliance, IIT-H director B S Murthy said, "IIT-H is one of the fastest evolving academic institutes with a strong focus on research, innovation & entrepreneurship. We want innovation as a magic wand to let our dynamic youth be job providers instead of job seekers. It is also important to nurture research interest among UG students, for India not only to be 'AtmaNirbhar' but also a global leader in innovation and technology development. I am confident this move will be a significant mark towards

the above goal." Emphasising academic aspects, Saptarshi Majumdar, dean (academics) IIT-H, said: "The collaboration between IIT-H and NIT has a long-term vision to strengthen the tech education ecosystem. Not only it connects the NIT students with the IIT-H PhD program, but also it nourishes the academic exchanges between two nationally important institutions. IIT-H believes that such an initiative will add value in NEP implementation, skill development and research excellence in the days to come."

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Thu, 25 May-23; Telangana Today - Hyderabad; Size : 148 sq.cm.;
Circulation:149245; Page : 4

IIT-H fraternity elated as 3 alumni crack Civils

STATE BUREAU
Sangareddy

The IIT Hyderabad fraternity was elated as three of their alumni members successfully cracked the Civil Services examination, the results of which were declared on Wednesday.

The 2017 B-Tech (Civil Engineering) graduate Uma Harathi bagged the AIR-3 rank in UPSC-

2022. While Jayasimha Reddy Ravula, a 2019-batch Electrical Engineering graduate, got AIR-217 and 2016 B-Tech (Mechanical Engineering) graduate Bollam Umamaheshwar Reddy bagged AIR-270.

In the past too, several students of the IIT-H cracked the examination and were in the service of the nation already.

Expressing delight at the success of the stu-



Uma Harathi

dents, Director Prof B S Murthy said the institute's alumni were doing well in almost every walk of life,

including service to the nation. He said that it was evident from Uma Harathi, Jaysimha and Umamaheshwar's dedication to serving the nation by cracking the hardest and most coveted administrative service test — UPSC.

He opined that their perseverance would act as motivation not only for the existing students but also for other youth in the country.

Uma Harathi said it was no doubt a challenging journey, this being her fifth attempt. The UPSC third ranker said she stuck to her strategy.

Attributing this accomplishment to the opportunities he got at the IIT-H, Jaysimha said understanding the examination patterns, planning accordingly and taking calculated risks while attempting the exam helped him.

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Sun, 25 Jun-23; Telangana Today - Hyderabad; Size : 107 sq.cm.;
Circulation:149245; Page : 2

595 UG engg seats up for grabs at IIT-H

CITY BUREAU
Hyderabad

A total of 595 seats in different undergraduate engineering programmes are up for grabs at the Indian Institute of Technology (IIT)-Hyderabad this year.

A maximum of 65 seats are available in each of the

Mechanical Engineering, Electrical Engineering, and Computer Science and Engineering programmes. Similarly, there are 60 seats in the Civil Engineering programme.

This year, 17,385 seats, including 15,932 regular and 1,453, are available in 23 IITs. Similarly, there are 23,954

seats in 31 National Institutes of Technology across the country. Meanwhile, admission counselling into IITs, NITs, IIITs, and other national institutions via the Joint Seat Allocation Authority is under way. The last date to register in the first round of admissions and exercising web options

is June 28. The seats will be allotted on June 30. Those who bag the seats should pay the fee online between June 30 and July 4. The second phase of seat allotment is on July 6, for which online reporting and fee payment should be done from July 6-10. Four more rounds of allotments will be conducted.



Information Technology, Electronics, & Communications Dept



Visvesvaraya National Institute of Technology Nagpur



TiHAN-IITH & Tata Technologies



Information Technology Electronics & Communication Dept



National Institute of Technology Rourkela



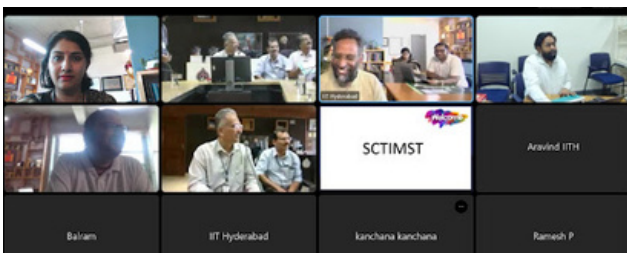
National Institute of Technology Silchar



National Institute of Technology Calicut



National Institute of Technology, Srinagar



Sree Chitra Tirunal Institute for Medical Sciences & Tech



TiHAN-IITH & NATRAX

IIT Hyderabad has signed an MoU with nine NITs for Faculty-Students Exchange





Dr Priyanka Verma
MSc (2014)
Department of Chemistry
Being appointed as an Assistant Professor
Department of Chemistry at IIT Delhi



Dr Hemanth Kumar Ch
PhD (2020)
Department of Civil Engineering
Being offered a position as an Assistant
Professor at IIT Dharwad



Mr Sanjiv Kumar
PhD Scholar
Department of Liberal Arts
Being offered a position as an Assistant
Professor at Indian Institute of
Management Sirmaur, Himachal Pradesh



**Dr Rupesh Ganpatrao
Wandhare**
Assistant Professor
Department of Electrical
Engineering
Being awarded the "SERB Technology
Translation Award"



Dr Sandipan Ray
Assistant Professor
Department of Biotechnology
Being elected as a Member of the
Executive Committee (EC) of the Indian
Society for Chronobiology (InSC)



**Prof Shashidhar T
& his research team**
Department of Civil Engineering
Their article "Pharmaceutical Pollution of
the World's Rivers," bagging the Cozzarelli
Prize



Ms Subhashree Mohapatra
IITH-SUT JDP PhD scholar
Department of Design
Being won the Best Paper Award at MANIT
Bhopal



**Dr Sandipan Ray & his
international collaborators**
Assistant Professor
Department of BioTechnology
Being selected for Wellcome Trust Grant,
UK



Dr Konjengbam Anand
PhD (2019)
Department of Computer Science
& Engineering
Being appointed as an Assistant Professor
at IIT Dharwad



Mr MD Soif Ahmed
PhD Scholar
Department of Physics
Received the Swiss Government Excellence
Scholarship



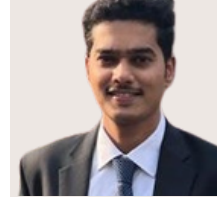
Dr Sayantee Jana
Assistant Professor
Department of Mathematics
Being a member of the Editorial Board of
Statistica Neerlandica Journal



Dr Ashok Kamaraj
Assistant Professor
Department of Materials Science &
Metallurgical Engineering
Being a member of the Editorial Board of
IIM Metal News Magazine



Ms Uma Harathi N
BTech (2017)
Department of Civil Engineering
Bagged the All India Rank-3 in UPSC 2022



Mr Jayasimha Reddy Ravula
BTech (2019)
Department of Electrical
Engineering
Bagged the All India Rank-217 in UPSC
2022



Mr B Umamaheshwar Reddy
BTech (2016)
Department of Mechanical &
Aerospace Engineering
Bagged the All India Rank-270 in UPSC
2022



Dr Sudarshan Kottai
PhD (2020)
Department of Liberal Arts
Appointed as an Assistant Professor at
IIT Palakkad



Prof Chandra Shekhar Sharma
Department of Chemical Engineering
 Being invited as an Editorial Board Member, for an IOP Publishing Journal "Nano Express"



Prof Ashok Kumar Pandey
Department of Mechanical & Aerospace Engineering
 Being appointed as the Chair for Technical Committee in Micromachines, IFToMM



Mr Anuj Sharma
MTech Student
Department of Civil Engineering
 Bagged the Best Presentation Award at the 4th International Conference on Waste Management held at IIT Guwahati



Dr Deepak Bharadwaj PVP
PhD (2020)
Department of Biomedical Engineering
 Being appointed as an Assistant Professor at the National Institute of Pharmaceutical Education and Research (NIPER), Guwahati



Prof Amirtham Rajagopal
Department of Civil Engineering
 Being invited as an Advisory Editorial Board Member in the International Journal of Impact Engineering



Mr Parth Gupta
PhD Scholar
Department of Biotechnology
 Received the RNA Society Poster Presentation Prize



Prof Sireesh S
Department of Civil Engineering
 Being selected as a recipient of the prestigious Australian Awards Fellowship 2023



Mr Debanjan Maity
PhD Scholar
Department of Chemistry
 Received the Poster Award at the IUMRS-International Conference on Advanced Materials and 11th International Conference on Materials for Advanced Technologies



Mr Anil Balajirao Dapkekar
PhD Scholar
Department of Chemistry
 Received the Best Poster Award at the ICOMC (International Conference on Organic and Medicinal Chemistry) Conference at NIT Warangal



Dr Surendra Nadh Somala
Associate Professor
Department of Civil Engineering
 His project "Sound Check" "Lunar gravitational Wave Antenna" Consortium, which has been selected by the European Space Agency for science activities on the Moon

Fifth Indian National Groundwater Conference

Workshop Date: Dec 04, 2023
 Conference Dates: Dec 05-06, 2023

Conference Brochure: <https://shorturl.at/hwX59>

Pre-Conference Workshop
 A one-day pre-conference workshop on "Modeling and Management of Groundwater in Fractured Geologic Media" is scheduled on 04 Dec 2023. As a part of this workshop, the participants will be taught on interpretation of geophysical, tracer, pumping data, and modeling strategies specific to fractured aquifers.

A field trip to IITH hydro-geologic test bed is proposed, where the participants will be field demonstrated on geophysical, tracer, and pumping experiments, use of advanced state of art equipment like ABEM Terrascan, Heat pulse flow meter, Low pressure Packers, Level loggers, TLC meter, Multi-level monitoring system, etc.

Call for Papers
 High quality, original research papers (abstracts) relating to one of the conference themes are invited. Link to Guidelines and submission for extended abstracts will be provided soon.

Important Dates
 Deadline for submission of Abstract: 31 Aug 2023
 Acceptance of submitted Abstract: 15 Sep 2023
 Dead line for Registration: 31 Oct 2023
 Workshop Date: 04 Dec 2023
 Conference Dates: 05-06, Dec 2023

Contact Us
 Dr. K.B.V.N. Phanindra | Dr. N. Seetha
 Co-Convenor
 Department of Civil Engineering, IIT Hyderabad
 Kandi, Sangareddy-502 285, Telangana
 Phone: (040)2301-4306, (040)2301-4300
 E-Mail: ingwc2023@ce.iitb.ac.in

Conference Venue
 The conference will be conducted in Convension Center (CC), IIT Hyderabad
 IIT Hyderabad is located about 40 km from Secunderabad railway station, 30 km from Lingampalli station, and 60 km from Airport
 Geographical coordinates of the venue: 17.5876° N, 78.1197° E

Local Organizing Team
Principal Organizer: IIT Hyderabad
Co-Organizer: NGRI Hyderabad
 JNTUK College of Engineering
 BITS Hyderabad
Convener: Dr. K.B.V.N. Phanindra
 Associate Professor, IIT Hyderabad
Co-Convenor: Dr. N. Seetha
 Assistant Professor, IIT Hyderabad
Members: Dr. Sash Regonda,
 Dr. Sri Zeeshan Ali,
 Dr. Maheswaran Rathnasamy,
 Dr. Shrivu Upadhyaya.

Registration Fee

Category	Conference	Workshop
Students / Research scholars	Rs. 1,000/- (+ 18% GST)	Rs. 2,000/- (+ 18% GST)
Faculty / Scientists	Rs. 4,000/- (+ 18% GST)	Rs. 4,000/- (+ 18% GST)
Industry / Working professionals	Rs. 8,000/- (+ 18% GST)	Rs. 5,000/- (+ 18% GST)

Registration fee includes: workshop/ conference kit, working lunches, and dinner

FIFTH INDIAN NATIONAL GROUNDWATER CONFERENCE
INGWC-2023
 05-06 December 2023



First Announcement & Call for Paper

Organized by
 Department of Civil Engineering
 Indian Institute of Technology Hyderabad

In Association with
 Association of Global Groundwater Scientists




CIMPA

NCM-CIMPA SCHOOL
 ON
 FINITE GEOMETRY
 AND
 CODING THEORY
 Nov 20, 2023 - Dec 1, 2023

Scan Code to visit Website



NCM-CIMPA School on Finite Geometry and Coding Theory

Dates: Nov 20, 2023 - Dec 1, 2023

For more details, Visit:

<https://shorturl.at/uvH18>

3rd International Conference on Main-group Molecules to Materials (MMM III)

Conference Dates: Dec 09 to 11, 2023.

For more details, Visit:

<https://sites.google.com/chy.iith.ac.in/mmm-iii/home?authuser=0>



Scan QR Code to visit Website



Department of Chemistry, IIT Hyderabad

పాఠశాల ప్రకటన
 ముఖ్య అధ్యాపకాధికారి
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Academic Staff



Dr Suresh P

Assistant Professor
Department of MSME

Prior to joining IITH, Suresh was working as an Assistant Professor in IIT Jodhpur and SRM IST Chennai. Before that, he was a postdoctoral fellow at JNCASR, Bangalore, India, SKK University, South Korea and Laboratory CRISMAT, Caen, France. Suresh did his BSc (Physics) and MSc (Physics) from Periyar University, Salem, Tamilnadu and University of Madras, Chennai, Tamilnadu, respectively. Further, he obtained his PhD degree from Materials Research Centre (MRC), Indian Institute of Science (IISc), Bangalore in the year 2013. His research interests are “Thermoelectric Materials & Devices, Thermoelectric Metrology, Magnetic Refrigeration and Powder Metallurgy.

My Experience at IITH:

Indian Institute of Technology Hyderabad's excellent infrastructures, sophisticated teaching equipment, cutting-edge research facilities, young and vibrant faculty members, enthusiastic and dynamic students, holistic healthcare center, and sports facilities with vision-cum-mission-driven administration makes me to be proud and I am indeed happy to be joining a part of it for its growth and development as a teacher and researcher.

Before joining IIT Hyderabad, Dr Kapil Jainwal worked as an Assistant Professor in the Electrical Engineering Department at IIT Bhilai from August 2020. Prior to that, he gained valuable industry experience working with Samsung Research and Development in their Analog design team for approximately two years. He received PhD from IIT Delhi, where he worked in the Integrated Circuit group, focusing on the design of On-chip CMOS image sensors. Before joining the PhD, he worked as a research scholar at the University of California, Riverside, USA. Prior to that, he pursued his Master's degree at IIT Bombay and completed his Bachelor's in Engineering from SGSITS Indore. These diverse experiences have shaped his expertise in the field of Electrical Engineering, specifically in the areas of analog/ digital IC design and CMOS image sensor technology.

My Experience at IITH:

I joined the Electrical Engineering Department at IITH as an assistant professor in June 2023. Joining IITH as a faculty member is a significant milestone in my academic career. As I entered the esteemed institution, I was immediately struck by its lively vibe, vibrant atmosphere, amazing campus and architecture of the buildings, the spirit of intellectual pursuit, facilities, and the passion for learning that permeated the campus. The institute's fellow faculty members, department head and seniors, and administration warmly welcomed me. I was introduced to my colleagues, who were accomplished, researchers and experienced educators. They generously offered their support and guidance, making me feel like an integral part of the department and the institute as well. From day one, I have been enjoying life in the institute. In the first week itself, I started teaching students and taking part in departmental/ institute-level activities, like admissions, recruitment, and many more. I would say it took me no time to settle here down in the department and also in the institute. Overall, joining IITH as a faculty member has been an amazing experience. The institution's commitment to academic excellence, research innovation, and holistic development of students is providing me with a platform to make a meaningful impact in the lives of young minds. I have experienced the life of many IITs in our nation, but IITH is one of the best and most unique institutes in many ways. I am grateful for the opportunities, intellectual stimulation, and supportive community that IIT Hyderabad is providing me as a faculty member.



Dr Kapil Jainwal

Assistant Professor
Department of
Electrical Engineering



Dr Atanu Rajak

Assistant Professor
Department of Physics

Atanu Rajak has been appointed as an Assistant Professor in the Department of Physics at IIT Hyderabad. Prior to joining IITH on 1st June 2023, Atanu was an Assistant Professor at Presidency University, Kolkata from 31st December 2018. Before working at Presidency University, he was a research associate at SINP Kolkata and a postdoctoral fellow at Bar-Ilan University, Israel. Atanu did his BSc from Ramakrishna Mission Vidyamandira, Belur, and obtained his MSc from IIT Bombay, Powai, and PhD degree from SINP Kolkata. His research interests are in the interdisciplinary area of condensed matter and statistical physics that include non-equilibrium many-body physics, thermalization in isolated Floquet systems, and the study of topological systems.

My Experience at IITH:

I feel very fortunate to be a part of an institute like IITH that provides a very dynamic and vibrant academic environment. I also appreciate the welcoming attitude both at the department and institute levels from the first day of my joining. The orientation document sent by email before joining was very informative, it helped me a lot to get to know various aspects as a family member of IITH. While interacting with my colleagues, I find them very supportive and helpful in every way. Last, but not the least, the administrative support of the institute makes me very comfortable and joyous for a smooth changeover. I hope this excellent experience will go on, and I will be able to enrich my teaching and research career in the coming years. I am now eagerly looking forward to working together with esteemed researchers at IITH and across the globe to contribute to the growth of IITH and the science overall.

Dr Indranil was primarily trained in veterinary medicine (Bachelor of Veterinary Sciences & Animal Husbandry; BVSc and AH) from West Bengal University of Animal and Fishery Sciences (WBUAFS), India. After his bachelor's in veterinary science, he completed his master's degree (MS) in Biology from New Mexico Tech (NM, USA) and his PhD in Biochemistry from Texas A&M University College Station (Texas, USA). Before joining IIT Hyderabad Indranil was a research fellow at the University of Michigan, funded by a fellowship from the Alzheimer's Association, USA. His broad research interest is to study fundamental mechanisms of the gene expression process in relation to human diseases and utilize this work to develop novel therapeutic strategies. In particular, he has extensively worked on the regulation of RNA metabolism in neurodegenerative diseases.

My Experience at IITH:

I joined IITH two weeks ago. After joining IITH, even within this short period of time, I have realized how helpful and cooperative the IITH community is. I want to particularly mention that all the academic section staff are extremely helpful, and they made my joining process very smooth. I am also glad to be a part of the Department of Biotechnology, where my colleagues are very welcoming and supportive. Many of my colleagues have kindly helped me on settling down and start my journey at IITH. Altogether, I can say that IITH provides a vibrant, supportive, and collaborative environment that is ideal for young faculties.



Dr Indranil Malik

Assistant Professor
Department of
Biotechnology

Non- Academic Staff

Mr Anup Kumar Shahi has done his BTech in Electronics and Communication Engineering from Uttar Pradesh Technical University and MTech in VLSI from Galgotias University.



Mr Anup Kumar Shahi

Junior Technician
Department of Electrical
Engineering

My Experience at IITH:

First of all, I would like to put big thanks to IITH for giving me a chance to work with it. With an all-time learning attitude hopefully, I will sharpen my knowledge from the available resources and try to deliver my best for further development of IITH. As long in the process it is a better environment to work with in the working place. With a positive and can-do attitude, I will be happy to serve IITH.

Mr R Hari Krishna, a Chemical Engineering graduate from Andhra University, before joining the prestigious IITH, had the privilege of working at the M/s South Asia LPG Company, a joint venture between HPCL and Total Energies for 2 years, where he honed many skills and gained invaluable insights in the LPG Cavern. Prior to his stint at the LPG company, he spent 4 years at M/s Aurobindo Pharma Ltd, where he had the opportunity to work in the Technical services wing and gained expertise in optimizing processes to enhance efficiency and productivity.

His areas of interest are Mass transfer operations, Scale up technology, Process design calculations, Process Safety hazard analysis, Product development, and Process simulation soft wares such as Aspen Plus, etc.



Mr Ramireddi Hari Krishna

**Technical Superintendent
Department of Chemical
Engineering**

My Experience at IITH:

I am incredibly grateful for the opportunity to work at India's premier institute -IITH.

Moreover, I feel very proud to work with exceptionally talented individuals whose expertise and passion were truly inspiring. The collaborative environment at IITH is truly exceptional. It nurtures us in all aspects of Life.



Mr Singam Sampath

**Junior Technician
Department of
Chemistry**

Mr Singam Sampath joined IIT Hyderabad as a Junior Technician in the Department of Chemistry. He did his PG in MSc Organic Chemistry from Osmania University. After that, he joined GVK Bio-Sciences PVT Ltd and worked there for a period of 2 years. He had more than 2 years of experience in the field of Research and Development in Chemical development services.

My Experience at IITH:

It's a great opportunity for me to work with an Institute of national importance. Starting with a cordial welcome to the department, I had good interaction and exposure in the department just within a few days. With this good start, I hope to keep up the good work to the extent possible in the ensuing days.

Mr Anbumani D completed his MSc in Genetic Engineering from Bharathiar University Coimbatore, Tamil Nadu. He brought with him a decade of invaluable experience in the field of Biology and molecular biology especially in wet labs and academic areas in the reputed institutions in India such as CMC Vellore, THSTI, and IISER.

My Experience at IITH:

I am delighted to introduce myself as Anbumani D, a recent addition to the team at the prestigious Institute. I am thrilled to be a part of this esteemed institution. Born and raised in the vibrant southern part of India, specifically Tamil Nadu, I have developed a deep-rooted passion for scientific exploration and collaboration. As I embark on this new journey, I am incredibly eager to engage with each and every one of you, working together towards the shared mission of IIT Hyderabad. Let us join hands and strive toward achieving remarkable milestones in our pursuit of knowledge and innovation.



Mr Anbumani D

**Technical Officer
Department of
Biomedical Engineering**



Mr Manivel Rajendran

**Technical Officer
Computer Center**

Mr Manivel Rajendran working as a Technical Officer at the Computer Center, IITH, has done his BE in Electronics and Communication Engineering from Pavendar Bharathidasan College of Engineering and Technology (Anna University - Chennai, Tamilnadu). After completing his education, he worked for two years in Chennai (Neurons Software Consultancy and Info Services (IBM)) and 11 years at IIT Bombay. He has technical experience in the field of Linux Server Administration, Networking, and Cyber Security.

My Experience at IITH:

I feel proud to be part of IIT Hyderabad, and it is the best place for me to learn and excel in the field in which I am working. It is an excellent opportunity to enhance my technical skills and knowledge. I am pleased to contribute to the institute's growth and career.



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भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

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