2025 Texas A&M ECS Symposium

Saturday, September 20th

College Station, Texas

Next-Generation Ion-Conducting Polymers and Membranes for Sustainable Solutions to Global Challenges

Dr. Vijay Mhetar
Notark Corporation
Founder, President, and CEO
Website: https://notark.com/

Ion-conducting polymers have potential to play a leading role in addressing global sustainability challenges across energy, environmental, and healthcare sectors. This work presents recent advancements in next-generation ion-conducting polymers based on novel styrenic pentablock copolymers, designed for superior performance and sustainability. These copolymers have been selectively functionalized to produce either anion-exchange membranes (AEMTuff™) or cation-exchange membranes (TuffPEM™), offering distinct advantages over conventional random copolymers such as Nafion®. The block-specific functionalization strategy enables a unique combination of properties—high ionic conductivity, low water uptake, and exceptional chemical and electrochemical stability—that are difficult to achieve in traditional systems. AEMTuff and TuffPEM membranes are fluorine-free, highly durable, and suitable for a broad range of applications, including green hydrogen production, energy storage in redox flow batteries, electrochemical conversion of CO_2 to value-added chemicals, and advanced water treatment technologies. This presentation highlights the synthesis, performance characteristics, and commercialization pathways of these advanced materials, underscoring their potential to enable sustainable and scalable solutions for some of the most pressing global challenges.