INVITED SEMINAR

On

DEVELOPMENT OF MEMBRANE BASED OPERATIONS FOR EMERGING SEPARATIONS CHALLENGES

12th July, 2024

under the auspices of

Centre of Excellence on Membrane (CoE) Technologies for Desalination, Brine Management, and Water Recycling

DeSaltM

Convener

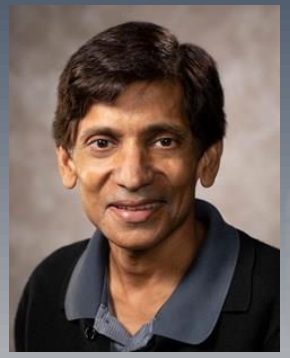
Prof. Swatantra P. Singh,

Indian Institute of Technology Bombay, India

Organized by

Environmental Science and Engineering Department

INVITED SPEAKERS



Prof. Ranil Wickramasinghe

Ralph Martin Department of Chemical Engineering

University of Arkansas, USA

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Dr. Ranil Wickramasinghe is a distinguished professor in the Department of Chemical Engineering at the University of Arkansas where he holds the Ross E Martin Chair in Emerging Technologies. He is an Arkansas Research Alliance Scholar. He is director of the **Center for Membrane Applications Science and Technology (MAST)** a National Science Foundation Industry-University Cooperative Research Center. Prof Wickramasinghe is the Executive Editor of Separation Science and Technology.

He joined the Department of Chemical Engineering at the University of Arkansas in 2011. Prof Wickramasinghe's research interests are in membrane science and technology. His research focuses on **synthetic membrane-based separation processes for purification of pharmaceuticals and biopharmaceuticals, treatment and reuse of water and for the production of biofuels.**

SEMINAR TIME AND LOCATION

04:30 PM to 06:30 PM Indian Standard Time (IST)

ESED Seminar Hall,

2nd Floor, New DESE-ESED Building

Environmental Science and Engineering Department,

IIT Bombay, Powai, Mumbai, Maharashtra-400076, India

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Seminar Coordinators: Ashish Kumar & Mitil Koli

Talk's Title: **Development of Membrane Based Operations for Emerging Separations Challenges**

Membrane based separations are attractive for a number of reasons such as easy scale up, lower operating cost and the potential for significant process intensification. For applications in bioseparations linear scale up is important given the regulatory approvals needed for a manufacturing process. In the case of water treatment recovery and recycle, membrane processes could lead to more cost effective treatment technologies. Catalytic membranes on the other hand, provide the possibility of combining reaction and separation into one unit operation which leads to significant process intensification. This could enable the economic conversion of waste biomass to bio-based chemical intermediates. In this presentation the potential for membranes in each of these areas will be discussed.

Biopharmaceutical manufacturing processes make use of cell lines to produce therapeutics such as monoclonal antibodies, fusion proteins etc. Membrane based processes such as membrane adsorbers, ultrafiltration and virus filtration are routinely used in the purification of the products. Here the focus will be on virus clearance, which is a major challenge in the manufacture of biopharmaceuticals. Today, biopharmaceutical manufacturing processes are typically run in batch mode. Further there is growing interest in complex therapeutics, e.g., live attenuated virus vaccines, viral vectors for delivery of gene therapy, VLPs, plasmid DNA, cell-based therapies. These more complex therapeutics create additional challenges when attempting to validate virus clearance. Some of these challenges will be discussed. In addition, there is a great deal of interest in developing continuous biomanufacturing processes in order to minimize batch to batch variation.

Treatment of highly impaired hydraulic fracturing wastewater for recovery and reuse is challenging. A combined electrocoagulation, microfiltration and membrane distillation process for treating this wastewater. The process has been tested at 1,000 L per day pilot scale.

The overall agricultural industry contributes more than 25% to world greenhouse gas emissions. Agricultural residues represent an abundant source of fuels and chemical intermediates. Here lignocellulosic biomass hydrolysis and dehydration has been conducted using a synthetic polymeric solid acid catalyst consisting of dual polymer chains grafted from the surface of a ceramic membrane.

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