SPARK

Newsletter of the

Department of Chemical Engineering

Edition 29

From HOD's Desk

The COVID-19 has taken our system to the new levels. Our department has shown a tremendous fight-back attitude towards this unprecedented pandemic situation. Our faculty and students have used the lockdown time to improve their skills and knowledge levels.

In line with what they say "Amid a storm, thrived a flower", many of our students secured admissions in some of the world's top universities. I congratulate their hard work and dedication. Also, without wasting the lockdown time, many of our students have completed a lot of online courses, online internships and training programs. I wish all of them a great success in their future endeavors.

Our faculty members showed extreme coordination and sincerity in conducting online classes and tests during this pandemic crisis. I extend my warm greetings to Dr.B.Ambedkar for bagging Rs.2.88 Crore from DST for his excellent project proposal. Also, many wishes to those published papers and chapters in reputed journals and books.

Our annual International Conference RACEEE 2020 was conducted with great success. Around 72 papers from various international participants were presented in the conference. I congratulate Dr.K.Jagannathan, Dr.M.Subramanian and Dr.B.Chitra for the successful conduct of the conference.

The editorial board has brought all the key features to light through this newsletter Spark. I appreciate the efforts of Dr.B.Chitra and Students who took part in this compilation.

EDITORIAL

Editorial Board

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Students opted for Higher Education– 2020 Batch

S.No.	Name	Admit from Universities	University Opted
1.	Abhishek S	1. University Of Manchester 2. University of Nottingham 3. University of Queens land 4. University College of London 5. KTH Royal Institute of Technology 6. University of Melbourne	KTH Royal Institute of Technology (Joined and attending classes)
2.	Akhil D	1. Delft University of Technology 2. KTH Royal Institute of Technology	Delft University of Technology (Withdrawn due to Covid -19)
3.	Aravind S	1. Cornell University 2. University of Massachusetts 3. Texas A&M	Cornell University (Deferred to Fall 2021)
4.	Arvindh V	1. Sheridan College 2. Humber College 3. Fanshawe College	Going to apply for next summer intake due to Covid-19
5.	Divya Lakshmi	1. Cornell University 2. Michigan Technological University 3. Delft University of Technology 4. National University of Singapore	Cornell University (Deferred to Fall 2021)
6.	Ghanesh Kesav	1. Carnegie Mellon University 2. Texas A&M University 3. Texas Tech University 4. University of Florida 5. University of California, Irvine 6. Northeastern University 7. Illinois Institute of Technology, Chicago	Direct Ph. D at Texas Tech

7.	Karishma Sri R	1. University of Missouri, Columbia 2. Illinois Institute of Technology, Chicago	University of Missouri, Columbia (Deferred to Fall 2021)
8.	Kaushik R	1. University of Texas, Dallas 2. University of Melbourne 3. University College Dubin 4. Deakin University	University of Texas, Dallas (Deferred to August 2021)
9.	Mathumitha K	1. Chalmers University of Technology 2. Uppsala University 3. University of Boras	Chalmers University of Technology (attending online classes)
10.	Nikhil S Kumar	1. Northeastern University 2. Case Western Reserve University	Northeastern University (deferred)
11.	Rohan K	1. Great lakes institute of management, Chennai	Great lakes institute of management, Chennai
12.	Sankar Ram	1. Amrita Vishwa Vidyapeetham University, Coimbatore, India	Amrita Vishwa Vidyapeetham University, Coimbatore, India
13.	Priyadarshini S	1. Delft University of Technology 2. University of Pennsylvania 3. Georgia Institute of Technology 4. University of California, Los Angeles 5. National University of Singapore	Georgia Institute of Technology (Deferred to Fall 2021)
14.	Mahima Jain	1. University of Georgia 2. Illinois Institute of Technology, Chicago	University of Georgia (Fall 2021)

15.	Karthik A	1. TU Hamburg 2. Ulm University 3. University of Waterloo	University of Waterloo (Deferred to Fall 2021)
16.	Shriram M K	1. Delft University of Technology 2. KTH Royal Institute of Technology 3. Drexel University 4. University of Alberta 5. University of Arizona 1. University of Groningen	Delft University of Technology (Withdrawn due to Covid 19)
17.	Thiruvikraman R	1. Deakin University 2. Bond University	Deakin University (Deferred to Feb 2021)
18.	Swetha V	1. University of Florida 2. University of Alberta 3. Delft University of Technology	University of Florida (Deferred)

Online Internships, Courses & Webinars Attended by Students

Name of the Student	Internships/Courses/Webinars Attended	Organized/offered by
Sujitha.S (UG Final year)	In-plant training	Kudankulam Nuclear Power Plant
	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	TCS iON soft skill program	TATA Consultancy Services
	Online Thamizhi writing training	Unity of NSS (Indian Youth Battalion)
Aakriti Krishnan (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
R Sai Jayaraman (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Neha R (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Adithya S (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Malolan R (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Vikas Madhav Nagarajan (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Lakshman K (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen Plus Workshop	IIT Madras
Lavanya G (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen Plus Workshop	IIT Madras
Bharkavi B (UG Final year)	Online Summer internship programme 2020	Indian Institute of chemical engineers
	Tcs ion soft skill program	Tata Consultancy Services
	HTML	Coursera
	MatLab Onramp	Mathworks
Dhanush R (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras

Manesh Kumar S (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras
Malarvizhi A (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras
Suryaprakash S (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
Mehala R (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras
Subha Lakshmi.M (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	TCS iON soft skill program	Tata Consultancy Services
Subash J (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras
Mohamed Anas T (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
Surendar D (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus workshop	IIT Madras
Gokul R (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
Kayalvizhi A (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus workshop	IIT Madras
Jahaguru RJB (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
Mugilan L (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	TCS iON soft skill program	Tata Consultancy Services
	Aspen Workshop	IIT Madras
	MATLAB Programming for Numerical Computation	Nptel
	Lean Six Sigma Yellow Belt	Anexas Europe
	International Lecture on "Catalysis - Catalyst Deactivation"	St. Joseph's College of Engineering

	International Lecture on "Soft skills for Students and Engineers"	St. Joseph's College of Engineering
Stebanraj P (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus workshop	IIT Madras
Sharumita T J (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus Workshop	IIT Madras
Hemapriya D (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Aspen plus workshop	IIT Madras
Sakthivel S (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
	Lean Six Sigma Yellow Belt	Anexas Europe
Abhishek B (UG Final year)	Online Summer Internship Program 2020	Indian Institute of Chemical Engineers
Priscilla Babu (UG Final year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Aspen Plus Workshop	IIT Madras
Keerthana R (UG Final year)	Online summer internship programme 2020	Indian institute of chemical engineers
Haridaran V (UG Final year)	Online summer internship programme 2020	Indian institute of chemical engineers
Swetha Saravanan (M.Tech II year)	1.Webinar-Research sharing: Liquid Biphasic system as recent separation and purification pipeline	Sri Sivasubramaniya Nadar College of Engineering
	2. Webinar-Recent developments on Biotechnology	St.Joseph college of engineering
	3. Webinar-Environmental monitoring in process industries	Sri Sivasubramaniya Nadar College of Engineering
	4. Webinar-Low cost effective housing construction practice	VRS College of Engineering and technology
	5. Webinar-Model based Process development of continouous chromatography of antibody separation	Sri Sivasubramaniya Nadar College of Engineering
	6.Webinar-Innovative approaches to treat palm oil effluents	Sri Sivasubramaniya Nadar College of Engineering

Deepthi J.S (M.Tech II year)	1. Webinar- Latest developments of biorefinery in the biochemical industry	Sri Sivasubramaniya Nadar College of Engineering
	2. Webinar-Computational chemistry on biofuel development	St.Joseph college of engineering
	3. Webinar-Innovative approaches to treat palm oil effluents	Sri Sivasubramaniya Nadar College of Engineering
	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Cynthia Susan George (M.Tech II year)	1. Webinar series in functional composite materials	Sri Sivasubramaniya Nadar College of Engineering
	2. Webinar-Environmental monitoring in process industries	Sri Sivasubramaniya Nadar College of Engineering
	3. Webinar- Innovative approaches to treat palm oil effluents	Sri Sivasubramaniya Nadar College of Engineering
	4. International workshop on art of scientific writing research paper	Sri Sivasubramaniya Nadar College of Engineering
	5. Webinar- Low cost rural housing construction practice	VRS College of Engineering and technology
	6. Webinar-Plants and equipment for road construction	MIT school of engineering
	7. Webinar-Water for future generations	Scad college of engineering
	8. Webinar-Glazing society of India-National building code	IIT Madras
	9. Webinar-Advancements in Biotechnology	St.Joseph college of engineering
	10. Webinar-Online course on Emotional Intelligence	Guru Nanak College
	11. Webinar-Online course on Entreprenurial development	Guru Nanak College
	12. Webinar- Efficient economic and environmental friendly	St.Joseph college of engineering
	1. QUIZ-Environmental day on biodiversity	Women's Christian College

	2. QUIZ- General awareness	Chennai National Arts and science
	3. QUIZ-Covid 19 Awareness and Diagonsis	The American College
	4. QUIZ- Covid 19	Rani Governement College for Women
Jayasuriya.S (M.Tech II year)	1.Webinar-Research sharing: Liquid Biphasic system as recent separation and purification pipeline	Sri Sivasubramaniya Nadar College of Engineering
	2. Webinar-Innovative approaches to treat palm oil effluents	
	3. Webinar-Environmental monitoring in process industries	
Anushri.I (M.Tech II year)	1.Webinar-Research sharing: Liquid Biphasic system as recent separation and purification pipeline	Sri Sivasubramaniya Nadar College of Engineering
Veda Varshita.M (M.Tech II year)	1.Webinar-Research sharing: Liquid Biphasic system as recent separation and purification pipeline"	Sri Sivasubramaniya Nadar College of Engineering
	2. Webinar-Model based process development of continuous chromatography for antibody separation	
	3. Webinar-Bio-remediation of the soils contaminated with strontium nitrate salts using phyco-colloid co-polymer	Int. Conference on Green surface for environmental sustainability
	4. Webinar-National level Quiz on Waste Management 2020	KPR Institute of Engineering and technology
Sruthi Rajan (M.Tech II year)	1.Webinar-Research sharing: Liquid Biphasic system as recent separation and purification pipeline	Sri Sivasubramaniya Nadar College of Engineering
Anubama.P (M.Tech II year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
Brindha .V (M.Tech II year)	Online Summer Internship Programme 2020	Indian Institute of Chemical Engineers
	Ongoing course on Environmental Sustainability	NPTEL

Faculty Activities

External fund Received

Dr.B.Ambedkar

- **Dr.B.Ambedkar, Associate Professor** received a Research Grant of INR.2.08 Crores had been approved for Project titled "Bench-Scale Design and Development: Investigation of High-Frequency, High-Intensity Ultrasonics for Carbon-Rich Solvent Regeneration in Solvent-Based Post-Combustion CO2 Capture Process (PCCC) for Reducing CO2 Capture Energy Demand" jointly with IIT Madras and RMIT University Australia, related to Carbon Capture and Sequestration (CCS) under IC#3 Mission Innovation Challenge DST

Paper Publications

Dr.R.Parthiban along with his research scholar and student published the following papers**.**

Dr.R.Parthiban

- "Synthesis and characterization of hybrid graphene nanocoolant for heat transfer dissipation in microchannel heat sinks" Chinese Journal of Chemical Engineering, Vol.28, pp. 913-922, (2020) (IF.2.627).
- "Hydrothermal liquefaction of Nostoc ellipsosporum biomass grown in municipal wastewater under optimized conditions for bio-oil production" Bioresource Technology, ISSN: 0960-8524, Vol. 316, Article No. 123943 (IF 7.54)
- "Evaluation of the photocatalytic efficiency of cobalt oxide nanoparticles towards the degradation of crystal violet and methylene violet dyes" Optik - International Journal for Light and Electron Optics, ISSN 0030-4026, Vol. 207, Article 164428, pp. 1-6. (IF:2.187)

- **Dr.V. Jaikumar and Dr. P. Senthil Kumar,** Associate Professors published a paper titled "Sulphonamide: Distribution, Toxicology,Environmental Characteristics, and Analysis - A Review" in an International journal titled "Current Analytical Chemistry", Vol. 16, pp. 1-13, 2020 **(IF: 1.234).**

Dr.V.Jaikumar

Dr.P.SenthilKumar, Associate Professor published the following research articles

- "Evaluation of optical, electrical, mechanical, thermal properties and non-isothermal decomposition behavior of PVA-ZnO nanocomposites"in an International journal titled "Iranian Polymer Journal", 2020 (IF: 1.707).

Dr.P.Senthil Kumar

- "Feasibility of Naphthol green-B dye adsorption using Microalgae : Thermodynamic and Kinetic Analysis" in an International journal titled "Desalination and Water Treatment", 2020 (IF: 1.234).
  - "Conversion of Green Algal Biomass into Bioenergy by Pyrolysis. A review" in an International journal titled "Environmental Chemistry Letters", 2020 (IF: 4.617).
  - Evaluation of mechanical, optical, and thermal properties of PVA nanocomposites embedded with Fe2O3 nanofillers and the investigation of their thermal decomposition characteristics under non-isothermal heating condition" in an International journal titled "Polymer Bulletin", 2020 (IF: 1.858).
  - "Optimization and modeling of reactive yellow adsorption by surface modified Delonix regia seed: Study of nonlinear isotherm and kinetic parameters" in an International journal titled "Surfaces and Interfaces", 2020, Elsevier.
  - "Electrodeionization theory, mechanism and environmental applications. A review" in an International journal titled "Environmental Chemistry Letters", 2020 (IF: 4.617)
  - "A Review on Fluoride : Treatment Strategies and Scope for Further Research" in an International journal titled "Desalination and Water Treatment", 2020 (IF: 1.234).
  - "Practice on treating pharmaceutical compounds present in wastewater using biosorption technique with different bio waste compounds. A Review" in an

International journal titled " Environmental Progress and Sustainable Energy", DOI: 10.1002/ep.13429, 2020 (IF: 1.596).

- Enhanced Zn(II) ion adsorption on surface modified mixed biomass - Borassus flabellifer and Aspergillus tamarii: Equilibrium, kinetics and thermodynamics study" in an International journal titled "Industrial Crops & Products", Vol. 153, pp. 112613, 2020 (IF: 4.191).
- "Production of pigment using Aspergillus tamarii: New potentials for synthesizing natural metabolites" in an International journal titled "Environmental Technology & Innovation", 2020 (IF: 3.356).
- "Adsorption of Pb(II) and Cd(II) ions onto Modified Biogenic Slaughterhouse Waste: Equilibrium and Kinetic Analysis" in an International journal titled "International Journal of Environmental Analytical Chemistry", 2020 (IF: 1.431).
- "Adsorptive Behavior of Surface Tailored Fungal Biomass for the Elimination of Toxic Dye from Wastewater" in an International journal titled "International Journal of Environmental Analytical Chemistry", 2020 (IF: 1.431).
- "Kinetic and Thermodynamic Analysis on the Abolition of Toxic Metals from Wastewater using Activated Carbon Produced from Compost Waste" in an International journal titled "Desalination and Water Treatment", 2020 (IF: 1.234).
- "Rhamnolipid-assisted mycoremediation of polycyclic aromatic hydrocarbons by Trametes hirsuta coupled with enhanced ligninolytic enzyme production" in an International journal titled "Journal of the Air & Waste Management Association", 2020 (IF: 2.245).
- "Microalgae for biofuel production and removal of heavy metals: a review" in an International journal titled "Environmental Chemistry Letters", 2020 (IF: 5.992).

Dr.D.GnanaPrakash

Dr.R.Anantharaj

- **Dr.D.Gnana Prakash & Dr.R.Anantharaj, Associate Professors** Published a manuscript titled " Enhancement of aqueous solubility and extraction of lauric acid

using hydrotropes and its interaction studies by COSMOS-RS model" in Journal of Dispersion Science and Technology, 2020. DOI: 10.1080/01932691.2020.1789471 (IF:1.7)

- **Dr.D.Gnana Prakash, Associate Professor** Published a manuscript titled "Application of an immobilized microbial consortium for the treatment of pharmaceutical wastewater: Batch-wise and Continuous studies", Chinese Journal of Chemical Engineering, 2020. DOI: 10.1016/j.cjche.2020.04.008 (IF:2.627)
- **Dr. B. Ambedkar, Associate Professor** published a research article "Carbon-Rich Solvent Regeneration in Solvent-Based Post-Combustion CO_2 Capture Process (PCCC): Process Intensification by Megasonics", *Chem. Eng. Process. Process Intensification*. 151:107913. (IF = 3.031)
- **Dr. B. Ambedkar & Dr. J. Dhanalakshmi**, Associate Professors published a manuscript titled "FTIR and Physicochemical Analysis of Carbon-rich and Regenerated Aqueous MEA".*J. Environ. Eng. Sci.* 1-9. (SJR = 0.239)

Dr.B.Ambedkar

Dr.J.Dhanalakshmi

- **Dr.R.Anantharaj** published a research article "*Investigation of Potential Azeotrope Breakers Using DFT and COSMO Approach*" **ACS Omega [IF 2.584]**. doi.org/10.1021/acsomega.0c02086.

Dr. D. Balaji, Associate Professor published the following research manuscripts:

Dr.D.Balaji

- "Integration of Cynodon dactylon and Muraya koenigii plant extracts in amino-functionalized silica-coated magnetic nanoparticle as an effective sorbent for the removal of Chromium (VI) metal pollutants." *IET Nanobiotechnology* (2020). doi: 10.1049/iet-nbt.2019.0313
- "Studies on generation of bio-energy from tannery effluent using MFC." *AIP Conference Proceedings*. Vol. 2225. No. 1. ,2020. https://doi.org/10.1063/5.0005526

- "Study of alkaline hydrolysis of post consumed polyethylene terephthalate waste." In AIP Conference Proceedings, vol. 2240, no. 1, p. 110001. AIP Publishing LLC, 2020. DOI: https://doi.org/10.1063/5.0011020, IF: 0.4
- "Optimized production of extracellular alkaline protease from Aspergillus tamarii with natural by-products in a batch stirred tank bioreactor", Preparative Biochemistry and Biotechnology, DOI: 10.1080/10826068.2020.1777426
- "Microbial Fuel Cell (MFC)-A review of Design components, Selection of Substrate and Microbes, Parameters affecting the Design and Applications". GEDRAG Organ. Rev. 33, 2288–22317. https://doi.org/10.37896/GOR33.02/238

Dr.P.Senthil Kumarand **Dr. Kilaru Harsha Vardhan**, Associate Professors published the following manuscripts

Dr.Kilaru Harsha Vardhan

- "Adsorptive Elimination of Methylene Blue Dye from Aquatic System Using Biochar Produced from Cocoa Shell" in an International journal titled "Desalination and Water Treatment", 2020 (IF: 1.234).
- "A Review on Systematic Approach for Microbial Enhanced Oil Recovery Technologies: Opportunities and Challenges" in an International journal titled "Journal of Cleaner Production", 258 (2020) 120777 (IF: 6.395).
- "Adsorption of Copper ions from Polluted Water using Biochar Derived from Waste Renewable Resources: Static and Dynamic Analysis" in an International journal titled "International Journal of Environmental Analytical Chemistry", 2020 (IF: 1.267).

Book Chapters Published

- Dr.P.Senthil Kumar Published a book chapter titled "Sustainability in the Spinning Process" for the book titled "Sustainability in the Textile and Apparel Industries", Springer Publisher.
- Dr.P.Senthil Kumar Published a book chapter titled "Sustainability in Dyeing and Finishing" for the book titled "Sustainability in the Textile and Apparel Industries,Springer Publisher.

International Conference on "Recent Advancements in Chemical, Energy & Environmental Engineering (RACEEE-2020)"

- **Dr. K. Jagannathan, Dr. M. Subramanian and Dr. B. Chitra**, Associate Professors, had organized the 5thInternational conference on Recent Advancements in Chemical, Energy & Environmental Engineering (RACEEE-2020) on February 13-14, 2020

  A Short report about the Conference:

  Inauguration of the conference was held in the **Central Seminar Hall,** New ECE Block, SSN College of Engineering. **Prof. Fulvia Chiampo** from **Politecnico di Torino, Italy**, was the chief guest and **Dr. Chun Yang Yin** from **Newcastle University, Singapore**, was the guest of honor. **Prof. Dr. S. Salivahanan**, Principal, SSN College of Engineering presided over the function in the presence of **Prof. Dr. R. Parthiban**, Conference Chair & Head of Department of Chemical Engineering and **Dr. K. Jagannathan**, Associate Professor & Convener-RACEEE-2020.

Around 98 abstracts from India, Indonesia, Singapore, Italy, The Netherlands, Nigeria and Vietnam were received for the conference and 79 papers were accepted out of which 72 have been registered and participated in the Conference which includes Academic staff, Research scholars, and Students from various reputed colleges / institutes /organization/ universities across the globe. 5 plenary lectures and 5 Technical sessions each consisting of 12 paper presentations have taken place.

National Level Conference on "Sustainable Trends in Energy and Environment Resources (STEER)" & on "Fuel Cell and Electric Vehicle Technology - 2020 (FCEVT-2020)"

- Indian Institute of Chemical Engineers - SSN Student Chapter organized two days National Conference on "Sustainable Trends in Energy and Environment Resources (STEER)" Organized by **Dr. D. Balaji**, Associate Professor. Shri. Senthilkumar Rajendran, Process Engineering Department Leader, Dow Chemicals, Chennai inaugurated and delivered the technical talk.

  A short report about the conference:

  The conference started with the inauguration ceremony. The inaugural started with the Thamizh Thai Vaazhthu by Vinatha.V and Shreya.S (3 rd year). The initiation of the conference was marked by the traditional lighting of the lamp by the dignitaries. The welcome Address and the introduction to STEER was given by Vigneswaran S -Secretary, IIChE-SSN Students Chapter. The Chief Guest for the inaugural was **Shri. Senthilkumar Rajendran**, Dow Chemicals. The conference proceedings CD which contained all the received abstracts of the presentations was released on the stage. Following the Inaugural, there was a one hour lecture by the Chief Guest on the scope and opportunities of chemical engineering. The various safety aspects involved was also discussed. The day 2 of the conference started with a workshop on "Applications of Excel in Chemical Engineering". The instructor of the workshop was Dr. M. Subramanian, Associate professor, Chemical Engineering, SSNCE.

National Level Conference on " Sustainable Trends in Energy and Environmental Resources (STEER)"

- Chemical Engineering and EEE departments jointly organized one day National Conference on **Fuel Cell and Electric Vehicle Technology - 2020 (FCEVT - 2020).** Co-ordinators are **Dr. R. Anantharaj & Dr.K. Sathish Kumar** Associate Professor, Chemical Engineering & **Dr. V. Thiyagarajan**, Associate Professor, EEE Department.

  A short report about the conference:

  FCEVT -2020 is the premier interdisciplinary platform to deliver the latest developments and innovative research results in Fuel Cell and Electric Vehicle

Technology for all professionals, researchers and engineers. The conference will serve as a forum to discuss high level scientific issues, exchange state of the knowledge in pure and applied sciences, and initiate collaborative research among various scientific groups. The inaugural function was followed by keynote talk on "Fuel Cell Applications in E-Vehicle Technology" by Dr. D. Kalpana, Principal Scientist, CSIR - CECRI. The theme of the conference attracted 35 submissions from various institutions including NIT Warangal, Government College of Engineering -Tirunelveli, K.Ramakrishnan College of Engineering, Bannari Amman Institute of Technology, Agni College of Technology, PSN College of Engineering and Technology, Sri Krishna College of Technology, Vel Tech and SSN College of Engineering.

Guest lectures, Workshops and Webinars Organized

- **Association of Chemical Engineers & IIChE-SSN Student Chapter** organized a guest lecture on "*Advances in Distillation Technology*" by Mr M Akbar Ali, Skill tech Process Engineering Consultant, Mangaloreon3rd February 2020
- **Dr. K. Jagannathan, Dr. M. Subramanian and Dr. B. Chitra**, Associate Professors, organized 2nd one day Training Workshop on *"How to get your research published in High Impact (Q1) Journals"* on 12.02.2020
- **Association of Chemical Engineers & IIChE-SSN Student Chapter** organized a guest lecture on "Chemical Engineers in Space - ISRO"by Mr.R. Dorairaj, Former Associate Project Director, GSLV-VSSC, ISRO on February 19, 2020.
- **IIChE-Chennai Regional Centre & IIChE-SSN Student Chapter** organized "Dr.B.Jagannadhaswamy Endowment Lecture" delivered by "Dr Santhoji Katare, Technical Leader & General Manager, Global Data Insight & Analytics, Ford Motor Private Limited, Chennai"on February 22, 2020.
- **Dr.P.SenthilKumar, Dr. B. Chitra and Dr. Kilaru Harsha Vardhan**, organized the International virtual Workshop on "Art of Writing Scientific Research Paper"
- **Dr.V.Jaikumar** organized a webinar on "Key Performance Indicators - 8 Pillars Of Refineries" given by Mr. Sendhil Kumar Paneer, Performance Control Senior Engineer, ARAMCO Total Refining & Petrochemical (SATORP), Saudi Arabia.
- **Dr.D.Balaji D & Dr.R Parthiban** organized a Webinar on "Process Engineering Methodology", resource person is Dr. S. Sakthivel, Assistant General Manager (Process) at Tata Consulting Engineers Ltd. Mumbai.
- **Dr. B. Ambedkar, Dr. J. Jagannathan and Dr. J. Dhanalakshmi,** Associate Professors organized a Webinar on "CFD's Applications Potential in Industrial Operations" presented by Dr. A. Subramani, Sr. Staff Engineer in General Electric, GE Aviation, Bangalore, India.

External Recognition

- **Dr.R.Anantharaj**, Associate Professor inaugurated the association activities and delivered a lecture in Global Institute of Engineering and Technology, Vellore
- **Dr.P.Senthil Kumar**, Associate Professor gave the guest lecture titled "Writing Scientific Research Paper" to the Department of Biotechnology, Rajalakshmi Engineering College.
- **Dr.P.Senthil Kumar,** Associate Professor acted as a Doctoral Committee Member for the PhD Part Time scholar to confirm the course works subjects at St. Joseph's College of Engineering.

Viva-voce & DC meetings

- **Dr. B. Ambedkar,** Associate Professor conducted confirmation DC meeting for the full time Research ScholarMs. R.K. Nilavuckkarasi.
- **Dr.P.Senthil Kumar**,Associate Professor convened the DC confirmation meeting for his full time research scholar Ms. G. Prasannamedha.
- **Dr.P.Senthil Kumar**, Associate Professor convened the Ph.D. public viva voce examination for his full time research scholar Mrs. P. R. Yaashikaa
- **Dr.K.Sathish Kumar**, Associate Professor Conducted Ph.D Public Viva Voce Examination through Zoom App for his research scholar Mrs.S. Subashini
- **Dr.K.Sathish Kumar,** Associate Professor Conducted Ph.D Public Viva Voce Examination through Zoom App for his research scholar Mr.M.Irshad Ahamed
- **Dr.K.Sathish Kumar**, Associate Professor Conducted Ph.D Public Viva Voce Examination through Zoom App for his research scholar Mrs.G.Carlin Geor Malar
- **Prof.R.Parthiban** convened the Synopsis meeting for his part time research scholar Mrs.G.Sudha via Google Meet.

Online FDP,webinar & Courses attended

Sl.No	Name of the faculty	Details of webinar/FDP/Course	Organised by/Offered by
1	Dr.R.Parthiban	Role of Chemical Engineering in Industrial Safety	Saveetha Engineering College
2		Insights to INDUSTRY	S.A.Engineering College
3		Patent Act, Drafting, Filing system and challenges in India	RMD Engineering College
4		Energy Optimization in Petrochemical Industry	JCT College of Engineering and Technology
5	Dr.V.Jaikumar	Art of Writing Scientific Research Paper.	Chemical Engineering Department, SSN CE
6		The Sustainable Development Goals – A global, trans disciplinary vision for the future	Coursera
7		Renewable Energy and Green Building Entrepreneurship	Coursera
8	Dr.P. Senthil Kumar	E-Quiz on "Microbial Diversity"	Shree Ramkrishna Institute of Computer Education and Applied Science, M.T.B. College campus, Athwlines, Surat, India
9		Online Certificate Course in "Patent Searching for Beginners"	IP Moment and Dept. of Environmental Science and Shree Ramkrishna Institute of Computer Education and Applied Science, M.T.B. College campus, Athwlines, Surat
10		"Fundamentals of Effective Scientific Writing: Manuscripts and Grants,	The ACS Webinars Team
11		National Level Quiz on E-Learning,	Padmabhushan Vasantdada Patil Pratishthan's College of Engineering, Mumbai

12		Virtual Faculty Development Programme on "Evolutionary Optimization Techniques,	Dept. of EEE, SSNCE
13		Webinar series on 1. Deep Learning for Modelling and Control of Bio Process, 2. Application of Soft Computing Techniques for Modelling and Control and 3. Modelling and EMPC Based Control of Steam Hydrolysis Process,	Dept. of E & I, Easwari Engineering College
14		International Technical webinar on Advancements in Biotechnology"	St.Joseph's College of Engineering
15		International Webinar Series on "Advances in Supramolecular and Biomolecular Research	Dept of Chemistry, SSNCE
16		National Level Online Quiz on Unnat Bharat Abhiyan (Beginner Level)	Unnat Bharat Abhiyan (UBA) Team of National Institute of Technology (NIT) Rourkela
17		i. National Level Online Quiz on Sanitation & Waste Management for COVID-19 i. National Level Online Quiz on COVID-19 (Beginner Level and Advanced level)	Unnat Bharat Abhiyan (UBA) Team of National Institute of Technology (NIT) Rourkela
18		International Webinar on Material characterization"	Department of Humanities and Sciences. Rajalakshmi Engineering College, Chennai.
19		Webinar series on the theme "You can do it - Are you ready?",	Sri Eshwar College of Engineering, Coimbatore
20		International Webinar on Recent Developments in Biotechnology"	St. Joseph's College of Engineering, Chennai.
21		Elemental Arts: Evolution of Modern Periodic Table	Sri Krishna College of Engineering and Technology, Coimbatore

22		'Waste Management & Pollution Control in the event of COVID-19 Pandemic - Challenges, Best Practices, Innovations & Way Forward	Elets, Telangana, India.
23		The Proposal Writing Process: Practical Tips	The ACS Webinars Team.
24		Journal Citation Reports (JCR) Certification Series - Part 1	Journal Citation Reports (JCR), India.
25		Faculty Program on NBA	Bharati Vidyapeeth College Of Engineering, Navi Mumbai, India
26		Effective Proposal Grant Funding Writing to Secure	LetPub, Canada
27		MATLAB Applications in Process simulation and Control	Sri Venkateswara College of Engineering, Chennai.
28	Dr.R.Anantharaj	Nanomaterials for Energy and High Temperature Applications.	Chemistry Division, School of Advanced Sciences, VIT, Chennai
29		Energy for Sustainable Development- Transforming the Future., .	Pandit DeenDayal Petroleum University, Gandhinagar, Gujarat
30	Dr.D.Balaji	Design Thinking for Innovation	Coursera
31		"Basic Author Workshop Research Article Writing & Reference Management Using Mendeley"	Faculty of Science, Annamalai University in collaboration with ELSEVIER
32		Effective and Efficient Online Teaching in the Age of Corona, A Hands On Workshop	IIT Bombay
33		Leveraging Technology In Education	EduTech
34		Virtual Teaching	CIT – TLC
35	Dr B Chitra	MATLAB	Coursera
36		Parents act, Drafting, Filing system and challenges in India	R. M. D Engineering College

37		How to set open book questions for Chemical Engineering Students, a need of an hour	Mohamed Sathak Engineering College, Kilakarai.
38		International Conference on Advanced Nanomaterials Application,	Centre for Nanotechnology Research, VIT, Vellore
39		Introduction to Google Docs	Coursera
40		Air Pollution – a Global Threat to our Health	Coursera

Tech Advancements

COVID-19 Indoor Safety Guideline
(Martin Z. Bazant, Professor of Chemical Engineering, MIT)

The epidemiological community has raised the alarm that COVID-19 is primarily transmitted through infected indoor air, but no quantitative measure is available to protect against this mode of transmission. Existing guidelines prescribe a minimum social distance (6 feet in the U.S.) or a maximum occupancy (25 persons in Massachusetts) for any indoor space, but clearly the exposure time, room size, ventilation system, respiratory activity, and facemask use must also be considered. Indeed, it is common sense that standing 6 feet away from an infected person is safe for a few seconds, but not for a few days; that 25 people may be safe in a grocery store, but perhaps not in a crowded bar; that close contact may be safe in a well ventilated laboratory, but not in a sealed tent; that social distance and plastic shields may protect against coughs and sneezes, but not against infected droplets from normal breathing, which can quickly spread to all corners of a room.

Consistent with this intuition, Professor Bazant is using mathematical models from chemical engineering and epidemiology to develop an appropriate safety guideline for well-mixed indoor spaces. The guideline is parameterized by the latest data for COVID-19 spreading and respiratory aerosol emissions, and made publicly available in an easy-to-use Excel spreadsheet. Running the numbers suggests that many classrooms may safely re-open for normal occupancy with facemasks, while more aggressive control of cumulative exposure time and ventilation could save lives in nursing homes.

To protect against airborne transmission, it is common sense that the exposure time, room size, ventilation and human activity must also be considered:

- Standing 6 feet apart is safe for a few seconds, but maybe not for a few hours;

- 25 people are safer in a large gymnasium than in a crowded bar;
- 6-foot separation is safer in a ventilated hospital than inside a sealed tent;
- At any distance, remaining quiet and calm is safer than singing or exercising;
- Social distance can be safely reduced if facemasks are worn.

Using mathematical models from chemical engineering and epidemiology, Professor Bazant have derived a safety guideline for well-mixed indoor spaces, in collaboration with John Bush, which combines all the key variables above in a bound on "cumulative exposure time". The guideline is intuitive and quantitative, calibrated against the latest data for COVID-19 indoor spreading and respiratory aerosol emissions, and easy to apply using a publicly available spreadsheet.

Airborne transmission risk, as quantified by the guideline, is always present indoors and critical to consider when devising policies, such as:

- **Contact tracing**. Compared to the existing definition of a "close contact" (any individual within 6 feet of an infected person for at least 15 minutes), the guideline predicts when *all* persons in a room should be considered close contacts for testing or quarantine.
- **Quarantine**. Official guidance emphasizes the isolation of infected persons, but it is also important to separate infected indoor air. Whenever this is not possible, as in most cases of home quarantine with healthy family members, the guideline provides specific recommendations for ventilation, filtration, and/or facemask use given typical exposure times and room characteristics.
- **Re-opening schools and businesses**. Running the numbers suggests that many classrooms and stores could safely accommodate normal occupancy by controling air quality and requiring facemask use, while recommending - but not strictly enforcing - social distancing beyond that of natural human behaviour.
- **Home safety**. The same measures also apply to homes, where people spend the most time together indoors, and thus are most likely to transmit the virus. Especially among the elderly in nursing homes and those with pre-existing medical conditions, which account for the majority of deaths in the U.S. and worldwide

from COVID-19, more aggressive control of IAQ and cumulative exposure time could save more lives than any measures imposed on less vulnerable populations.

The guideline thus provides specific guidance on how to limit COVID-19 transmission through well-mixed indoor air, but one should also consider various caveats emphasized in the paper and other literature, including the possibility of short-range aerosol transmission in respiratory jets. Such effects, which can lead to large fluctuations in droplet concentrations around their mean values, are only partially addressed by choosing a sufficiently small tolerance in the well-mixed guideline and will depend on the details of airflow and human behavior in a specific indoor space.

Science finds a better way to measure stress, anxiety and depression (Bill Snyder, Stanford School of Engineering)

Clinical depression and stress-related emotional disorders are responsible for high rates of suicide, the leading cause of death in young people ages 15 to 24. Nationally, some 20% of the population will experience a mental health disorder during their lifetime, and globally these disorders cost the economy $2.5 trillion every year.

Yet there are no objective tests in use that can diagnose these disorders, says Leanne Williams, a professor of psychiatry and behavioral science at Stanford. Instead, the "gold standard" for psychiatric diagnosis is a verbal interview, asking patients how they feel, etc. "Imagine if you were diagnosing and treating diabetes without tests, without sensors. It's really impossible to imagine, yet that's what we're doing for mental health right now," says Williams, who spoke about the research at Stanford's recent Reunion Homecoming Weekend festivities.

Williams and her colleagues are working on a project called Mentaid, which aims to understand mental health by finding measurable links between brain activity and the production of certain hormones. Ultimately, the researchers aim to develop wearable devices that will measure brain activity related to emotional distress or disorder.

The science underlying that goal is complex.

The researchers are aware of six different circuits that the brain engages. These circuits control particular types of activity. When the activity concludes, the circuit should switch off. But stress and anxiety can disrupt that cycle, and a circuit that should switch off stays on, resulting in states like hyperanxiety or an inability to focus.

Zhenan Bao, a professor of chemical engineering at Stanford who is working with Williams, says that the presence of cortisol, a type of hormone that humans routinely excrete in sweat, is an important indicator of stress. The researchers are examining cortisol's relationship to factors such as heart rate and skin conductivity and the six brain states they have observed.

The group is developing an early prototype of a wearable that would collect information on those variables and give doctors and the wearer insight into their mental health.

New Catalyst for Creating Syngas from Waste CO_2

(Article by Amanda Doyle in "The Chemical Engineer")

A CATALYST produced via flame spray pyrolysis can be used to turn waste CO_2 into syngas for use in fuels and feedstocks. The catalyst has been developed by a team at UNSW Sydney using flame spray pyrolysis (FSP) to make zinc oxide (ZnO) nanoparticles. FSP is a combustion synthesis method where a metal precursor dissolved in a solvent is fed into a flame along with a flow of oxygen where it combusts to create nanoparticles.

ZnO is a cheaper alternative to materials such as palladium, which have been used in the past for previous attempts at this technique. ZnO nanoparticles are traditionally created via a hydrothermal approach but these have lower activity compared to the FSP-made nanoparticles.

"We don't need to worry about complicated synthesis techniques that use really expensive metals and precursors – we can burn it and in ten minutes have these particles ready to go," said Emma Lovell, Lecturer at the School of Chemical Engineering.

The catalyst can then be used to turn CO_2 into syngas via an electrolyser. Most syngas is produced via steam methane reforming, so this new method would reduce the need for fossil fuels while also using waste CO_2. "Syngas is often considered the chemical equivalent of Lego because the two building blocks - hydrogen and carbon monoxide – can be used in different ratios to make things like synthetic diesel, methanol, alcohol or plastics, which are very important industrial precursors," said Lovell. "So essentially what we're doing is converting CO_2 into these precursors that can be used to make all these vital industrial chemicals."

"Waste CO_2 from say, a power plant or cement factory, can be passed through this electrolyser, and inside we have our flame-sprayed zinc oxide material in the form of an electrode," said Rahman Daiyan, Research Fellow at the School of Chemical Engineering and lead author of the study. "When we pass the waste CO_2 in, it is processed using electricity and is released from an outlet as syngas in a mix of CO and hydrogen."

They convert the CO_2 to syngas using simultaneous electrochemical CO_2 reduction reactions and hydrogen evolution reactions. The mix of CO and H_2 in the syngas can be adjusted from the way the nanoparticles are burned with FSP. The metal precursor is fed to the FSP nozzle and by controlling the rate of flow, nanomaterial properties such as crystallinity and surface chemical environment can be controlled. For example, increasing the feed rate increases the size of the nanoparticles. This then allows tuning of the H_2/CO ratio of the syngas by getting the correct balance between CO and H_2 reactions on the surface of the catalyst.

The team has already tested an electrolyser with waste CO_2 containing contaminants, and further work will need to be done to test the technology on flue gas to ensure it can tolerate the conditions. If it is successful, it should be possible to easily scale the process as the catalyst is effective and easy to make, and it should also be possible to retrofit the technology to existing facilities.