SPARK

Newsletter of the Department of Chemical Engineering

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Highlights in this Newsletter

From HOD's Desk

The COVID-19 second wave is brutal. I sincerely hope that all of you stay safe. It has been more than a year since our regular work schedule has been disrupted by this pandemic. Our students and faculty have never let the department performance down due to this pandemic anyhow. It has been very impressive to see the hard work by them.

This year's student merit scholarship program was held and I congratulate all the students who received this merit scholarship. Despite the COVID lockdown, this year we have many of our students got placed in good MNCs with impressive salaries. I extend my warm greetings to them and I wish them my best for their future endeavours. Also, it is heartening to see that many students have participated in webinars, conferences and workshops held online.

Our department alumni interaction has been held successfully and it was really a happy moment to see our students from various part of the world, long time after they moved out of our campus.

Faculty research is always strong in Chemical Engineering department. This time also, our faculty have published many quality papers in some leading journals. I congratulate Dr. P. Senthil Kumar and Dr. V. Jaikumar for being instrumental in signing important MoUs with industries.

Our research scholars are continuing their work, despite this pandemic crisis. They are supportive to their supervisors and to the Research in Chemical Department. I appreciate their efforts and praise their hard work.

On the whole, this has been a great journey and we will continue to thrive and develop our limits to achieve much bigger things.

STUDENT ACTIVITIES

Merit Scholarships 2021

S.No	Student Name	Year	CGPA	Scholarship Status	Photos
1	Vasudhareni R	II	9.42	Exemplary	
2	Aishwarya B	II	9.29	Outstanding	
3	Jagadheesh H C	II	9.28	Outstanding	
4	Anitha V	III	9.48	Exemplary	
5	Nanditha Ram Satagopan	III	9.47	Outstanding	
6	Pooja S	III	9.45	Outstanding	
7	Mehala R	IV	9.64	Exemplary	
8	Lakshman K	IV	9.55	Outstanding	
9	Dhanush R	IV	9.49	Outstanding	
10	Preethi V	IV	9.49	Outstanding	
11	Subash J	IV	9.49	Outstanding	

PLACEMENT DETAILS - BATCH - 2017 - 2021

S.No.	Name	Company	Category	Salary per Annum Rs.
1	Abhishek B	TCS	Non-Core	360,000.00
2	Ajeema Begum A	Cognizant	Non-Core	401,000.00
3	Bharkavi B	Infosys	Non-Core	360,000.00
4	Dhanush R	TCS	Non-Core	360,000.00
5	Gnaneshwar L	TCS	Non-Core	360,000.00
6	Lakshman K	Cognizant	Non-Core	401,000.00
7	Lavanya G	Cognizant	Non-Core	401,000.00
8	Malarvizhi A	Cognizant	Non-Core	401,000.00
9	Mugilan L	TCS	Non-Core	360,000.00
10	Preethi V	Cognizant	Non-Core	401,000.00
11	Shreya S	Freshworks	Non-Core	480,000.00
12	Shweta KS	McKinsey	Core	1,000,000.00
13	Sibi Sankar M	Cognizant	Non-Core	401,000.00
14	Subash J	TCS	Non-Core	360,000.00
15	Sujitha S	Infosys	Non-Core	360,000.00
16	Suryaprakash S	Hyundai Motor	Non-Core	680,000.00
17	Vaishnavi G	Cognizant	Non-Core	401,000.00
18	Vinatha V	TCS	Non-Core	360,000.00
19	Vyass Valsaraj	TCS	Non-Core	360,000.00

Online Internships, Courses & Webinars Attended

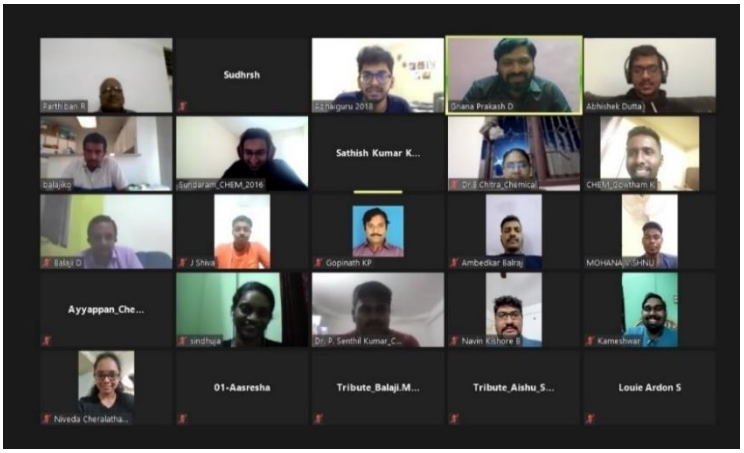
Name of the Student	Internships/Courses/Webinars Attended	Organized/offered by
Aindrila Mandal (II Yr B.Tech)	Webinar on "Introduction to MATLAB"	ACE - IIChE – SSN Student Chapter
	15 Hours Course on Finance for Engineering Professionals	SSNCE and Dr. Thomas Smith from Emory University, USA
CS Poorva (II Yr B.Tech)	Internship on Petroleum Refinery Engineering	Indian Institute of Chemical Engineers
	15 Hours Course on Finance for Engineering Professionals	SSNCE and Dr. Thomas Smith from Emory University, USA
	SYCON (SSN Youth Conference)	SSN Entrepreneurship Development Cell
	Webinar on "Introduction to MATLAB"	ACE - IIChE – SSN Student Chapter
Jagannath S (II Yr B.Tech)	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
Joshua T (II Yr B.Tech)	Finance for Engineers-One Credit Course	Dr.Thomas More Smith,Emory Goizuetta Buisness School
	C for Everyone: Programming Fundamentals	University of California, Santa Cruz offered through Coursera
	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
M.Guruprakash (II Yr B.Tech)	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
Rakshith VS (II Yr B.Tech)	Internship on Petroleum Refinery Engineering	Indian Institute of Chemical Engineers
Reshma.A. (II Yr B.Tech)	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
Rohith Viswanath S (II Yr B.Tech)	Summer Internship-Six Sigma Yellow Belt Certification	Indian Institute of Chemical Engineers
	Finance for Engineers-One Credit Course	Dr.Thomas More Smith,Emory Goizuetta Buisness School
Sharon Jose R B (II Yr B.Tech)	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
Shruthi P (II Yr B.Tech)	Webinar on "Introduction to MATLAB"	ACE - IIChE – SSN Student Chapter

	Finance for Engineers-One Credit Course	Dr.Thomas More Smith,Emory Goizuetta Buisness School
	Summer Internship-Six Sigma Yellow Belt Certification	Indian Institute of Chemical Engineers
	SYCON (SSN Youth Conference)	SSN Entrepreneurship Development Cell
Sravya Indraganti (II Yr B.Tech)	Finance for Engineers-One Credit Course	Dr.Thomas More Smith,Emory Goizuetta Buisness School
Supraja M (II Yr B.Tech)	Internship Programme on Chemical Process Technology	Indian Institute of Chemical Engineers
Thirthaa (II Yr B.Tech)	Summer Internship-Six Sigma Yellow Belt Certification	Indian Institute of Chemical Engineers
	Finance for Engineers-One Credit Course	Dr.Thomas More Smith,Emory Goizuetta Buisness School

Alumni Updates

TRIBUTE'21

The event is about get-together of our alumni and staffs of Chemical Engineering Department, SSN College of Engineering.



On the day of 04 January 2021, the main event was kick started around 7.45 PM through ZOOM. It happened for about one and half hour and then the department the participants were segregated into the breakout rooms. HOD of Chemical Engineering Department initiated the event by welcoming our alumni. A fabulous video of our department was played. Our alumni raised a question how was the information regarding abroad education is transferred. Our HOD answered that we are posting all that information on notice board. Around 5-6 people of Batch 2016 who are doing their higher education in abroad has created a group in LinkedIn. In order to help students to pursue their higher education, Their LinkedIn ID has been shared to our fellow students. The meeting came to an end by 11 PM.

FACULTY ACTIVITIES

Paper Publications

1. Adsorption Characteristics of Magnetic Nanoparticles Coated Mixed Fungal Biomass for Toxic Cr (VI) ions in Aquatic Environment, A. Saravanan, P. Senthil Kumar*, M. Govarthanan, Cynthia Susan George, S. Vaishnavi, B. Moulishwaran, S. Praveen Kumar, S. Jeevanantham, P R Yaashikaa, Chemosphere, Vol. 261, pp. 12922 2021, Clarivate: 5.77 https://doi.org/10.1016/j.chemosphere.2020.129226
2. Spectral, thermal and morphological studies of fluorescent dye grafted diblock copolymers, R. Anbarasan, B. Meenarathi, P. Senthil Kumar, P. Vellaichamy, Journal of Macromolecular Science, Part A: Pure and Applied Chemistry, 2021, Clarivate: 1.349, https://doi.org/10.1080/10601325.2020.1866435
3. Treatment of methanol industry effluent using algal biomass, Gelidium omanense-Kinetic modelling, N. Rajamohan*, P. Senthil Kumar, M. Rajasimman, Fatma, Al Qasmi, Chemical Engineering Journal Advances, Vol. 5, pp. 100068, 2021, Scopus https://doi.org/10.1016/j.ceja.2020.100068
4. Enzyme-loaded nanoparticles for the degradation of wastewater contaminants: a review, V. Karthik, P. Senthil Kumar*, Dai-Viet N. Vo, P. Selvakumar, M. Gokulakrishnan, P. Keerthana, V. Audilakshmi, J. Jeyanthi Environmental Chemistry Letters, 2021, Clarivate: 5.992, https://doi.org/10.1007/s10311-020-01158-8,
5. Effect of antibiotics on the microbial efficiency of anaerobic digestion of wastewater: A review Leilei Xiao, Yiping Wang, Eric Lichtfouse, Zhenkai Li, P. Senthil Kumar*, Jian LIU, Dawei Feng*, Qingli Yang, Fanghua Liu, Frontiers in Microbiology, Vol. 11, pp. 611613, 2021, Clarivate: 1.69, 10.3389/fmicb.2020.611613
6. Sustainable Strategy for the Enhancement of Hazardous Aromatic Amine degradation using lipopeptide biosurfactant isolated from Brevibacterium casei, Femina Carolin C, P. Senthil Kumar*, G. Janet Joshiba, Pavithra Madhesh, Racchana Ramamurthy, Journal of Hazardous Materials, Vol. 408, pp. 124943, 2021, Clarivate: 9.038, https://doi.org/10.1016/j.jhazmat.2020.124943
7. Simultaneous removal of Cu(II) and Reactive Green 6 dye from wastewater using immobilized mixed fungal biomass and its recovery, A. Saravanan, S. Karishma, P. Senthil Kumar*, Sunita Varjani**, P.R. Yaashikaa, S. Jeevanantham, Racchana

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8. Ultrasonic Assisted Agro Waste Biomass for Rapid Removal of Cd(II) ions from Aquatic Environment: Mechanism and Modelling Analysis, A. Saravanan, P. Senthil Kumar*, Dai-Viet N. Vo, S. Swetha, P. Tsopbou Ngueagni, S. Karishma, S. Jeevanantham, P.R. Yaashikaa Chemosphere, Vol. 271, pp. 129484, 2021, Clarivate: 5.778 https://doi.org/10.1016/j.chemosphere.2020.129484
9. Effective removal of Cr(VI) ions from synthetic solution using Mixed Biomasses : Kinetic, Equilibrium and Thermodynamic study, A. Saravanan, P. Senthil Kumar*, Sunita Varjani*, S. Karishma, S. Jeevanantham, P.R. Yaashikaa Journal of Water Process Engineering, Vol. 40, pp. 101905, 2021, Clarivate: 3.465, https://doi.org/10.1016/j.jwpe.2020.101905
10. A review on algal-bacterial symbiotic system for effective treatment of wastewater, A. Saravanan, P. Senthil Kumar*, Sunita Varjani, S. Jeevanantham, P.R.Yaashikaa, P. Thamarai, B. Abirami, Cynthia Susan George, Chemosphere, Vol. 271, pp. 1295402021, Clarivate: 5.778, https://doi.org/10.1016/j.chemosphere.2021.129540
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12. Efficient Electrophoretic deposition of an intensification process to enhance the mechanical properties of Glass fibre reinforced polymer, M.S. Nisha*, K. V. Ravali, P. Senthil Kumar*, P. Faruk Khan, P. Vinay, K. Jairam, Chemical Engineering and Processing: Process Intensification, Vol. 160, pp. 108298, 2021, Clarivate: 3.731, https://doi.org/10.1016/j.cep.2021.108298
13. A Review on Cleaner Approach for Effective Separation of Toxic Pollutants from Wastewater using Carbon Sphere's as Adsorbent: Preparation, Activation and Applications, R. Sivaranjanee, P. Senthil Kumar* Journal of Cleaner Production, Vol. 291, pp. 125911, 2021, Clarivate: 7.246, https://doi.org/10.1016/j.jclepro.2021.125911
14. Effective removal of malachite green dye from aqueous solution in hybrid system utilizing agricultural waste as particle electrodes, A. Annam Renita, Kilaru Harsha Vardhan* P. Senthil Kumar*, P. Tsopbou Ngueagni, A. Abilarasu, Subi Nath, Pallavi Kumari, R. Saravanan Chemosphere, Vol. 273, pp. 129634, 2021, Clarivate: 5.778, https://doi.org/10.1016/j.chemosphere.2021.129634

15. An effective separation of toxic arsenic from aquatic environment using electrochemical ion exchange process B. Senthil Rathi, P. Senthil Kumar*, R. Ponprasath, K. Rohan, N. Jahnavi, Journal of Hazardous Materials, Vol. 412, pp. 125240, 2021, Clarivate: 9.038, https://doi.org/10.1016/j.jhazmat.2021.125240
16. Preparation of PAN/lycopene-TiO_2 nanocomposite membrane for azo dye degradation Devi Baskar, Gobi Nallathambi*, Arun Karthick Selvam, P. Senthil Kumar* Desalination and Water Treatment, 1–9 2021, Clarivate: 1.234, 10.5004/dwt.2021.26896
17. Prediction on Water Quality of a Lake in Chennai, India using Machine Learning Algorithms, D. Venkata Vara Prasad, Lokeswari Y Venkataramana, P. Senthil Kumar*, G. Prasannamedha, K. Soumya, A.J. Poornema, Desalination and Water Treatment, 1–8 2021 Clarivate: 1.234, 10.5004/dwt.2021.26970
18. Sustainable Adsorbents for Decontamination of Pesticides from Water: A Review, Muthamilselvi Ponnuchamy, Ashish Kapoor*, Ponnusamy Senthil Kumar*, Dai-Viet N. Vo, Akash Balakrishnan, Meenu Mariam Jacob, Prabhakar Sivaraman, Environmental Chemistry Letters, 1-39 2021, Clarivate: 5.992, 10.1007/s10311-021-01183-1.
19. Effective separation of toxic phenol from aquatic system using membrane assisted solvent extraction system, E. Poonguzhali, Ashish Kapoor*, P. Senthil Kumar, S.Prabhakar Desalination and Water Treatment, 1–12, 2021, Clarivate: 1.234, 10.5004/dwt.2021.27037
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25. Green Synthesis of Copper Nanoparticles using Sesbania aculeata to Enhance the Plant Growth and Antimicrobial Activities, V. Tamil Elakkiya, R.V. Meenakshi, P. Senthil Kumar*, V. Karthik, K. Ravi Shankar, P. Sureshkumar, A. Hanan International Journal of Environmental Science and Technology, 1-11 2021, Clarivate: 2.54
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39. Techniques and modeling of polyphenol extraction from food: A review Adithya Sridhar, Muthamilselvi Ponnuchamy, Ponnusamy Senthil Kumar*, Ashish Kapoor*, Dai-Viet N. Vo, Sivaraman Prabhakar, Environmental Chemistry Letters, 2021, Clarivate: 5.992
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47. Stimulation of Bacillus sp. by lipopeptide biosurfactant for the degradation of aromatic amine 4-Chloroaniline, Femina Carolin C, P. Senthil Kumar*, B. Chitra, Fetcia Jackulin C, Racchana Ramamurthy, Journal of Hazardous Materials, Vol. 415, pp. 125716, 2021 Clarivate: 9.038, https://doi.org/10.1016/j.jhazmat.2021.125716
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Conference, Guest lectures, Workshops and Webinars Organized

1. Dr. D. Balaji Ph.D, ASP, IIChE-SSN Student Chapter, organized 7th National Conference On "Sustainable Trends in Energy and Environmental Resources (STEER 2021)" on March 26 & 27, 2021.

Industrial Collaboration & MOU

1. Dr. P. Senthil Kumar, ASP had a discussion with Dr.S.Raghu, Director, EMRION TECHNOLOGY PVT ltd, Chennai for consultancy project work and MoU between SSN and EMRION TECHNOLOGY PVT ltd, Chennai on 19-03-2021
2. Dr. P. Senthil Kumar, ASP gave the presentation for interim reports on the L&T Consultancy Project titled "Treatability studies on the optimization of ozone and carbon dosages for the effective removal of contaminants from secondary treated effluent" to the L&T Team on 31-03-2021 and received the excellent feedback from the L&T team and they are highly satisfied with the results and the presentation.

3. Dr V Jaikumar was instrumental in signing Memorandum of understanding with SEED for Safety organisation for doing consultancy projects in Industrial safety, Hazard analysis, HAZOP studies ETP design and trouble shooting. Mar 2021.

External Recognition

1. **Prof. Dr. R. Parthiban** delivered a talk titled "Intensification of Heat Transfer Rate using Nano Fluids" on 20 Feb 21 in the Two-Week AICTE sponsored Faculty Development Programme on "Recent Trends in Nano Materials and its Applications" (Series I) held during 15 - 27 February 2021 organized by Department of Chemical Engineering, Coimbatore Institute of Technology, Coimbatore - 641 014, Tamil Nadu.

2. **Dr. K. Jagannathan, ASP**, delivered an invited talk on "Photo Oxidation of organic matter in water" in the 3-day CPCB sponsored online Training Programme on "Advanced Oxidation Technology – A futuristic way forward for treatment of recalcitrant pollutants" organized by Centre for Environmental Studies, Anna University, Chennai on 25.02.2021

3. **Dr. P. Senthil Kumar, ASP** has acted as a Ph.D. Doctoral Committee Member for the research candidate in the Department of Chemical Engineering, Sathyabama Institute of Science and Technology, Chennai on 07-02-2021
4. **Dr. P. Senthil Kumar, ASP** has acted as an external examiner to evaluate the Ph.D. Thesis titled "Nanocomposite Hydrogels: Fabrication, Characterization and Applications" from Faculty of Sciences, Shoolini University, Solan, Himachal Pradesh on 14-02-2021
5. **Dr. P. Senthil Kumar, ASP** delivered the Guest Lecture titled "Reactor Design" at the Department of Biotechnology, Government College of Technology, Coimbatore on 26-02-2021
6. **Dr. P. Senthil Kumar, ASP** delivered the Guest Lecture titled ""Gas liquid reactions"" at the Department of Biotechnology, Government College of Technology, Coimbatore on 01-03-2021"
7. **Dr. P. Senthil Kumar, ASP** delivered the Guest Lecture titled "Research Methodology in Wastewater Treatment" at the Department of Chemical Engineering, Erode Sengunthar Engineering College, Perundurai on 26-03-2021
8. **Dr. D.Balaji** attended DC Meeting for Mr. Vellampalli Mohan Venkata Saikrishna, SRMIST, Chennai on January 29, 2021

Research Scholar's Info

1. Dr.R.Anantharaj, ASP conducted the first DC meeting for his part-time research scholar, Mr.Kadambanathan K on 23rd Jan 2021.
2. Mrs Arthi, PhD Scholar of Dr V Jaikumar submitted Thesis to Centre for Research, Anna University on 29-1-2021.
3. Ms. R.K. Nilavuckkarasi (17247697211/Ph.D./AR13) Full Time Research Scholar of Dr. B. Ambedkar (Supervisor) Associate Professor, presented a pre-synopsis seminar titled "Megasonics-Assisted Carbon-Rich Solvent Regeneration in Solvent-Based Post-Combustion CO_2 Capture Process (PCCC)" on 13.02.2021 at 10.30am.
4. Dr.R.Anantharaj, ASP conducted the synopsis DC meeting for his Full time research scholar, R Achsah (16245997138) on 24.02.2021.
5. Dr. D. Balaji, ASP conducted the DC Meeting for his part-time research scholar, Mr. R Gnanasekaran on 24.03.2021.

6. Ms. Dhanya Vishnu., Ph.D (Full time) scholar under the supervision of Dr. D. Balaji, Associate Prof has been awarded CSIR-SRF grant.
7. Dr. R. Anantharaj, ASP conducted the synopsis DC Meeting for his full-time research scholar, Mr. M.S. Vivek on 18.03.2021.
8. Mr. Nagarajan Arumugam, Part-time PhD Scholar of Dr. D. Balaji, presented a paper entitled 'Biosorption of malachite green dye by chemically modified Aspergillus tamarii: kinetics, thermodynamic and equilibrium studies' in 6th International Conference on Nanoscience and Nanotechnology (ICONN 2021)' SRM IST, Kattankulathur, Tamil Nadu, India on February 1-3, 2021.
9. Ms. A Arunthathi, JRA of Dr. D. Balaji, presented a paper entitled 'Mini Review on Centralized Waste Management System in India' in Virtual International Conference on Sustainable Practices and Innovations in Civil Engineering (SPICE 2021) organized by Department of Civil Engineering, SSN College of Engineering on March 19 & 20, 2021.

External Projects Applied

Name of the Faculty	Project Title	Agency & Budget
(Students Project IV Year) Kayalvizhi A, Malarvizhi A & Shreya S Under the Guides Dr. Kilaru Harsha Vardhan, Dr. P. Senthil Kumar	Assessing the capability of bacteria for the bioremediation of toxic food additive azo dye (Tartrazine)	Tamil Nadu State Council for Science and Technology. Rs. 10000/-
Students Project IV Year Jahaguri R J B, DhanushaR & Hemapriya D Under the Guide Dr. R. Anatharaj	Isolation of cardanol from cashew nut shell liquid using deep eutectic solvent at 298.15 K and Atmospheric pressure	Tamil Nadu State Council for Science and Technology. Rs. 10000/-
Students Project IV Year Lakshman K, Lavanya G & Gokul R Under the Guide Dr. K. Sathish Kumar	Removal of naphthol green-B dye from water matrices using deep eutectic	Tamil Nadu State Council for Science and Technology. Rs. 10000/-

Dr. J. Dhanalakshmi Dr. J. Umarani IIITD&M	Novel energy efficient process for Sox & Nox removal from coal-fired power plant flue gas stream using ionic liquids	DST SERB POWER Rs. 29.90 Lakhs
Dr. R. Anantharaj	Simultaneous dichlorination and decolourization of industrial wastewater using deep eutectic solvent: Quantum chemical calculations and experiments	CSIR Rs. 69.49 Lakhs
Dr. R. Parthiban Dr. N. P. Rajesh (Physics)	Design and synthesis of polyaspartiamide based polymeric networks for the high performance of fuel cell applications	DST - SERB Rs. 47.54 Lakhs
Dr. K. Sathishkumar Dr. R. Rengaraju(EEE) Dr. G. R. Venkatakrishnan (EEE)	AI based real time health monitoring system for a modified Li – Graphene battery with electrolyte synthesized form waste plastics	DST SERB CRG Rs. 39.66 Lakhs
Dr. S. V. Srivapriya (Civil) Dr. D. Balaji	Valorisation of landfill waste material in the construction industry	DST SERB CRG Rs. 24.79 Lakhs
R. Ananathraj Dr. V. Thiyagarajan(EEE) Dr. R. Regaraju (EEE)	Electrochemical hydrogen oxygen production from salinated water electrolysis using deep eutectic solvent as electrolytes: Towards the best device	DST SERB CRG Rs. 53.22 Lakhs

Online FDP, Webinar, Conference & Courses Attended

S.No	Name of the faculty	Details of webinar/ FDP/Course	Organised by/ Offered by
1	Dr. R Parthiban, Professor	Webinar on "Nuclear Energy Opportunities and Challenges for Chemical Engineers"	National Institute of Technology Rourkela, on 23.12.2020
2	Dr.V.Jaikumar Associate Professor	Webinar on "Process of Innovation Development"	SSN - IIC on 04-01-2021
3		Webinar on, "Insights to National Innovation & Start-up Policy 2020	SSN - IIC on 06-01-2021
4		Webinar on "Demystifying PSO in NBA Perspective"	SSN - IIC on 30-01-2021.
5		Webinar on "IPR Rights and IP Management for Start-up	SSN - IIC on 06-02-2021.

6		FDP on "Emerging Research Trends on Battery and Electric vehicle Technology"	SSN College of Engineering, 25 -26 Feb
7		Webinar on "Quality Enhancement in HEI-NBA perspective" by Prof. T. Thyagarajan, Dean, Madras Institute of Technology, Chennai	IQAC -SSNCE on 13.03.2021
8		Webinar on ""Recent Trends in World of Patents"	SSN-IIC & Cintelligence Services Private Limited on 27.03.2021
9	Dr. K. Jagannathan Associate Professor	Webinar on "Demystifying PSO in NBA Perspective"	SSN - IIC on 30-01-2021.
10		Webinar on "IPR Rights and IP Management for Start-up	SSN - IIC on 06-02-2021.
11		Webinar on "Quality Enhancement in HEI-NBA perspective" by Prof. T. Thyagarajan, Dean, Madras Institute of Technology, Chennai	IQAC -SSNCE on 13.03.2021
12	Dr. D. Gnana Prakash, Associate Professor	Online FDP on "Green Technology & Sustainability Engineering"	Coimbatore Institute of Technology, Coimbatore, 18.01.2021-22.01.2021
13	Dr. M. Subramanian, Associate Professor	Online STTP on Moodle Learning Management System	Center for Educational Technology, National Institute of Technology Warangal, 04-08 Jan 2021
14		ISO Internal Auditor Training for Faculty	TUV - NORD Training Academy at SSN during 24-25 Feb 2021
15	Dr. D.Balaji, Associate Professor	Webinar on "Referencing and Citation Tools: Mendeley"	Association with Elsevier on January 8, 2021
16		Online FDP on "Waste Technology"	4-8 Jan-2021, NIT Warangal.
17		Webinar on "Advanced Functional Nanomaterials and Their Applications"	Sri Ramakrishna Engineering College, Vattamalaipalayam, Coimbatore, on 09-03-2021.
18		Presented a paper entitled 'Production of Oil from Waste Thermoplastics by Pyrolysis' in '**International Virtual Conference on Advances in Nanoscience and Nanotechnology (ICANN 2021)**' Sponsored by Tamil Nadu State Council for Science and Technology	Department of Chemistry, School of Science & Humanities, Bharath Bharath Institute of Higher Education and Research (BIHER) Chennai–600073, Tamil Nadu, India on February 05-06, 2021.

19		Presented a paper entitled 'Studies on surface engineered magnetic nanocomposites integrated with biochar in the treatment of heavy metals and the production of value-added products from the spent adsorbent' in **6th International Conference on Nanoscience and Nanotechnology (ICONN 2021)**	SRM IST, Kattankulathur, Tamil Nadu, India on February 1-3, 2021.
20	Dr. B. Ambedkar Associate Professor	Webinar on "IPR Rights and IP Management for Start-up	SSN - IIC on 06-02-2021.
21		Webinar on ""Recent Trends in World of Patents"	SSN-IIC & Cintelligence Services Private Limited on 27.03.2021
22		Webinar on "Milestone flexible microwave synthesis platform – flexiWAVE"	Milestone India Pvt Ltd on 12.03.2021
23	Dr.R.Anantharaj Associate Professor	Online STTP on " Ionic Liquids and Deep Eutectic Solvents with Nature	Department of Chemical Engineering, Indian Institute of Technology Guwahati, 10-13, Mar 2021.
24		Presented a paper entitled "Isolation of Cardanol from Cashew Nut Shell Liquid using Deep Eutectic Solvents" in the Two-day **International Conference on Recent Technologies and Advanced Materials for Green Energy and Sustainable Environment**	National Institute of Technology Tiruchirappalli, Tiruchirappalli during March 12-13, 2021.
25	Dr. Kilaru Harsha Vardhan, Associate Professor	FDP on "Emerging Food Processing Technologies: Prospects and Challenges for Food and Nutrition Security"	Department of Food Engineering & Technology, Tezpur University,4 - 8 January 2021
26		Online FDP on "Blended Learning and Flipped Classroom"	National Institute of Technical Teachers Training and Research, Chandigarh. 1-5, Feb 2021
27	Dr.B.Chitra, Associate Professor	Online FDP on "Green Technology & Sustainability Engineering"	Malaviya National Institute of Technology, Jaipur" 04 to 08 Jan.2021
28		Online FDP on "Alternate Fuels"	A.D.Patel Institute of Technology, 08-12, Feb 2021

Other Activities

1. Dr K Jagannathan, ASP, demonstrated **COPO attainment** tool that he has developed to the team members of Civil, CSE, EEE & BME separately during 12-30 Jan 2021. He also customized the tool and handed over to them as per the requirements of Civil, EEE and BME.
2. Dr K Jagannathan, ASP, proposed and demonstrated a **Google form-based approach to manage Leave Application System with ease** during Feb 2021.

3. Dr J Dhanalakshmi ASP created a new research lab "**Solvent Development for Clean Technology**" in the existing process control lab funded by DST, SERB (File No: ECR/2016/001744, Sanctioned Amount INR 26.52 Lakh).

RECENT ADVANCEMENTS IN CARBON CAPTURE

U.S. Department of Energy's Pacific Northwest National Laboratory—along with Fluor Corp. and the Electric Power Research Institute (EPRI) developed a low viscous, water lean EEMPA solvent which utilizes 17% less energy and reduces cost by 19%. The study on EEMPA claims that it can capture $47.10 against commercial carbon capture technology at roughly $58.30 per metric ton of CO_2. EEMPA was made low viscous by promoting intern hydrogen bonding and equipment costs were reduced by using plastic instead of steel.

Noya Labs converted industrial cooling towers into CO_2 capture devices that could absorb half a ton and a ton of carbon dioxide per day. The CO_2 regenerated from cooling towers can be sold to industrial consumers. Their initial experimentation on home level consumer air purifier failed as it was uneconomical. For initial investments, the company had ties with tech investment firm fifty years, and Chris Sacca's lower carbon capital. Noya would be producing commercial CO_2 at less than $100 per ton where other companies sell it for 600-700$. Calgary-based Suncor

Energy Inc. is investigating in Vancouver-based Svante Inc in commercialisation of carbon capture technology. Svante says Suncor is taking part in a funding round generating US$25 million, bringing the total under its Series D financing to US$100 million. Aker Carbon Capture (ACC) and Siemens Energy have signed MOU to develop carbon capture solutions for gas turbines and gas-fired power plants. The collaboration will initially focus on European market to combine gas turbines with carbon capture and storage technology.

Centre for Carbon Capture and Utilization

Centre for Carbon Capture and Utilization (CCCU) vision is to focus research activities on alternate energy efficient carbon capture technologies. This research activities sub-divided into novel solvent development, energy efficient solvent regeneration techniques, process optimization on conventional Solvent-Based Post-Combustion Carbon Capture (PCCC) process and conversion of CO_2 into useful products. We express gratitude to Sri Sivasubramaniya Nadar College of Engineering for constant support on the research activities in Carbon Capture. A new space of 241 Sq.m. is allotted at Bio-medical Engineering block, 3rd floor for Centre for Carbon Capture and Utilization (CCCU) which was inaugurated by HOD/Chem on 3rd Mar 2021.

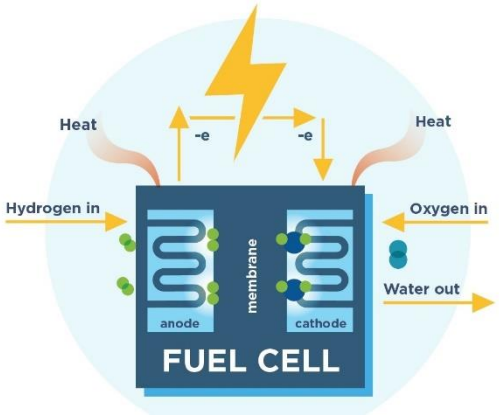
CENTRE FOR CARBON CAPTURE AND UTILIZATION
INAGURATION DAY 03.03.2021

Dr B Ambedkar, Associate Professor,
Centre for Carbon Capture and Utilization
Department of Chemical Engineering, SSNCE

SCOPE AND DEVELOPMENT AREAS OF THE BIOCHEMICAL INDUSTRY

The biochemical industry is an endless gold mine for those who can approach and exploit it in an effective and efficient manner. The need for clean and renewable substitutes of energy is necessary in a world like ours. There is a plethora of topics that are currently under research and development. Some of them have been mentioned below.

Fuel Cells and Batteries: As we saw earlier, fuel cells are a novel inclusion to the inventory of alternate energy sources having minimal or zero-CO_2 emission. Microbial Fuel Cells (MFCs) have been described as bioreactors that convert the energy in the chemical bonds of organic compounds into electrical energy through catalytic activity of microorganisms under anaerobic conditions. They have been tested to be potential bioelectricity sources generated from organic biomass and waste. Although MFCs are highly advantageous in many aspects, they have several drawbacks that are being researched upon to develop a more sustainable model. Again, as we discussed earlier, a class of Direct Methanol Fuel Cells (DMFCs) also generate bioelectricity from methanol via oxidation. However, there are certain issues to be troubleshot. The electro-oxidation kinetics is slow, various surface-intermediates are formed during the electrode reactions, other unwanted species like CO and formaldehyde are produced as intermediates and they do not readily oxidise and remain adhered to the catalyst surface, inhibiting desired product formation. Thus, a very important challenge is to develop new electro catalysts that inhibit the poisoning and increase the rate of the reaction for efficient usage. Another phenomenon, namely 'methanol crossover' takes place within the cell that leads to loss of methanol and decreases the potential of the oxygen electrode to lower positive values and therefore the operating voltage of the fuel cells is diminished. Methanol is a corrosive liquid which is also toxic and inflammable. Alternatively engineered fuel cells are currently being explored to expand the horizon for more renewable energy resources. Biohydrogen too, is produced in a similar fashion and has high scope for development.



Biomedical engineering: One of the primary needs in the medical field, where biochemical engineers work to design are pharmaceuticals, artificial organs, biomedical devices, chemical sensors, and drug delivery systems. Biochemical engineers implement their knowledge of chemical processes occurring in biological systems to innovate and develop products to improve one's health and quality of life.

Specific areas of research encompass metabolic, enzyme, and tissue engineering. Cell culture study is widely investigated in biochemical engineering due to its many applications in developing fuels, improving the efficiency in producing drugs and pharmaceutical processes, thereby finding cures for diseases. In a time like this, with a deadly disease which is out at large, scientists and researchers are experimenting various drug combinations and organisms to try and find anything close to a vaccine or cure.

Bioethanol: In consequence to the ever-increasing trend in global population, there is a proportional growth in demand for adequate food and resources, especially in developing countries like India. Bioethanol is predominantly produced by first generation bioethanol production from starchy and glucose rich raw materials like rice, corn, sugarcane, potato etc. These staple food crops are already majorly used up and there is a need to resort to second generation bioethanol production from lignocellulosic biomass like vegetable and fruit waste, wood, grass etc. But there is not sufficient information on processing bioethanol from these and hence research and development in this field is still ongoing.

Biodiesel: A lot of studies are being done to obtain biodiesel from a variety of raw materials, apart from the conventional vegetable oil. The plant *Jatropha Curcas,* contains oil rich seeds from which jatropha oil can be extracted and converted to biodiesel on implementation of many biochemical processes. Jatropha biodiesel was in use, but it rapidly lost its fame since the crops started to compete with food crops for nutrition and water. But jatropha is an easy growing, versatile crop that can withstand a range of conditions. Research is conducted to find more sustainable methods for plantation of these crops. There has been an expansion in looking into producing biodiesel from wasted/used cooking oil, soybean oil etc.

Nanditha Ram Satagopan
Third Year, Chemical

READY FOR INDUSTRY 5.0?

INDUSTRIAL REVOLUTION AND CHEMICAL INDUSTRIES: The fifth industrial revolution, also known as industry 5.0, will be based on man-machine collaboration, with human intelligence working in tandem with cognitive computing. Staff would be up-skilled to provide value-added activities in manufacturing, leading to mass customization and personalization for consumers, if humans are reintroduced into industrial production with collaborative robots. People employed alongside robots and smart machines are referred to as Industry 5.0. It's about robots assisting humans in performing tasks more efficiently and effectively by using advanced technologies such as the Internet of Things (IoT) and big data. It gives the Industry 4.0 pillars of automation and productivity a personal human touch. In comparison to Industry 4.0, which is being hailed as the next industrial revolution, Industry 4.0 is a systemic transition with implications for civil society, political systems, and human identity in addition to economic and manufacturing implications. The Fifth Industrial Revolution (5IR) can be summarized as the combination of humans and machines in the workplace.

Another way to look at this is to complain that the computers we make are making us redundant. Robots will eventually surpass humans in intelligence, and there will be no stopping them. They'll take over the planet, and we'll be left with nothing to do – we'll be made obsolete. The bright side is that AI and robotics have a huge impact on how we function, play, and live by automating routine and highly complex activities and assisting us with decision-making. Humans will still have a role to play, but it will necessitate drastic changes on our part.

The fifth industrial revolution, also known as Industry 5.0, combines a number of digital and physical advanced technologies to create a stronger physical-to-digital-to-physical link, which has the potential to change the chemicals industry by fostering strategic growth and streamlining operations. The time is right for a change like this: The Internet of Things (IoT), advanced materials, additive manufacturing, advanced analytics, artificial intelligence, and robotics, all of which are important to the chemicals industry, have achieved a cost and performance level that allows for widespread implementation. More significantly, these innovations have progressed to the point that they can be integrated with chemical companies' core conversion and marketing processes to digitally transform operations and allow "smart" supply chains, factories, and new business models. Various smart manufacturing strategies, such as predictive asset management, process control, and production models, can

boost the efficiency of chemical plants.The chemicals industry is known for its high asset concentration. As a result, advanced IT/OT technology can assist businesses in reducing maintenance costs and increasing asset performance by using predictive or automated maintenance. Advanced analytics software may detect trends in data obtained from sensors on sensitive equipment such as generators, compressors, and extruders in order to predict and diagnose potential breakdowns. Smart equipment will then give plant operators messages about any needed maintenance, possible breakdowns, and parts ordering and distribution schedules. Manufacturers will be able to move from planned or reactive repairs to predictive maintenance as a result of this. Data from similar equipment installed at different locations can also be obtained, compared, and used for predictive maintenance, performance management, and facility design.

"Industry 5.0 will make the factory a place where creative people can come and work, to create a more personalized and human experience for workers and their customers," says Esben Ostergaard, Universal Robots chief technology officer and co-founder. Industry 5.0 will likely impact the way chemicals companies operate and grow their businesses, as they shift away from the pay-by-the-ton revenue model to provide value-added products and services to their customers. How fast and well companies perform will depend on the decisions they take today and the initiatives they commit to for the coming years. As changes in chemicals affect related industries, time is of the essence: Industry 5.0 is no longer a topic of the future.

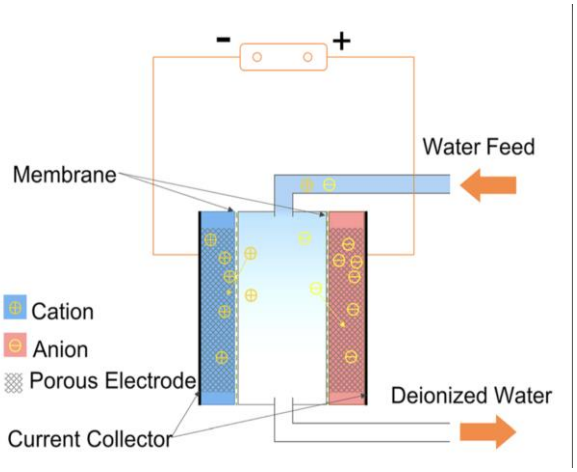
Yamini B & Joshua T
Second Year B.Tech (Chem)

NOVEL, ENERGY EFFICIENT DESALINATION PROCESSES

Water is an important resource for the entire world. Freshwater is becoming very scarce due to pollution and wastage. The need for freshwater has grown beyond just saving water and we need additional sources of freshwater.

Desalination provides a climate-independent source of water for critical human needs and economic development (industry and agriculture in particular). It is an

effective way to secure water supplies against the effects of climate change, a growing population and drought. By converting saline water, the process can offer freshwater in areas lacking natural groundwater, or surface water supplies. Together with water reuse, **desalination** can offer solutions to water scarcity and, in some countries, provides over 90 per cent of total water supply.



There are two existing methods used as desalination processes. The most common desalination processes are **distillation** and **reverse osmosis.** There are several methods. Each has advantages and disadvantages but all are useful. The methods can be divided into membrane-based (e.g., reverse osmosis) and thermal based (e.g., multistage flash **distillation**) methods.

Distillation is a phase separation method whereby saline water is heated to produce water vapour, which is then condensed to produce freshwater. The major energy requirement in the distillation process thus becomes providing the heat for vaporization to the feedwater. There are two types of membrane process used for desalination: **reverse osmosis (RO)** and **electrodialysis (ED)**. In the RO process, water from a pressurised saline solution is separated from the dissolved salts by flowing through a water-permeable membrane.

There are disadvantages to these methods and they are:

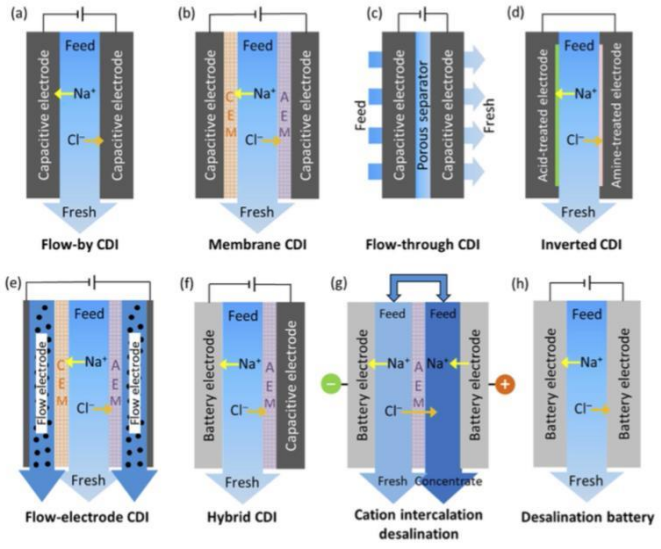
High Costs to Build and Operate: It is very costly to build and operate desalination plants. Depending on their location, building a plant can cost from $300 million to $2.9 billion. Once operational, plants require huge amounts of energy. Energy costs account for one-third to one-half of the total cost of producing desalinated water. Because energy is such a large portion of the total cost, the cost is also greatly affected by changes in the price of energy. It is estimated that a one cent increase in the cost of a kilowatt-hour of energy raises the cost of of one acre-foot of desalinated water by $50.

Environmental Impact: The environmental impact is another disadvantage to water desalination plants. Disposal of the salt removed from the water is a major issue. This discharge, known as brine, can change the salinity and lower the amount of oxygen in the water at the disposal site, stressing or killing animals not used to the higher

levels of salt. In addition, the desalination process uses or produces numerous chemicals including chlorine, carbon dioxide, hydrochloric acid and anti-scalents that can be harmful in high concentrations.

A lot of research is being done for a new method. It is called **capacitive deionisation**. CDI is an emerging and promising new technology for removal of ionic as well as polarizable species from water. It is an alternative to membrane-based technologies, having low operational cost, enhanced energy efficiency, and less water rejection. The technology works on the principle of electroadsorption of ions at the surface of electrically charged electrodes, generally made of porous carbon materials. The concept of CDI date back to the 1960s but the community of CDI has grown exponentially in last two decades.

Capacitive deionization, a new system still under development which, besides filtering salt from water, can also store energy. It makes use of a set of electrodes (cathodes and anodes) that attract salt ions when an electric current flow through them. Then, at the regeneration stage, and by means of an inverted current or zero voltage, the ions are released and generate electricity. The main hurdle still to be overcome is the development of the required electrochemical condensers, as this second stage can cause the electrodes to rust heavily. It is also the case that the system can at present remove only small concentrations of salt, since anything going above 1.2 v dramatically increases the corrosion of the electrodes as they release the ions. There are several labs working on this promising **water desalination technology**; in theory, it should require between five and six times less energy than reverse osmosis. One of the latest advances in this field has been made by a team of researchers at the University of Pennsylvania; they have created a **water desalination** process called **battery electrode deionization (BDI) system**. Their technology is based on a cell with two electrodes at each end, and two channels separated by a membrane. The scientists circulated two solvents — one saline and the other with fresh water— applying a constant current. The first advantage is that the same results as before can be achieved with half the voltage (0.6 v). Secondly, by just reverting the cell voltage flow (+0.6 v or -0.6 v) and creating a simultaneous production of **desalinated and concentrated water** in two channels, it also circumvented the two-cycle approach and the challenging regeneration stage.



Finally, they discovered that, by stacking additional membranes, they could reduce energy consumption even further.

The technology is currently suitable for low-concentration salt water only, although the development team is confident about future applications, once the technology is somewhat more mature. One thing must be kept in mind, that is, even when there are new developments, one must not forget to conserve resources.

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STEEL PLANT COMES FOR RESCUE

STEEL PLANT'S CRUCIAL ROLE IN LIQUID OXYGEN PRODUCTION: India has seen a record surge in COVID-19 cases per day and many patients need liquid oxygen during treatment. Steel units and oil refineries have already stepped-up supply of liquid oxygen produced at their plants and the move will not impact their manufacturing or refining operations, industry sources said. Steel plants require gaseous oxygen steel making and for oxygen enrichment in Blast Furnaces, apart from some general purposes like lancing and gas cutting and set up captive units to produce the gas along with nitrogen and argon As the carbon level is lowered in liquid steel, the level of dissolved oxygen theoretically increases according to the relationship %C × %O = 0.0025. This means that, for instance, steel with 0.1 percent carbon, at equilibrium, contains about 0.025 percent, or 250 parts per million, dissolved oxygen. The level of dissolved oxygen in liquid steel must be lowered because oxygen reacts with carbon during solidification and forms carbon monoxide and blowholes in the cast. This reaction can start earlier, too, resulting in a dangerous carbon monoxide boil in the ladle. In addition, a high oxygen level creates many oxide inclusions that are harmful for most steel products. Hence Captive Oxygen Plants in Integrated Steel Plants are designed to produce primarily gaseous products of Oxygen, Nitrogen and Argon and then routed through Pressure Reduction & Management System (PRMS) to meet the process need at desired pressure. Such plants can produce 5-6% maximum Liquid Oxygen

(LOX) at the peak capacity, which is a highly pure product compared to the industrial oxygen.

According to a statement issued by the Ministry of Steel, there are 33 oxygen plants in the Indian steel sector; of which 29 are tapped regularly.The total daily oxygen production capacity of steel plants is 2,834 metric ton (MT). Steel plants in both public and Private sector are striving hard to supply the liquid oxygen to different states. The Average delivery of Liquid Medical Oxygen (LMO) by SAIL has been raised to more than 800 tons per day. Total daily Oxygen production capacity of Steel plants is 2834 MT. As against 2834 MT of daily LMO production capacity in the Steel Sector, the production of LMO is 3474 MT. This is higher than the LMO production capacity because most units have reduced the production of Nitrogen and Argon and only producing LMO. The Centre has asked states and Union territories to allow all manufacturing units to maximize their production of liquid oxygen and make it available to the government for medical purposes. All-out efforts are being made to enhance the production of liquid oxygen and the dispensation the same, for which all oxygen plants whether in the private or public sector are working 24x7 and dispensing oxygen. Steel plants are also filling oxygen cylinders and supplying them to the states and hospitals.

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