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Sarvajani University
Sarvajani College of Engineering & Technology
Shree Dhansukhlal Thakordas
Department of Chemical Engineering



Report on Expert Talk under R & D Lecture Series

Catalysis as an Enabling Technology to achieve 2050 Net Zero target



Sarvajani College of Engineering and Technology

Department of Chemical Engineering
Expert talk under R&D Talk series



"Catalysis as an Enabling Technology to achieve 2050 Net Zero Target"



Dr. Haresh Manyar
Theme Lead,
Catalysis Research cluster,
School of Chemistry and
Chemical Engineering,
Queen's University Belfast,
UK

Topics of the talk

- Development of novel catalytic processes by combining catalyst design, process intensification and in situ spectroscopy techniques with computation simulations.
- Catalytic processes for sustainable production of a range of biofuels and additives including gasoline and diesel range alkanes, BDMF, AL, HMF, GVI, glycerol triacetins, glycerol carbonate and glycidol to address imminent global challenges faced by society.

Date: September 09 2021
Time: 2.30 PM IST

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As the current need of the Industries to develop the process without harming the world, environment and limited resources, there is a very keen need to understand reaction mechanisms and kinetics of surface processes, to design new and better catalysts, perform clean and benign chemistry and intensify existing processes to enhance the reaction performance from renewable sources. To deal with upcoming field of innovations & for the next generation process development, the choice of the catalyst (active catalytic species and support) significantly influences the reaction rate and product selectivity which is the result of the interaction of organic molecules with the active catalyst site, such as adsorption configuration, strength and its influence on the metal electronic structure. Chemical Industries are really challenging to deal with the better product yield from the renewable. And as a vision of chemical engineering for self-optimizing plant, opportunities for Chemicals engineers, Process Industry trends should innovate the new trends of use of catalysts and what's coming in future can be the most urgent requirements by the traditional process developers.

Resource Person	Dr. Haresh Manyar Theme Lead, Catalysis research cluster, School of Chemistry and Chemical Engineering, Queen's University Belfast, UK
Topic	Catalysis as an Enabling Technology to achieve 2050 Net Zero target
Date and Time	9/09/2021 at 2:30 PM to 4:00 PM.
Venue	Virtual on Google meet
Coordinator	Dr.Vaishali Umrigar
Target Audience	Students, Faculty, HODs and Principals from Engineering & Technical institution
Total Registration	81

The session of an expert lecture on **“Catalysis as an Enabling Technology to achieve 2050 Net Zero target”** was organized by Department of Chemical Engineering, SCET under R & D lecture series.

Prior to the talk, there was an official meet with dean R & D and the expert and the R& D committee member and HOD, Chemical Engineering. Prof.Chirag Paunwala, dean R & D had put forward the willingness of the Institute for having collaboration with the expert's organization for R & D and internship of the students. Dr.Haresh Manyar had discussed their collaborative work with Indian University with 2+2 and 3+1 course completion with UK University and Indian University. Also he highlighted the research collaboration with Chemical Engineering department for grants and other government funds in India. He had shown very positive approach for having certain things in collaborative ways for our students for internship.

Then expert has joined the talk session as arranged above. Department R &D coordinator Prof. Srujal rana invited the event coordinator Dr.Vaishali Umrigar for the introduction of the speaker. Dr.Vaishali had introduced the speaker to audience with his brief CV and then invited Dr.Haresh Manyar.

The expert has started the talk at 2:45 pm IST (UK 10:00 am) by welcoming all the participants saying Jay Shree Krishna to all. There are 80+ registrations for this online webinar.

The session started with the introduction of catalysis and why there is a need of the development of catalysts from renewable. To connect with all, Dr. Haresh introduced himself as senior lecturer, Queen's Belfast University, UK. He is handling course design and research related to the catalysis.

Dr. Manyar is also Year Head of Teaching for level 2, Chemical Engineering BEng and MEng courses, where he has designed modules on Green Chemistry and Chemical Engineering, Chemical Product Design, and Process Control. He has received Queen's Teaching Award 2016 for excellence in Teaching and American Chemical Society's I&EC Research 2019 Excellence in review award.

His current research projects include a number of industrial collaborations including Almac Sciences, UK; Coryton biofuels, UK; Chevron, USA; Shell, Netherlands; and Oleon, Belgium for development of batch and continuous flow platforms for synthesis of APIs, speciality chemicals and biofuels.

His research output includes over 125 papers/book chapters, patents/invention disclosures and conference proceedings with an h-index 22 (Google scholar).

He has covered the main content as development of novel catalytic processes as below:

Highlights from the Talk

- ✓ **Catalysis, an enabling technology to achieve sustainable manufacture of renewable chemicals and biofuels, thus Progressing towards the most ambitious 2050 net zero target**
- ✓ **To develop novel catalytic processes by combining catalyst design, process intensification, and in situ spectroscopy techniques with computational simulations.**
- ✓ **Chemical processes such as hydrogenation, alkylation, esterification, and ketonisation,**
- ✓ **Rational catalyst design criteria to engineer selectivity to desired products, improved process efficiency, catalyst stability and longevity.**
- ✓ **Catalytic processes for sustainable production of a range of biofuels and additives including gasoline and diesel range alkanes, bis-hydroxymethyl furfural, alkyllevulinate, HMF levulinate, GVL, glycerol triacetate, glycerol carbonate and glycidol to address imminent global challenges faced by our society.**

Session started and as per the topics highlighted for each point, Dr. Manyar explained and elaborated his research work to the students, faculties and external participants. He had explained all points with histories, applications and products' development with the use of flow chemistry. And then at the end he has shown the research perspectives for Chemical Engineering in Catalysis from renewable resources.

Q & A session have highlighted various scopes of research work in catalysis, analytic techniques for catalyst characterization in Chemical Engineering.

Finally the session was concluded by Prof. Srujal Rana and Dr. Vaishali Umrigar by delivering a vote of thanks to the guest and all participants.

We would like to thank Dr. Hiren Patel, Principal, SCET, for providing an opportunity to schedule such an informative & research oriented talk. We profusely thank Dr. Chirag Paunwala, Dean R & D for providing a

conducive environment and his continuous support. We would also like to acknowledge our Managing trustees and office bearers of the Sarvajanic University for their continuous support.

GLIMPSES OF THE EVENT :

The screenshot shows a Google Meet interface with a presentation slide titled "Catalysis at Queen's" from the "Theoretical and Applied Catalysis Research Cluster". The slide is divided into two main sections: "KNOWLEDGE AND KNOW-HOW" and "mechanism". The "KNOWLEDGE AND KNOW-HOW" section includes images of laboratory equipment and a list of techniques: XANES, EXAFS, Raman, GC, IR, and MS. The "mechanism" section features a diagram showing the flow from "Synthesis" to "Characterization" via "Computational modelling". A "Reactivity / Kinetics" box is also present. The slide is branded with the Queen's University Belfast logo. The Meet window shows a participant list on the right and a toolbar at the bottom.

The screenshot shows a Google Meet interface with a presentation slide titled "What is 2050 Net Zero Target" from the "QUEEN'S UNIVERSITY BELFAST". The slide states: "The Committee on Climate Change recommended that the UK reduce its greenhouse gas emissions to net zero by 2050. Net zero is necessary, feasible and cost-effective. Necessary – to respond to the overwhelming evidence of the role of GHG in driving global climate change". It includes a graphic of a green clock labeled "2050" and a bar chart showing "Emissions today" and "Any remaining emissions to 2050 must be offset". The Meet window shows a participant list on the right and a toolbar at the bottom.

The screenshot shows a Google Meet interface with a presentation slide titled "What is 2050 Net Zero Target" from the "QUEEN'S UNIVERSITY BELFAST". The slide includes the text: "Net zero is necessary, feasible and cost-effective. Necessary – to respond to the overwhelming evidence of the role of GHG in driving global climate change". It features two charts: "Annual CO2 emissions by world region in billion tonnes (Gt) per year" (1721-2015) and "EU emissions trajectory in a 1.5 °C scenario" (2020-2050). The charts show various regions and emission sources. The Meet window shows a participant list on the right and a toolbar at the bottom.

Meet linkCatalysis as an Enablin... Meet - cdr-tpgx-wwu

meet.google.com/cdr-tpgx-wwu

REC H Harsh Manyar is presenting

What is 2050 Net Zero Target

Net zero is necessary, feasible and cost-effective.
Necessary – to respond to the overwhelming evidence of the role of GHG in driving global climate change

2:47 PM | cdr-tpgx-wwu

Type here to search

Meet linkCatalysis as an Enablin... Meet - cdr-tpgx-wwu

meet.google.com/cdr-tpgx-wwu

REC H Harsh Manyar is presenting

2050 Net Zero Target

2020	2050
Population increases by around a third	7.6bn to 9.8bn
Energy demand increases by around a third	
CO ₂ e emissions need to reduce by around half	32Gt (net CO ₂ e emissions) to 18.4Gt (net CO ₂ e emissions)

2:49 PM | cdr-tpgx-wwu

Type here to search

Meet linkCatalysis as an Enablin... Meet - cdr-tpgx-wwu

meet.google.com/cdr-tpgx-wwu

REC H Harsh Manyar is presenting

2050 Net Zero Target

10 Key Solutions Needed to Reduce Greenhouse Gas Emissions

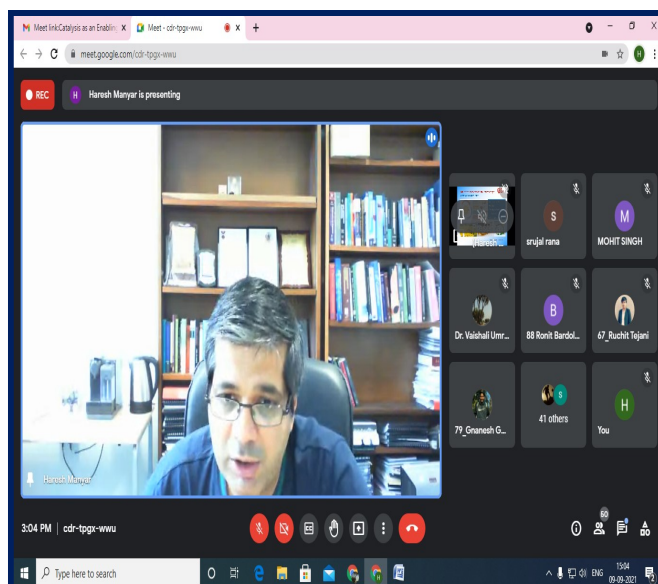
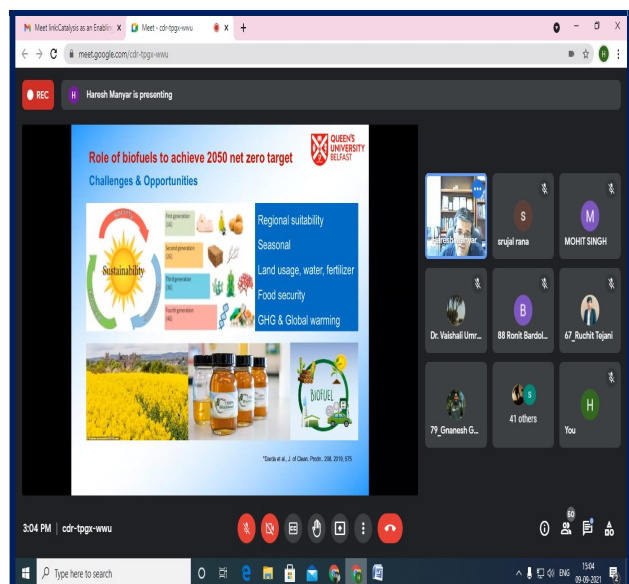
1. PHASE OUT coal plants
2. INVEST in clean energy & efficiency
3. RETROFIT buildings
4. DECARBONIZE cement, steel & plastics
5. SHIFT to electric vehicles
6. INCREASE public transport
7. DECARBONIZE aviation and shipping
8. HALT deforestation & RESTORE degraded lands
9. REDUCE food loss and waste
10. EAT more plants & less meat

A third of oil reserves, half of gas reserves, and > 80% of coal reserves should remain unused from 2020 to 2050

Source: WRI. WORLD RESOURCES INSTITUTE

2:59 PM | cdr-tpgx-wwu

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Compiled by:

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Chemical Engg. Department, SCET.