# IICHE-MRC E-NEWSLETTER

## MUMBAI REGIONAL CENTER

# INSIDE




INDIAN INSTITUTE OF CHEMICAL ENGINEERS
Mumbai Regional Center, B-18 Vardhman Complex,
Gr Floor, Opposite Home Town & 247 Park, LBS Marg,
Vikhroli (West), Mumbai - 400 083

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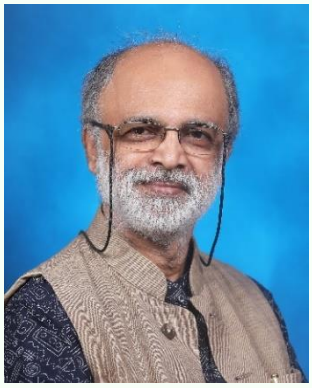


# FROM CHAIRMAN'S DESK

**Prof. Anirudh B. Pandit**
**Chairman IIChE-MRC**

My dear present and future fellow stake holders of the IIChE-MRC, I am very happy of having this opportunity to address you all.

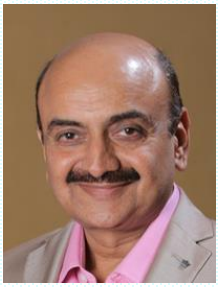
The 21st year of the 21st century had given countless sorrows. As 2022 is starting, we have already outlined some possible threats: climate change (at the top of everyone's list), new Covid variants, and rising inflation. COVID-19 has been one of the biggest stories in the history of mankind. Covid forced humanity to go down on its knees. The pandemic not only claimed lives, it pushed many people in debt trap. Despite India having highly dense population, we successfully curbed further spread of the second wave by multi-pronged actions. The rapid and deep reach of vaccination across the country has given us confidence that the country will witness a faster economic recovery. With unpredictable outbreaks worldwide, it is difficult to predict the end of the pandemic, though it appears to cease in near future. It's only human who look for patterns and try to make sense of randomness. The good news is that we are better prepared than two years ago.

On behalf of IIChE-MRC, I sincerely appreciate Dr. U. Kamachi Mudali, former Chairman IIChE-MRC for his time and effort in making IIChE-MRC more vibrant. He has successfully conducted many online events, EC meetings, AGM, and new committee elections as per IIChE-HQ Guidelines despite pandemic. We congratulate Dr. Mudali on joining as Vice Chancellor at VIT, Bhopal and wish him all the best ahead. Indian Institute of Chemical Engineers (IIChE) is the premier professional organization providing industry and academic interactions for professional growth. IIChE-MRC continues to conduct and support many online & hybrid events despite the pandemic. I wish this issue of e-Newsletter too proves beneficial to the member community to encourage them to collaborate for a new and better world. We plan to slowly make it theme based e-Newsletter.

Wishing all our readers a **Happy, Healthy, and Wealthy 2022.**

**Prof. Anirudh B. Pandit**

# EDITOR'S CORNER



Dear Readers,
Greeting for 2022!

I am happy to share yet another issue of IIChEMRC Newsletter with very informative and thought provoking technical article on Hydrogen Economy by Professor G.D. Yadav. It is my pleasure to present glimpses of recent events including CHEMCON-21, OYCE-2021, MRC meetings and webinars. The respective lectures and events are available on MRC website and U-tube. We would like to thank readers for their honest feedback on previous issues of E-Newsletter. Let me reiterate that the Institute needs active support of industry, academia and R&D organisations and indeed, the individual members for their active and meaningful contribution.

Every week we are reading news of fatal accidents or fire incidences across chemical Industries. It is thus, imperative to have sufficient measures for the safety of citizens living close to the chemical industries. Many chemicals are known, but few have been tested for their toxicity. Monitoring of hazardous chemicals should be carried out continuously with the use of available information technologies.

The other concern where chemical engineers have greater role to play is 'Pollution Hazards' which have impact on physical and mental development of our citizens. Northern India suffers severe air pollution every winter. The cycle of apathy, inaction, reaction, and accusation does not deliver any lasting solution. We may set more aggressive targets and based on available information act on the polluters.

We don't have so good track records of managing plastic pollution, not due to paucity of policies but due to poor implementation. The per-head plastic generation has nearly doubled in lats five years, but the infrastructure has not expanded in that proportion. The waste should not be allowed to contaminate our oceans, rivers and ambient air. Chemical engineers have the big role to play here also.

Beyond pandemic, areas of national importance remain inflation, inequality, investment and absence of students from schools. Thus, the priorities for 2022 seem obvious.

May your choices reflect your hopes in 2022.
Happy reading! Take Care, Stay Safe !!

**Jagdish Nageshri**
**Editor, IICHE-MRC e-Newsletter**

# CLIMATE CHANGE, NET ZERO EMISSIONS & THE CASE FOR HYDROGEN ECONOMY

**Professor Ganapati D. Yadav,**
*FNA, FTWAS, FASc, FNASc, FNAE*

**Emeritus Professor of Eminence & J.C. Bose National Fellow, Former Vice Chancellor, R.T. Mody Distinguished Professor, Tata Chemicals Darbari Seth Distinguished Professor of Leadership & Innovation at Institute of Chemical Technology (ICT), Mumbai**

The announcement by Finance Minister Smt. Nirmala Sitharaman a year ago to launch a National Hydrogen Mission was the most welcome news in the budget. Then the Prime Minister launched the Hydrogen Mission on August 15, 2021. I believe that the time for the hydrogen economy is opportune for India. But are we prepared for it and what needs to be done? Hydrogen economy has a great potential for boosting India's energy security and alleviating the greenhouse gases (GHG) emissions. Simply stated, hydrogen can be employed as a fuel in a variety of applications, including fuel cell power generation and fuel cell vehicles. It combusts cleanly producing only water and no other obnoxious gases, and it can used as fuel in conventional IC engines to produce mechanical or electrical power. Above all, the overall energy efficiency is higher than IC engines that run with conventional fuels such as petrol or diesel. The hydrogen IC engine is said to be about 38%, 8% higher than petrol IC engine, while the fuel cell is 2–3 times more efficient than an IC engine.

Energy and the environment are thoroughly connected and the crude oil-based economy for the manufacture of fuels, chemicals and materials will not have a sustainable future. By the mid-2050s, there may not be a viable source of crude oil by using the current means of production and hence alternate sources must be tapped. Even otherwise, the over-use of oil products over last century has done a great harm to the environment, ultimately culminating into the Paris Agreement of 2015. Can hydrogen be the savior of the environment and how? In the realm of renewable energy across the world, it is estimated that the share of the renewable energy will increase from current ~27% to ~51% by 2035 to ~73% by 2050 totaling 49000 Terrawatt-hour (TWh). The contribution of solar, wind and hydro will be more than 50% in the renewable energy sources which will be 73% of the total; coal will still play a role. The European Union, the Hydrogen Council and Bloomberg New Energy Finance (BNEF) have reported that hydrogen could grow from 2% of the global energy mix in 2018 to 13–24% by 2050, at about 8% CAGR at the mid-point. The Hydrogen Council predicts investment of USD 150 billion by 2030. For the hydrogen economy to be a reality, hydrogen must be produced cheaply and in an ecofriendly manner, and it should serve as the commercial

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fuel that would provide a substantial portion of the country's energy demand and services. The reason might not so obvious to the public but in the so-called net-(carbon)-zero economy, green hydrogen will have to play a dominant role, not only in achieving the objective of converting carbon dioxide into fuels and chemicals such as methanol, dimethyl ether, formic acid, hydrocarbons, polymers, ammonia, etc. but also transforming (waste) biomass including waste plastics into fuels and chemicals. Carbon dioxide, the GHG and hydrogen are linked together in more than one way for protection of environment and provision of future stocks of chemicals and energy.

Hydrogen should be manufactured using local resources using indigenously developed technologies. It can be manufactured via a variety of processes which are coupled with a broad range of emissions, depending on the type technology and energy source used, thereby having different costs consequences and material needs. Hydrogen production technologies are broadly and simplistically categorized into three types such as grey hydrogen, blue hydrogen, and green hydrogen. The main difference among the grey, blue, and green hydrogen is that the hydrogen is produced using fossil fuels, non-renewable energy, and renewable energy, respectively. Electrolysis of water using clean electricity from wind, solar, hydro, or nuclear energy sources will give green hydrogen which is the gold standard because it produces zero GHG emissions. Steam reforming of biomass, biogas, biooil, or natural gas also gives hydrogen called blue hydrogen giving the other carbon portion in the feedstock as carbon dioxide. Authorities estimate that this process captures up to 90% of the carbon having low to moderate carbon intensity. Whereas the steam reforming of fossil sources similarly gives grey hydrogen coupled with co-generation of carbon dioxide; and this method is the most common technology which is increasingly unpalatable because of the emissions of carbon dioxide.

Green hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has numerous potential applications across different industries, transport, power, and buildings sectors. Most importantly, it does not emit carbon dioxide and almost no air pollution when used. It thus provides a key to decarbonise industrial processes and economic sectors where reducing carbon emissions, which is both important and challenging to achieve. This is part of the so-called net zero carbon policy by 2050 in consonance with the Paris Agreement while working towards zero pollution. However, hydrogen represents a modest fraction of the global energy mix and is still largely produced as grey hydrogen from fossil fuels, notably from natural gas or coal, resulting in the release of tons carbon dioxide annually in the EU. The reduction of carbon dioxide emissions of ~35 gigatons in 2020 to ~10 gigatons will contain the global temperature to within 1.5 Degree C in 2050. For hydrogen to contribute to mitigate

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climate change and climate neutrality, it ought to attain much larger scale and its production must become fully from water splitting using green technologies. During November 2019-March 2020, the list of planned global investments increased from 3.2 GW to 8.2 GW of electrolysers by 2030 of which 57% in Europe. The Hydrogen Council founded in 2017 by 13 companies has now 109 companies as members from more than 20 countries, bringing together an even broader range of sectors along with the complete hydrogen value chain. However, the transition to a hydrogen economy encounters many challenges that must be surmounted, including large-scale infrastructures for refilling stations of hydrogen akin to those of petrol, diesel and natural gas, and the cost of hydrogen production, transport, and storage. These challenges can be overcome collectively by multi-partnership among companies, nations, and continued research across institutions, and above all local government policies. Today, the fossil-fuel based grey hydrogen is much cheaper than the green or blue hydrogen. The EU report estimates that the costs today for fossil-based hydrogen are ~1.83 USD/kg for the EU, highly dependent on natural gas prices, and disregarding the cost of carbon dioxide. Projected costs today for fossil-based hydrogen with carbon capture and storage (CCS) are around 2.44 USD/kg, and renewable hydrogen 3.05-6.71 USD/kg. Further, the fossil-based hydrogen with carbon capture can become competitive only if the carbon prices are in the range of 70-110 USD/ton of carbon dioxide. The electrolyser costs have gone down during the past decade by about 60% and will further reduce by half by 2030 due to the economies of scale. In other words, the cost of hydrogen must be below 1.5-2 USD/kg to make a practical commercial sense for the hydrogen economy. Incidentally, the cost of hydrogen production by using water splitting in conjunction with solar energy is less than USD 1/kg for the process developed by the author in collaboration with OEC; we have named it as ICT-OEC hydrogen production technology. I hope the Ministry pays attention to it.

Some other costs and life cycle analysis (LCA) must be mentioned here for the planners to take cognizance of this article. The EU is way ahead in planning for the hydrogen economy. According to the International Energy Agency, IEA (2019), the well-to-gate greenhouse gas emissions for renewable hydrogen from renewable electricity are close to zero. The well-to-gate greenhouse gas emissions of steam reforming of natural gas are 9 kilograms carbon dioxide equivalent per kg of hydrogen. The same figures for the well-to-gate greenhouse gas emissions of steam reforming of natural gas with CCS with 90% and 56 % respectively are 1 and 4. In this analysis the natural gas prices for the EU are taken as 26.8 USD/MWh, electricity prices from 43-106 USD/MWh, and capacity costs of USD 730/kW. Based on cost assessments of IEA, the International Renewable Energy Agency (IRENA), and BNEF, the electrolyser costs will decline from 1100 USD / kW to 550 USD / kW or less after the year 2030, and 220 USD/kW after the year 2040. Costs of CCS increases the costs of steam reforming of natural gas from 990

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USD/kWh to 1850/kWh. On the basis of current electricity and gas prices, low-carbon fossil-based hydrogen is projected to cost in 2030 from 2.5-3.0 USD in the EU, and renewable hydrogen are projected to cost from USD 1.3-2.9/kg according to IEA, IRENA and BNEF. The target for solar electricity is to be cost competitive with the current fossil-fueled system. If the cost of installed PV power can be reduced from the present cost of about USD 5/W installed to about USD1/W installed, the cost of solar electricity is predicted to reach USD 0.10/kWh.

One of the issues using carbon based, whether renewable or fossil, is the emission of carbon dioxide associated with hydrogen production. That co-product carbon dioxide can be valorized by using hydrogen into a few products enumerated earlier, such as methane and higher hydrocarbons, methanol, dimethyl ether (DME), formic acid, formates, urea, carbonates, etc. DME is the cleanest, colorless, non-toxic, non-corrosive, non-carcinogenic and environmentally friendly chemical that is mainly used today as an aerosol propellant in various spray cans, replacing CFC. Due to its high cetane rating of 55-60, compared with 40-55 for conventional diesel fuel, much higher than that of methanol, DME can be effectively used in diesel engines. Like methanol, it is a clean-burning fuel and produces no soot and black smoke. DME is the best substitute for propane and butane in LPG as a cooking fuel and the well-established LPG industry infrastructure can be used for DME. The worldwide demand for DME is currently only about 150,000 tons/year, which could be considerably increased if large quantities of DME are needed as fuel.

There are many points to advocate hydrogen economy for India's transition to clean and green energy. Renewable electricity will lead the decarbonization or net-zero effort across the globe by 2050. Meanwhile hydrogen can serve as a vector for renewable energy storage in conjunction with batteries, and transport, guaranteeing as a backup for seasonable variation. Hydrogen can substitute fossil fuels in some carbon intensive industrial processes, such as steel and chemical and allied industry, lowering GHGs and further bolstering global competitiveness for those industries. It can present solutions for difficult to abate parts of the transport system, in addition to what can be accomplished through electrification and other renewable and low-carbon fuels. India can learn a lot from countries like the US, the EU, Japan, and China, and from their policies to promote the hydrogen economy. It was heartening to note that the Indian Oil has planned to purchase 15 polymer electrolyte membrane (PEM) fuel cell buses that can run on hydrogen fuel and is also setting up a facility to produce hydrogen to run the buses. The Ministry of Natural Gas and Petroleum must be applauded for creating the hydrogen corpus fund. The renewable energy resources like solar and wind, and other types are environment-friendly alternatives to produce electricity to be applied for hydrogen production. The potential of solar energy for producing sustainable electric power (solar PV or solar heat), or by direct use of solar heat to produce hydrogen for fuel cell power generation and as fuel for ICEs merits

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attention. However, the high capital cost of fuel cell, about USD 5,500/kW, is one of the major hurdles of its development that must be surmounted before commercialization.

As fuel cell technology becomes mature & economical, fuel cells and fuel cell vehicles will gain substantial market share vis-à-vis conventional power generation sources and transportation vehicles. In that way, the entire world would benefit from lower dependence on oil and coal as the major sources of energy and cleaner environment through lower carbon emissions. What we need in the future are the integrated plant for hydrogen production from water splitting and its use in controlling environmental pollution and climate change as well as production of many chemicals (the carbon dioxide refineries). Also, we need a novel, realistic rethinking of the energy policy—from transitioning from coal to petroleum to gas and eventually to electrification of transport, to carbon pricing and a focus on new technologies. Why and how the energy and material policies should consider (renewable) carbon for chemicals and materials with non-carbon renewable sources of energy should be abundantly clear now. However, before this vision is turned into a reality and the transition to the Hydrogen economy happens, many technical, social, and policy challenges must be conquered. The Government of India should make the first move, sooner than later, in consonance with its grand objectives, the 5 trillion-dollar economy notwithstanding.

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**Professor Ganapati D. Yadav,** D. Sc. (Hon. Causa, DYPU) and D. Eng. (Hon. Causa, NIT Agartala), Emeritus Professor of Eminence, Former Vice Chancellor and JC Bose National Fellow at Institute of Chemical Technology, is one of the highly prolific and accomplished engineering-scientists in India, known for his contributions to education, research and innovation in Green Chemistry and Engineering, Catalysis, Chemical Engineering, Energy Engineering, Biotechnology, Nanotechnology, and Development of Clean and Green Technologies. He is an elected Fellow of Indian National Science Academy, Indian Academy of Sciences, National Academy of Sciences, India, Indian National Academy of Engineering, and TWAS, and Fellow of RSC IChemE, UK, IIChE, Indian Chemical Society, and ISTE among others. His productivity is phenomenal: supervision of 107 Doctoral, 135 Masters theses, 47 PDFs, 495, 115 patents; 3 books; h-index 64, i10 index 316; 14,900+ citations. He was conferred Padma Shri, the fourth highest civilian honour, by the President of India in 2016. He is on the board of 5 public limited companies as an Independent Director and associated with many policy making bodies of the central government.

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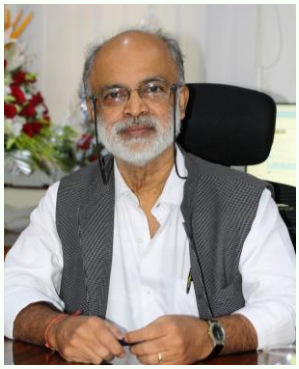
# KNOW YOUR EC MEMBERS of IIChE-MRC



## Prof. Anirudh B. Pandit
## Chairman IIChE-MRC

***Ph.D.(Tech.), B. Tech. (Chem.)***
***(FTWAS, FNA, FASc, FNAE, FNASc, FMASc)***
Professor, UGC Research Scientist, "C" (Professor's Grade)
J. C. Bose National Fellow (DST, Govt. of India)

Prof. Aniruddha B. Pandit was born on 7th December 1957 in Mumbai, Maharashtra. He earned his B. Tech (Chem) degree from Indian Institute of Technology (IIT), Banaras Hindu University in 1980 and earned his Ph.D. (Tech) degree from University Department of Chemical Technology (now ICT), in1984. From 1984 till 1990 he worked in the Department of Chemical Engineering, University of Cambridge, United Kingdom as a Research Assistant & then as a Research Associate with Prof. J. F. Davidson, working in the area of bubble break-up and design of multiphase reactors. He developed many novel designs of gas-liquid contactors and also developed new impeller designs.

ACADEMIC & RESEARCH CONTRIBUTIONS: After returning to India in 1990, he joined ICT as a UGC Research Scientist 'B' and was subsequently promoted to Scientist 'C' (Professor's Grade) in 1996. He was instrumental in starting a major activity & program in the area of Hydrodynamic Cavitation for intensification of physical and chemical processing applications. He has successfully exploited the cavitation phenomena for a variety of operations such as crystallization, emulsification, nano-particle synthesis and processes such as esterification, oxidation etc on industrial scale. He has been an active industrial consultant for many large size national and international companies.

A unique creative approach of using fundamental knowledge, coupled with simple, elegant experiments has resulted into novel cavitational reactors. Prof. Pandit has authored over 472 publications, 5 books and over 12 chapters (with over 30000 citations)and has 15 patents & is on the Editorial board of five International Scientific Journals. He has guided 50 PhD's and 90 master's students so far.

**Subjects Taught:** Environmental Engineering and pollution control Chemical Project Economics, Design of Multiphase Reactors and almost all the Chemical Engineering subjects and undergraduate and postgraduate level.

**Recognized Research guide** for Ph.D. (Tech.) in Chemical Engineering, Bioprocess Technology, Green Technology, Ph.D. (Science) in Chemistry. Guided students: Ph.D. : 50, Masters : 90

**Total Research Publications:** 472 National/International :, Citations> 30000, H-Index: 94

**Patents (granted in last 5 years):** 15

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# KNOW YOUR EC MEMBERS of IIChE-MRC

**National And International Awards:** Indian National Academy of Science (INSA), Best Teacher Award, 2012; Sir J. C. Bose Fellow of the Department of Science and Technology, Government of India, 2015; Vishwakarma Medal, Indian National Academy of Science (INSA), 2015; Fellow The World Academy of Sciences (TWAS), 2015

**Awards:**

- ISTE National award for outstanding research, 1995
- Prof. R.A. Rajadyaksha Best Teacher award, on 15 occasions in the past 20 years
- VASVIK award, 1996; Fellow, Maharashtra Academy of Science 1997
- IIChE – Herdilia award for excellence in basic research, 2001
- Distinguished Alumnus award, Institute of Technology-Banaras Hindu University, 2004
- Distinguished Alumnus award, UICT, 2008; INSA, Best Teacher award, 2012
- Vishwakarma Medal of Indian National Science Academy 2015
- Fellowships of, Maharashtra Academy of Sciences, 2000
- Indian National Academy of Engineering, 2006, Indian Academy of Sciences, 2008
- Indian National Science Academy, 2009; National Academy of Sciences in India, 2009
- Fellow of TWAS 2015

**Other Contributions:** In addition to his research contribution, Prof. Pandit has contributed to innovation in teaching, at graduate and undergraduate levels, demonstration experiments for elaborating the physical principles of many chemical engineering operations. He is actively involved in working with committees in the area of harnessing solar energy & with tribal population in extending the chemical engineering principles for drying of farm/ forest product & water disinfection for potable water. He is a president of a NGO named Land Research Institute dealing with the Energy and Town planning sector.

**Administrative Contributions:** Prof. Pandit has taken over the charge as Vice Chancellor of Institute of Chemical Technology on November 29, 2019. Prior to this, he has acted as a Dean in his capacity of Human Resource and earlier as Dean of Research Consultancy and research Mobilization. He has been the coordinator of ICT-DAE center for Chemical Engineering Education and Research since its inception in 2008. He is on the editorial board on 5 international journals and is an associated editor of Ultrasonic Sonochemistry. He has successfully guided and completed international science collaborations with Universities from France, Australia and The Netherlands. He is also on the project appraisal and evaluation committees of the DST and UGC, Govt of India. He is currently serving as a member of the BOG of the IIT Bombay. He has been an active industrial consultant to many national and international industries.

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# KNOW YOUR EC MEMBERS of IIChE-MRC

**Shri Lalit Vashita** is a Chemical Engineer from NIT Rourkela 1986 batch. He is proficient in the area of separation and filtration technologies with experience of over 35 years. He is the CEO Founder Diva Envitec Pvt. Ltd., a company in the field of process engineering and toxic Wastewater treatment, Co-Founder EKOBARN Pvt Ltd - into composting and Diva Agritec Pvt Ltd, a green agro initiative. Diva Envitec offers bespoke solutions to the process engineering needs of the API, pharma, chemical, sugar, distillery and wastewater sectors and operates in the areas of wastewater & effluent treatment, process filtration, precious metal catalyst recovery, feasibility studies, R&D projects, hot gas filtration, membrane processing for Biologicals and Chemicals, Ceramic, Polymeric, RO/NF/UF/MF/MBR, mainly process applications. He has been in the IIChE MRC member for 15 years and in EC twice. He has also convened conferences on Wastewater Management AQUA for IIChE MRC in 2009 and 2016

**Shri Mahendra A. Patel** is a Chemical Engineer from Gujarat University (1979). He joined ONGC in 1980 as GET and Superannuated in 2016 as GM Production. He had experience of 36 years of working in Oil and Gas industry at different level. He travelled across India for ONGC Oil and Gas production activities including Mumbai offshore being major part of his assignment. He was instrumental for enhancement of production and had played key role for value added products like LPG, CNG, PNG, ATF etc. He was responsible for Quality Control of Crude and Natural Gas. Presently he is Govt. Registered Valuer for Plant and Machinery, Chartered Engineer, Associates of Insurance, Freelance Surveyor & Loss Assessor. He is Life Member of IICHEMRC since 2007, Treasure since 2019 as well Fellow of IOE, Fellow of IOV, Vice Chairman IOV, Mumbai Chapter.

**Shri Dhawal Saxena** is a Chemical Engineer and presently working as Secretary IIChE MRC, Executive Director, Blast Carbo Blocks Pvt. Ltd., Member, Bureau of Indian standards MED-17 committee and Former Vice President Indian Carbon Society. He has honour of being youngest National Council member elect at IIChE 2015-2017 and Former Registrar at IIChE National Council 2016 & 17. He was Co-ordinator for Lean Six Sigma online Internships at IIChE and completed more than 500 internships. Director BIS "Providing Turnkey system for Chemical Process Industries". He is recipient of IIChE NOCIL award for Design & Development in Chemical Industry and "Jeevan Raksha Padak" Gallantry Award by Govt. Of India.

**Shri Jagdish Nageshri** is Chemical Engineering graduate (1982) from Gujarat University, PG in Finance / Operations Management and Homi Bhabha (BARC) Gold medallist. Has Hands on with handling Hydrogen, Ammonia at high pressures and range of temperatures for distinctive chemical engineering operations, with career span from Process Engineer at Birla's Soda Ash plant (Porbandar) to Corporate Operation & Safety Head of flagship unit of Department of Atomic Energy (Mumbai). Has served in several high level technical expert committees and as senior faculty at BARC Training School (HBNI). He is credited for commissioning of Heavy Water Plant Hazira, major trouble shoots at Baroda plant, award winning operations at Thal plant in 2018 & major dismantling of Talcher plant in 2021.

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# KNOW YOUR EC MEMBERS of IIChE-MRC

**Dr. M. P. Jain** is a B.Tech. (Chemical), M.Tech. (Chemical) from IITBHU and Ph.D (Chemical) from IIT Bombay. He has served IIChE MRC from 2004 as member, treasurer and Chairman and National Council of IIChE as member, treasurer and Vice-president. He has served BARC for more than 34 years as Research and Development engineer in process development of heavy water and also headed section for food preservation.

**Dr. Alpana Mahapatra,** Former Professor & Head, Chemical Engineering. Dept., D. J. Sanghvi College of Engineering, Mumbai. She is Ph.D.(Tech.) from ICT, Mumbai, M. Tech. (Process Engg. & Design from IIT, Delhi, B.Tech. (Chem. Engineering) from Calcutta Univ. and InDA Life Fellow. Research Area: Separation Processes, Chem. Reaction Engineering, Food Technology. IIChE National Council member (2019-2022).

**Dr. Aparna Nitin Tamaskar** B. Tech and M. Tech from LIT Nagpur, PhD from IIT Bombay. She is closely associated with Mumbai regional center, IIChE-MRC as EC Member from 2010. She had active participation in various IIChE activities as joint treasurer, Joint secretory, in charge of student's activity, vice chairman (2018-19). She has 20 years of teaching experience in D.J. Sanghvi College of Engineering, affiliated to Mumbai university.

**Dr. T.L. Prasad** obtained B.E. (Chemical Engineering) from N.I.T. Karnataka; M. Tech (Chemical Engineering ) from I.I.T Madras and PhD from HBNI. Working as Senior Scientific Officer at Desalination Division of Chemical Engineering & Technology Group of Bhabha Atomic Research Centre, Trombay. His research interests include Power reactor Decontamination and Decommissioning; Calciner systems for High level liquid wastes of Nuclear Industry; Alkaline Hydrolysis and Incineration for Spent solvent management; Advanced Oxidation Processes for management of Organic wastes; Recovery of Uranium and other valuables from Seawater/Brine; RO membrane management; Brine management using bio-desalination. Has presented more than 75 research papers in various International and National symposiums/seminars and peer reviewed journals. Editor and Reviewer for Journals. He is member of Indian Nuclear Society; Indian desalination Association; fellow of Institute of Engineers (I); Indian Institute of Chemical Engineers as well honorary faculty at HBNI.

**Prof. Sanjay Mahajani** has completed PhD from ICT and post doctoral research from Monash University Australia. He is full time professor in Department of Chemical Engineering IIT Bombay. His area of research is Catalysis and Process development. He has published 150+ international journal paper's and 10+ international and national patents.

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# KNOW YOUR EC MEMBERS of IIChE-MRC

**Shri Praveen Saxena** is Director & CEO of Blast Carboblocks private limited, Mumbai. Blast Carboblocks is in business of Design & manufacturing Graphite Equipment for Chemical Process Industries. He has honor of being Committee Member of BIS M-17, Vice President of Indian Carbon Society, Director of Process Plant & machinery manufacturers Association of India, Editorial Board Member of Chemical Business, advisory member of Board of studies in Chemical Engineering, Mumbai University. He has been Chairman IIChEMRC (2010), MRCEC member (2008-2019), Fellow (2019), Vice president (2013-2020), Joint Secretary (2010-2011). He is recipient of NOCIL award for excellence in design & development, Prof. S.K. Sharma medal and CHEMCON distinguished Speaker Award.

**Shri Shreedhar Chitanvis** is former Head of Process Engineering at the India office of Aker Solutions, a Norway - based company that delivers integrated solutions, products and services to the global energy industry. He holds a B. Tech. from LIT Nagpur and an M.E. from IISc Bangalore. He is a Functional Safety Professional certified by TŰV Sűd since 2011. He is now a freelance consultant in the fields of Process Engineering and Process Safety. He has been a part of the Executive Committee of IIChE MRC since 2009 and was Vice Chairman of the Committee from 2010 to 2014. He is also a member of the Technology and Energy Expert Committee of the Indian Chemical Council since 2011.

**Shri Vijay Sane** has 38 years of experience with Gharda Chemicals in R&D. Process Development and Process Safety. Currently he is visiting Faculty at ICT, since 2004. He has been part of MRC EC since 2004.

**Shri Rajesh Jain** is Marketing Director of M.R. Impex looking after Export / Import and local trading of chemicals He has passed out B.E (Chem) in 1993 from Bharati Vidyapeeth College of Engg. He is associated with IIChE-MRC since 2006. He has served as Hon Joint Secretary for 2 terms. He can be contacted on rajeshjain100@ymail.com or 9757094861.

**Shri Pratik G. Bhagat** is Principal Process Engineer National Petroleum Construction Company (NPCC) Mumbai. He is Senior Process engineer with 10+ years of experience in process engineering EPC&EPCM. He is recipient of Promising Young Talent Award. Key areas of his experience are Design and development of Refrigeration compression system, LPG storage system, Anti-surge solutions and alarm rationalisation.

**Shri Akash S. Shinde** has completed B. Tech in Chemical Engineering in 2015. He is pursuing PhD in Chemical Engineering from IIT Bombay. He has worked in CSIR- National Chemical Laboratory Pune for 1.5 year. He is working in IIT Bombay as Technical Superintendent from 2017. He has hands on experience on Hollow fibre membrane synthesis, process development for speciality chemicals.

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Report on

# CHEMCON 2021

## IMMT, Bhubaneswar - 26-30 December 2021

Indian Chemical Engineering Congress (CHEMCON-2021) and the 74th Annual Session of the Indian Institute of Chemical Engineers (IIChE) was held at CSIR-Institute of Minerals and Materials Technology, Bhubaneswar during 26-30 December 2021 in hybrid mode. CHEMCON offers the most attractive platform, ensuring five days of intensive interface among the National and International experts in Chemical Engineering and allied fields. These interactions helps the delegates to constantly update and equip themselves so as to keep pace with the fast changing professional scenario. CHEMCON-2021 featured host of events, which includes memorial lectures, plenary lectures, seminars, international symposium, panel discussions, exhibition, etc. IIChE-Bhubaneswar Regional Centre and CSIR- IMMT Bhubaneswar have organized the event in association with the Institute of Chemical Technology & Indian Oil Odisha Campus, Bhubaneswar.

The Indian Institute of Chemical Engineers (IIChE), founded on 18th May 1947, is an apex professional body of Chemical Engineers in the country and presently has around 25,000 corporate members on its roll. The activities of the Institute are spread across India through its 41 Regional Centres and 160 Student Chapters, with its Head Quarter located at the Jadavpur University Campus, Kolkata.

CHEMCOM 2021 was virtually inaugurated by Chief Guest Mr. Naveen Patnaik, Hon'ble CM of Odisha with the virtual presence of Guest of Honour, DR. Shekhar C. Mande, Director General - CSIR and the invited guests dignitaries and participants. Inaugurating the event Chief Guest, Mr. Naveen Patnaik, Hon'ble CM of Odisha expressed his immense pleasure towards the beginning of the event. He said that "The government of Odisha will provide you the best in class and facility for growth. I wish the event grand success."


**Chief Guest Shri NAVEEN PATNAIK Chief Minister ODISHA addressing the CHEMCON Conference**


Indian Chemical Engineering Congress
& 74th Annual Session of Indian Institute of Chemical Engineers

26
DECEMBER,2021

CSIR-IMMT,
BHUBANESWAR

CHEMCON-2021
BHUBANESWAR

**Jointly Organized by**

Indian Institute of Chemical Engineers,
Bhubaneswar Regional Centre

CSIR- Institute of Minerals and Materials Technology,
Bhubaneswar

**In Association with**

Institute of Chemical Technology,
Bhubaneswar

**International Collaborators**

Canadian Society for
Chemical Engineering

South African Institution of
Chemical Engineering

**Supported by**

Reliance Industries Limited — Chemistry for smiles
IndianOil
Aditya Birla Chemicals
Tech Mahindra
EXCEL
NALCO

## CM inaugurates CHEMCON-2021

**STATESMAN NEWS SERVICE**
BHUBANESWAR, 26 DECEMBER:

Indian Chemical Engineering Congress (CHEMCON-2021) and the 74th Annual Session of the Indian Institute of Chemical Engineers (IIChE) kick started on Sunday with Chief Minister Naveen Patnaik assuring that his government will provide the best in class and facility for growth.

The 5-day long CHEMCOM will be held till 30 December in hybrid mode.

CHEMCOM 2021 was inaugurated on virtual mode by CM Naveen Patnaik, in the presence of Dr Shekhar C. Mande, DG -CSIR and other dignitaries and participants.

The theme of the Conference "Sustainable Utilisation of Resources for Chemical & Mineral Sectors", focuses on providing a forum for substantial discussion on the availability and utilization of mineral resources using the existing and emerging technologies.

Dr. Shekhar C. Mande Director General, CSIR and Secretary DSIR expressed his concern towards the death rate in the last year due to the pandemic and said "the world is staring at very different kinds of problems and if we have to be ready for the problems, be it climate change or future pandemics, the elegant solutions will only come if we all work together."

Prof. Suddhasatwa Basu, Director, CSIR-IMMT ,D.P. Mishra, C. P. Gurnani and Dr Avijit Ghosh spoke.

Dr. G. K. Roy was felicitated by Dr. C. Eswaraiah, the Organising Secretary of CHEMON 2021.

## Chief Guest
**Shri Naveen Patnaik**
*HON'BLE CHIEF MINISTER OF ODISHA*

## Guest of Honour
**Dr. Shekhar C. Mande**
*DIRECTOR GENERAL, CSIR & SECRETARY, DSIR*

**MR. C. P. GURNANI**
*CHAIRMAN, NOC*
*CEO & MD, TECH MAHINDRA*

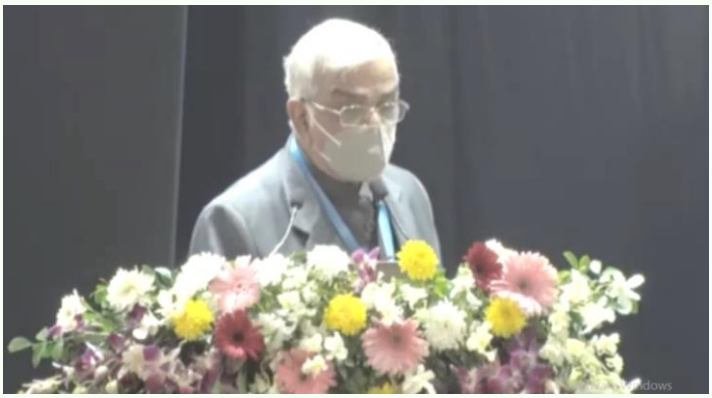
**PROF. SUDDHASATWA BASU**
*CHAIRMAN, LOC*
*DIRECTOR, CSIR-IMMT*

## Glimpses of

# CHEMCON 2021 INAUGURATION

**26 December 2021**

**WELCOME ADDRESS by**
**Prof. Suddhasatwa Basu**



**Shri D.P. MISHRA addressing the Chemcon Audience introducing Guests**

**Opening remark by**
**SHRI C.P. GURNANI**

**Address by**
**Guest of Honour**
**SHRI DR SC MANDE**

## Glimpses of

# CHEMCON 2021 INAUGURATION

**26 December 2021**

**Inaugural Speech by**
**Prof. M. K. Jha,**
**President IICHE**

**DR AVIJIT GHOSH Briefing**
**IICHE Activities**


**Inaugural Speech by**
**SHRI SM VAIDYA**
**CMD, IOCL**

**Inaugural Speech by**
**SHRI ASHWIN C. SHROFF**
**Chairman, EXCEL Industries Ltd.**

# Glimpses of
# CHEMCON 2021
## 26 December 2021

**Inaugural Speech by**
**Dr. SANTRUPT MISRA**
**Director, Aditya Birla Chemicals**


**Felicitation of**
**Prof. G.K. Roy,**
**his daughter Dr. Roy**
**receiving the Award**

**Prof. Anurudh B. Pandit**
**Chairing Indo-Canadian session**

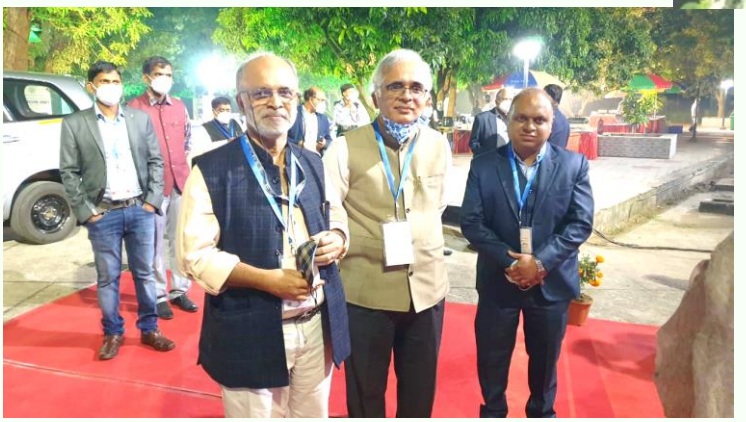
**Distinguished Audience**
**At CHEMCON 2021**

# Glimpses of
# CHEMCON 2021
## 26-30 December 2021


Lifetime Achievement Award Ceremony (L-R) Prof Satyanarayan, Prof Bala Subramanian, Awardee Prof V.K. Srivastava Mrs Srivastava, President IICHE Prof MK Jha, Vice President IICHE Praveen Saxena, Prof Madhu Agrawal, Dr MP Jain…

**Prof V. K. Srivastava, IIT Delhi addressing the audience after receiving Lifetime Achievement Award of IIChE 2021**

**Vote of Thanks by Dr. C. Eswaraiah, Organising Secretary**



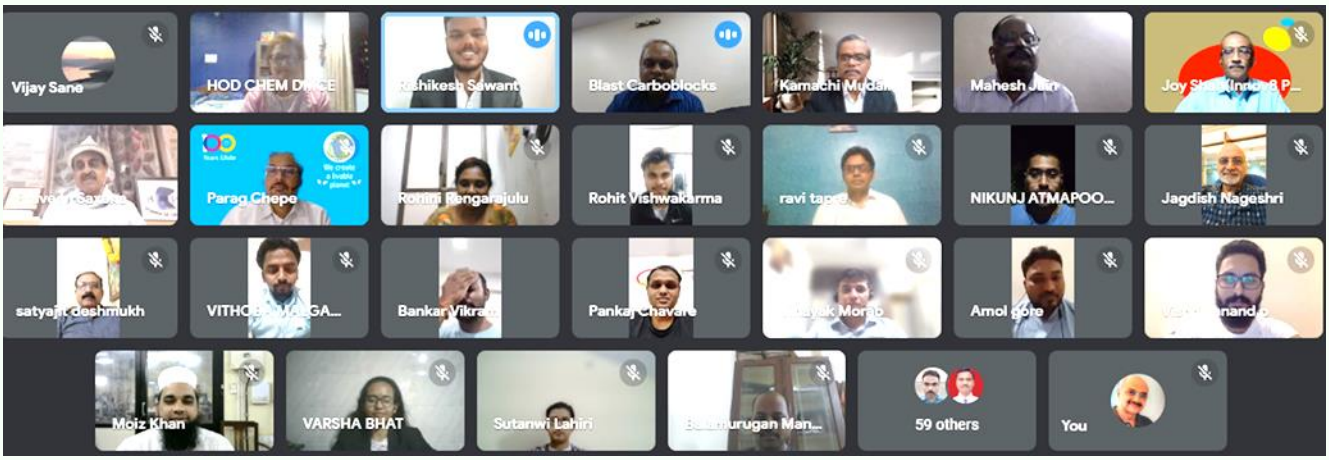
**(L-R) Prof. A.B. Pandit VC, ICT; Dr. Shekhar Mande DG, CSIR & Secretary DSIR; Shri Dhawal Saxena, MRC Secretary & ED Blast Carboblocks.**

# Glimpses of OYCE 2021

## Datta Meghe College of Engineering, Navi Mumbai - 25/09/2021

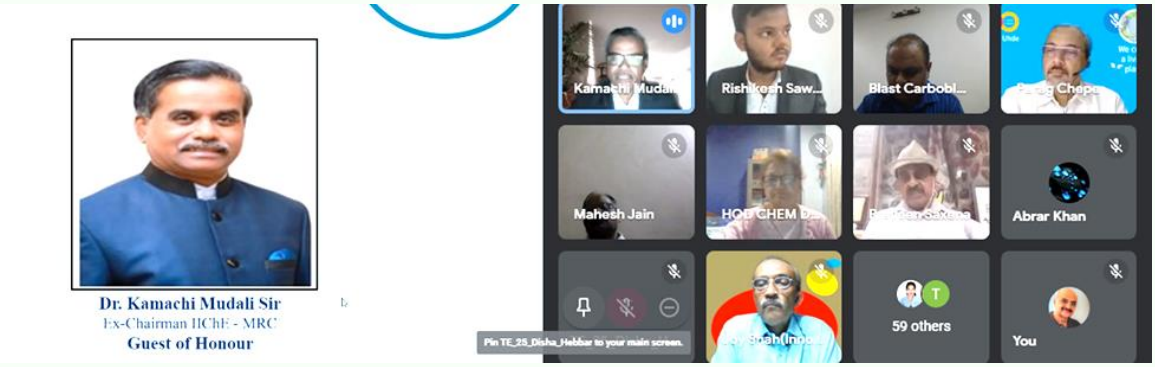
The online (Hybrid) event on 25th September, 2021 was organised by the student representatives from Datta Meghe College of Engineering, Airoli, under the guidance of the IIChEMRC. The event was sponsored by Blast Carboblocks and Thyssenkrupp Industrial Solution. Shri Parag V. Chepe, Chief Engineering Officer & Executive Director (Engineering), ThyssenKrupp was Chief Guest of the function OYCE 2021. In his keynote address Shri PV Chepe said, “Chemical engineering needs innovations. Innovations are the key to success for companies.”. Highlighting the his group’s purpose, he continued “We create a liveable planet, ThyssenKrupp maintains its tradition of offering the industry sustainable and innovative technologies. In recent times, it has introduced its Alkaline Water Electrolysis Technology to produce Green Hydrogen and other Green Chemicals, and thereby reduce the emission of the greenhouse gases.” ThyssenKrupp has been associated with OYCE for the last 5 years, in keeping with its tradition of encouraging industry and academic initiatives.

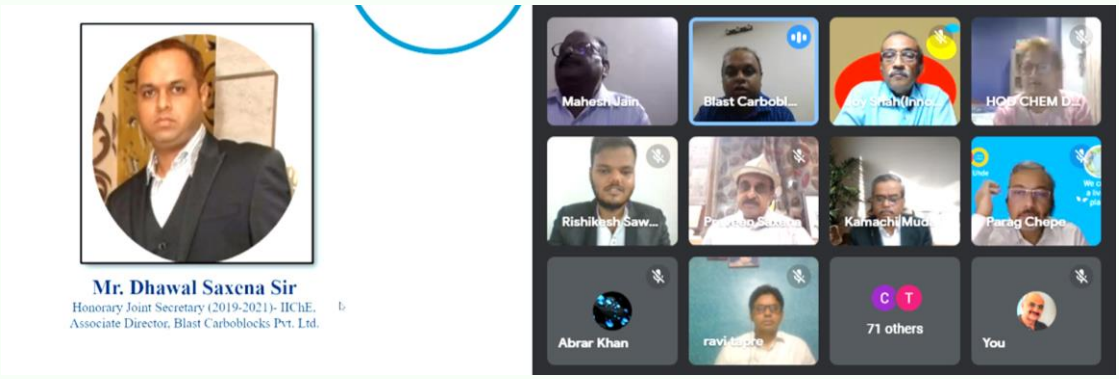
Among other dignitaries present were, Prof. MK Jha, National President – IIChE; Dr Kamachi Mudali, Ex-Chairman, IIChEMRC; Joy Shah, Founder and Chief Consultant, Innov8 Protech Solutions; Sushil Kumar, Ex-President IIChE, Reliance; Shri RG Rajan, Ex-CMD, RCF; PK Saxena, Director - Blast Carboblocks & Co-sponsor; Dhawal Saxena – then Joint Secretary IICHEMRC and Associate Director – Blast Carboblocks; Dr. Mrs. K. S. Deshmukh, Head of Chemical Engineering Department, Datta Meghe COE & convener; Dr Ravi Tapre – Faculty, Datta Meghe COE to name a few. The 17th edition of the Competition attracted a number of entries in both its categories – the Students Category and the Working Professionals / Post Graduate Category, from across the country. The latter saw a number of papers of interest from leading chemical manufacturers like RCF, IGCAR and BARC, and leading academic institutions like IIT-Bombay and Institute of Chemical Technology, Mumbai. All the participants were given Certificate. Participants securing first three places were awarded Cash Prizes as well.

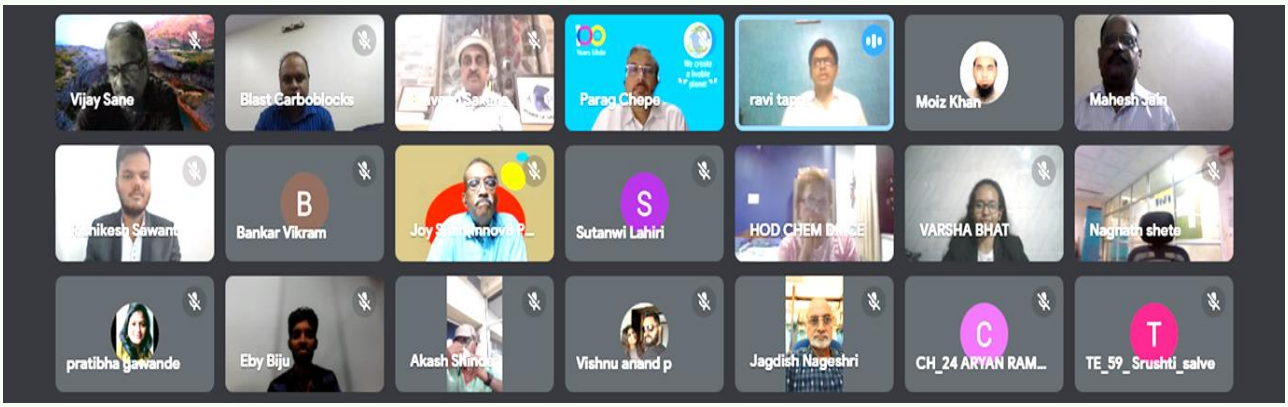


# Glimpses of OYCE 2021

## Datta Meghe college of Engineering - 25/09/2021



# Glimpses of OYCE 2021

## Datta Meghe college of Engineering - 25/09/2021


thyssenkrupp INDUSTRIAL SOLUTIONS &
BLAST CARBOBLOCKS

OUTSTANDING YOUNG CHEMICAL ENGINEERS 2021

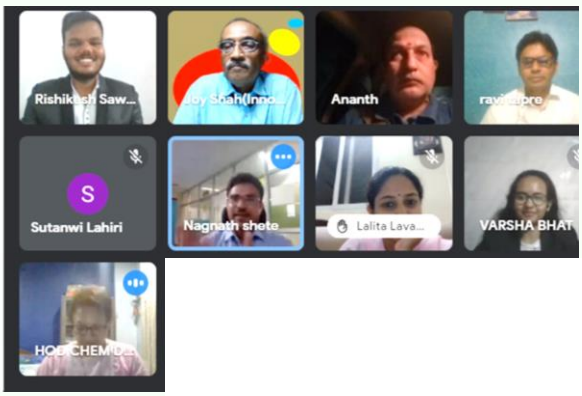
NAGANATH BASAVESHWAR SHETE

Rashtriya Chemicals & Fertilizers Ltd

has secured 1st in the 17th session of OYCE
Technical Paper Presentation

Presented the paper on the topic

" Increase in Methyl Amines production by increasing Ammonia concentration in reaction mixture and altering reaction equilibrium. "





thyssenkrupp INDUSTRIAL SOLUTIONS &
BLAST CARBOBLOCKS

OUTSTANDING YOUNG CHEMICAL ENGINEERS 2021

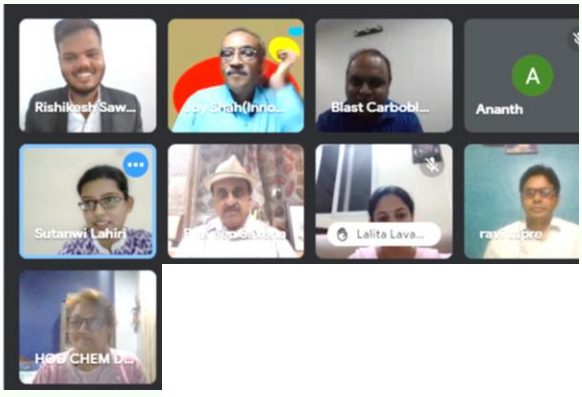
SUTANWI LAHIRI

BARC/ HBNI

has secured 1st in the 17th session of OYCE
Technical Paper Presentation

Presented the paper on the topic

" Application of Sonochemistry In Industrial Graphite Decontamination "





thyssenkrupp INDUSTRIAL SOLUTIONS &
BLAST CARBOBLOCKS

OUTSTANDING YOUNG CHEMICAL ENGINEERS 2021

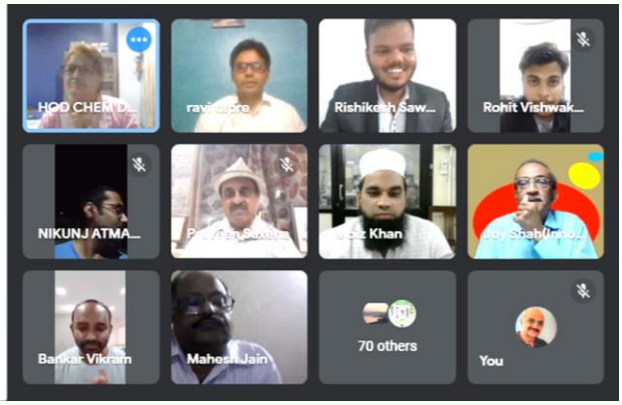
VIKRAM VIJAY BANAKAR
SARVESH SANJAY SABNIS

Institute of Chemical Technology

has secured 2nd in the 17th session of OYCE
Technical Paper Presentation

Presented the paper on the topic

"Innovative Approaches for Scale Control and Subsequent Improved Heat Transfer "



# Glimpses of
# SCHEMCON 2021

MANIT Bhopal - 22-23 October 2021

**Chief Guest**
Honourable MP Sadhvi Pragya Singh Thakur

Guest of Honour Shri Rameshwar Sharma MLA, Madhya Pradesh

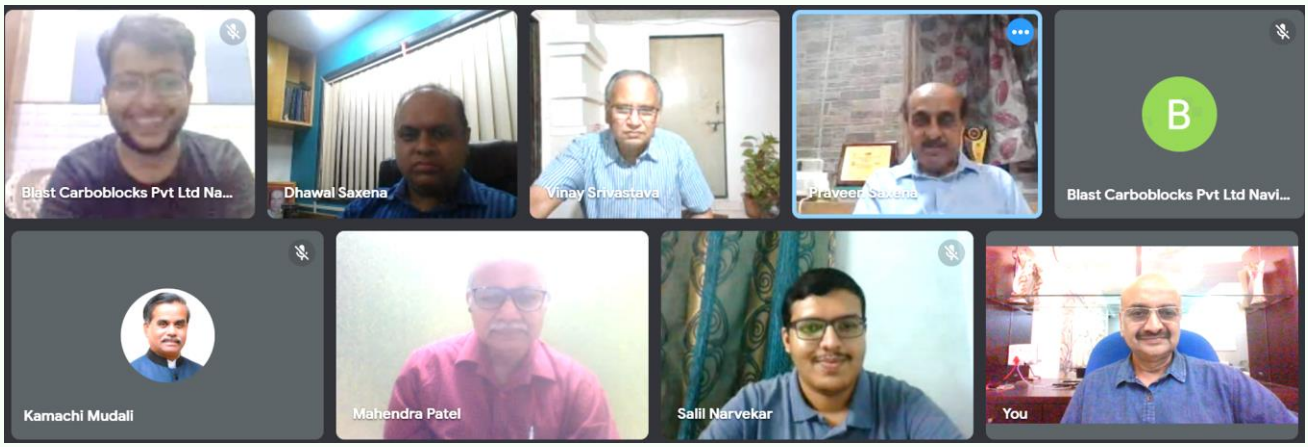
The Students' Chemical Engineering Congress (SCHEMCON), an annual event organized by the Students' Chapter of IIChE under one of its Regional Centres was organized jointly by MANIT Bhopal and IISER Bhopal. The SCHEMCON-2021 with a theme "Globally Advancement in Technology for Environment (GATE2021)" provided a formal platform for sharing knowledge of chemical process industries. The aim of the SCHEMCON-2021 was to challenge and inspire chemical engineers, research scholars and industry for exchanging best practices of clean and sustainable environment. The event provided an excellent opportunity for young researchers and post-graduate students to interact with eminent scientists and industrial personnel working in the frontier areas of chemical engineering science.

Inauguration ceremony commenced with introductory speech by Shri MK Jha, by President IIChE, followed by speech of Shri Pravin Saxena, Vice President, IIChE, Prof. Bala Subharamanian, Vice President, RC affairs IIChE, Dr. Avijit Ghosh, Secretary IIChE, Prof. NS Raghuwanshi, Director MANIT, Dr. Manoj Tripathi, Head CED, IISER, Bhopal. There was motivating Speech by Chief Guest Hon. MP Sadhvi Pragya Singh Thakur and Guest of honour Shri Rameshwar Sharma.

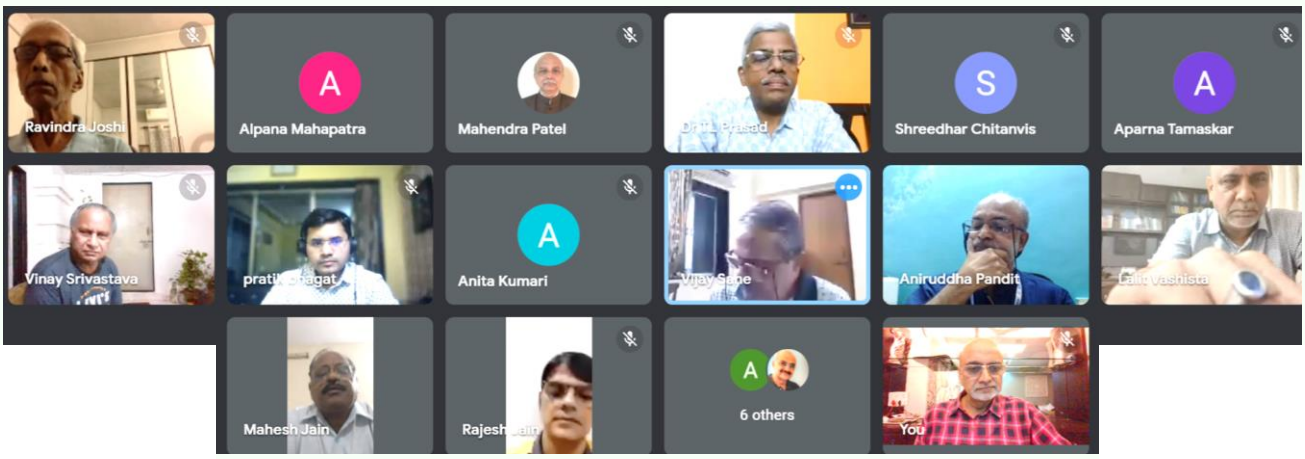

# Glimpses of
# 61st Annual General Meeting (AGM) 2020-21
## IIChE-MRC - 7th August 2021

61st Annual General Meeting (AGM) 2020-21 of IIChE-MRC conducted on 7th August 2021. The followings agenda items were discussed:

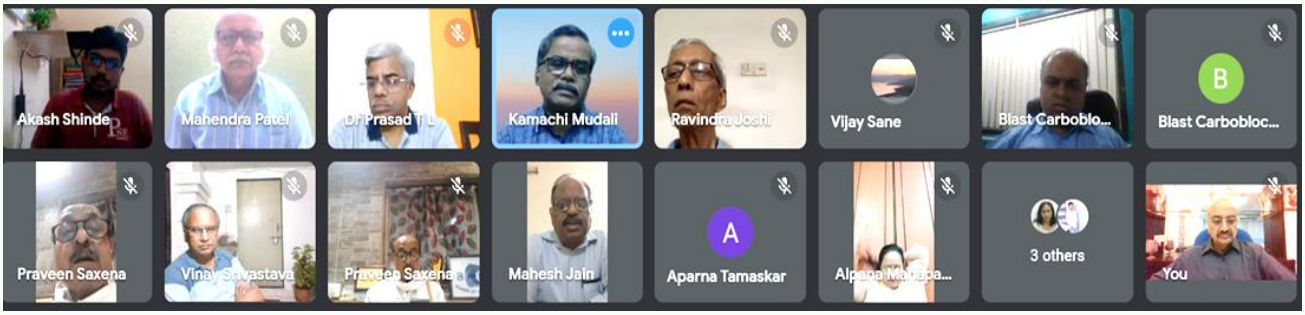
1. IIChE MRC activities during 2020-21,
2. MRC U-Tube channel functioning,
3. IICHEMRC website updating,
4. MRC E-Newsletter Advisory and editorial committee,
5. Six sigma Training & PSM Course coordination,
6. MRC members status,
7. MRC Diamond jubilee lecture series,
8. S-CHEMCON 2021, CHEMCON 2021, OYCE 2021,
9. NR Kamath Memorial Quiz,
10. Industrial Visit,
11. Election of new committee,
12. Audited financial report for FY 2020-21.



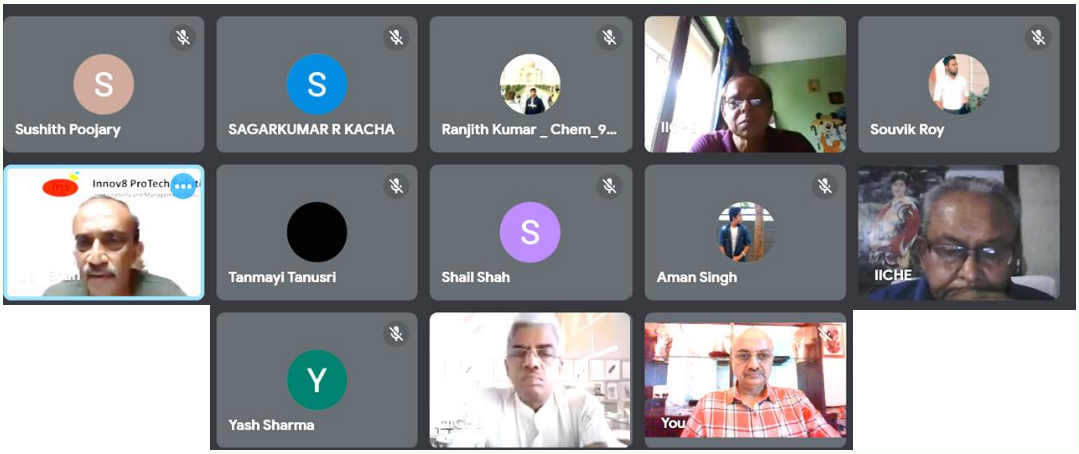

## IICHE-MRC EC (2021-23) First meeting - 09/10/2021




## IICHEMRC EC (2019-21) meeting - 24/07/2021




## Interaction between PSEE (Process Safety Environment & Energy) Committee members, Councillors, & MRCEC members & Feedback from OIP-2021 Interns - 20/06/2021



# Important Milestones of 2021

**(Courtesy Open source)**

1st Jan 2021: The US has started vaccination.

16th Jan: Vaccination starts in India with frontline workers.

25th Jan: New variants discovered in South Africa and Brazil spreads.

7th Feb: New case numbers bottom out at around 8,500 cases.

26th Feb: Stock Markets fall almost 4% in a single day for fears of the new variant.

1st March: Vaccination starts for senior citizens and for above 45 with co-morbidities.

8th March: Maharashtra and Karnataka reduce stamp duty to encourage real estate.

22nd March: Increases in gap between two doses of Covishield from 4 to 8 weeks.

25th March: A sharp increase in the number of cases reported is observed.

1st April: Vaccination for everyone above the age of 45 years starts.

5th April: single-day number of cases 1lakh plus cases. A clear second wave in India,

1st May: Vaccination for all above the age of 18 opens up.

6th May: 4.14 lakh cases are reported in a single day. This is the highest.

13th May: The dose gap of Covishield is increased from 8 weeks to 12-16 weeks.

10th June: Around 1 lakh cases are reported in a day.

1st July: Covishield gets a green pass - travel to Europe becomes possible for Indians.

13th Aug: Highest ever export from India in a month is reported - $35.43 billion in July.

5th August: Demand for cars / bikes climbed sharply but companies struggling to meet.

The issue of chip shortage that started last year was still not resolved.

13th Sept: Jet Airways announces its plan to restart its operations in 2022.

8th Oct: Tata wins the bid for Air India.

21st Oct: India announcing administering a total of 1 billion vaccine doses.

3rd Nov: Covaxin gets approval from WHO.

15th Nov: The first-ever parliamentary level meeting on crypto currencies.

29th Nov: New variant called Omicron is discovered spreading at high rate.

25th Dec 2021: Vaccine for above 15 years of age and Booster dose for frontline workers.

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# India’s chemical industry

**(Courtesy Open source)**

Covering more than 80,000 commercial products, India’s chemical industry is extremely diversified and can be broadly classified into bulk chemicals, specialty chemicals, agrochemicals, petrochemicals, polymers and fertilisers.

- India's chemical industry ranks as sixth largest in world, and third in Asia.
- India's chemical industry accounts about 14% of production in Indian industries
- The chemical industry generates employment for more than five million people.
- India was also the third largest producer of plastic.
- India is the fourth-largest producer of agrochemicals.
- Chemical industry is a major contributor to the Indian economy, 7% of GDP.
- It accounts for ~16% of the world production of dyestuffs and dye intermediates.
- Indian colorants has emerged as a key player with a global market share of ~15%.
- The chemicals industry is de-licensed, except for few hazardous chemicals.
- India holds a strong position in exports / imports of chemicals at a global level.
- Proximity to Middle East, petrochemical source, helps on economies of scale.
- It has opportunities considering conflict among the US, Europe and China.
- Chemicals small / medium enterprises likely to grow (revenue) at ~20% in FY22.
- It is likely to grow to ~25% of the GDP in the manufacturing sector by 2025.
- To reduce emissions / meet sustainability, there will be need for new chemicals.
- Chemical companies need to focus more on developing new products.
- Growth will depend on evolving variety of new products, processes and services.
- Bridge the gap between speed of marketplace change and innovation process.
- Ever-shortening product-cycles will challenge the pace of the innovation process.

*******

# IIChE Forthcoming Event at a Glance

## IIChE Celebrating Platinum Jubilee Year - 2022

&

## International Conference on Advances in Chemical and Materials Sciences

# (ACMS-2022)

**(Hybrid Mode: Offline and virtual participation)**

**February 24-26**

**Organized by: Indian Institute of Chemical Engineers, Headquarters**

**In association with**

National Institute of Technology, Jalandhar, Heritage Institute of Technology, Kolkata,
And Osmania University College of Technology, Hyderabad

**Separate Technical Session for the UG and PG students**

**About: ACMS-2022:** The aim of ACMS-2022) to bring together students (UG and PG), scientists, researchers, academicians, and industrialists from various sectors to exchange the knowledge and share their experiences and latest research outcomes about all aspects of Chemical and Materials Science.

### Abstract theme

Materials Science and Engineering (MSE)

Advance Chemical Engineering (ACE)

Carbon, Polymer, and Composite (CPC)

Biochemical Science and Engineering (BSE)

Chemistry and Environment (CE)

### Important Dates

Abstract Submission (200 words): ~~30th June, 2021~~ 31st July, 2021

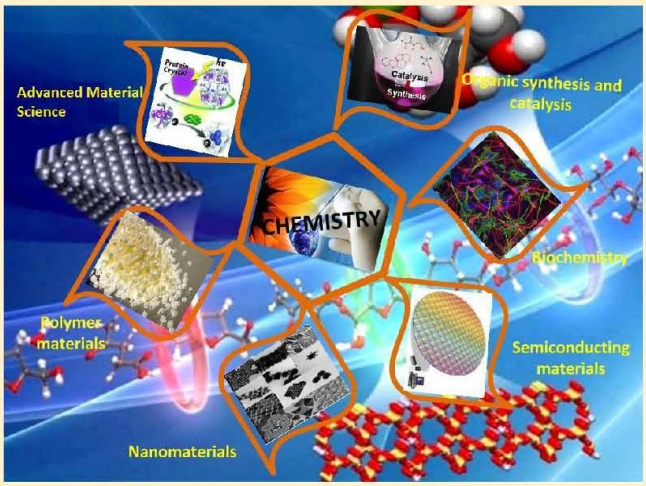
Abstract acceptance notification: 15th August, 2021

Full paper submission for publication: 30th September, 2021

**For more details visit conference website: http://acms2022.iiche.org.in/**

**Abstract submission through online**

**Best Presentation Award in all the Technical Sessions**




**Publications:** All the accepted papers will be invited for publication in the reputed international journals or as a book chapter after the regular peer review process as per the requirements of the publishers.

### Conference Journals


**Venue (Online/Offline):**

**HIT Kolkata**

(M): 9830752111 /9444954151

**Contact us**

**Organizing Secretary, ACMS-2022**
**Indian Institute of chemical Engineers**
**Dr. H.L. Roy Building, Jadavpur University Campus,**
**Kolkata 700032; Email:icacms2022@gmail.com / acms@iiche.org.in**

# IIChE Forthcoming Event at a Glance

Indian Institute of Chemical Engineers
(IIChE)
*Celebrating 75 years of glorious journey...*

# SCHEMCON 2022

***(18th Annual Session of Chemical Engineering Students Congress)***

## At NIT Warangal, 23rd -24th September 2022

**On theme "Sustainable Technological Advancements In Chemical Industries -2022 (STAC-2022)"**

**Organized by**
**Department of Chemical Engineering**
**National Institute of Technology Warangal, TS.**
**&**
**IIChE- Hyderabad Regional Centre**
**Under the aegis of**
**IIChE Student Chapter of NITW**

## IICHE-MRC E-NEWSLETTER ADVISORY COMMITTEE

| | | |
|---|---|---|
| 1 | Prof. A.B. Pandit | Vice Chancellor, ICT, Mumbai |
| 2 | Prof. G. D. Yadav | Former VC, ICT & Former President, IIChE |
| 3 | Prof. V.K. Srivastava | Former President IIChE |
| 4 | Shri R.G. Rajan | Ex CMD, RCF & former Chairman IIChE-MRC |
| 5 | Dr. Sanjeev Katti | Director General, ONGC Energy Centre |
| 6 | Dr. Sanjay Mahjani | IIT-Bombay |
| 7 | Shri Praveen Saxena | Director & CEO Blast Carboblocks Pvt. Ltd. |
| 8 | Dr. D. Mandal | BARC, Mumbai |
| 9 | Shri Jayesh Master | Consultant |
| 10 | Prof. S.S. Bhagwat | ICT, Mumbai |
| 11 | Dr. S. Ganeshan | Ex Toyo and Former president IIChE |
| 12 | Shri D. P. Misra | Former President IIChE |
| 13 | Shri K. Venkatramanan | L&T and Former President, IIChE |
| 14 | Shri Sushil Kumar | Ex Reliance & Former President, IIChE |

## IICHE-MRC E-NEWSLETTER EDITORIAL TEAM

| | |
|---|---|
| Shri Jagdish Nageshri | Editor |
| Shri Dhawal Saxena | Member |
| Shri Mr. Nikhil Nilange | Member |
| Shri Salil Narverkar | Member |
| Shri Himanshu Saluja | Member |

# IICHE HEADQUARTER TEAM
# OFFICE BEARERS 2022

| | |
|---|---|
| **Shri D. M. Butala** | **President** |
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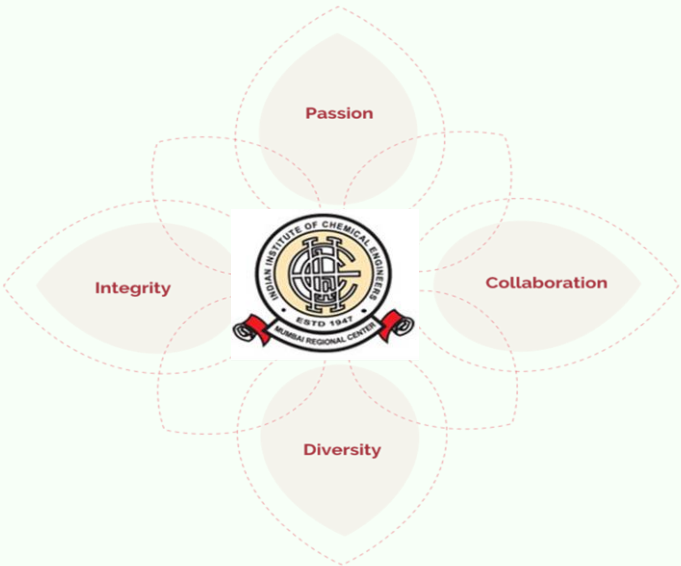
| **Shri Shashikant Pokale** | **Hon. Joint Secretary** |
| **Prof. Bishnupada Mandal** | **Hon. Treasurer** |
| **Shri Praveen Saxena** | **Hon. Registrar** |
| **Dr. Madhu Agarwal** | **Hon. Controller of Examination** |
| ***Prof. Suddhasatwa Basu,*** | ***Ex-Officio Member & Hon. Editor*** |

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