



Nafion™

Ion Exchange Materials

Advancement of Nafion™ Membrane for Vanadium Redox Flow Battery

Long Life High Efficiency Ion Exchange

Nafion™ perfluorosulfonic acid (PFSA) was invented by Chemours, formerly DuPont, in the 1960s. For over 50 years, Nafion™ has served a wide range of electrochemical applications in space, military, energy, and other various industries. In recent years, vanadium redox flow batteries (VRFBs) have attracted much attention in the energy storage research field due to their unique feature of using a fluidic material as the energy storage media. Compared with lithium ion batteries, redox flow batteries (RFBs) possess the advantages of long cycle life (15-20 years), inflammability, and low toxicity—making them good candidates in grid scale energy storage application.



Now pushing the limits on system efficiency/cost per kWh for energy storage and vehicle electrification

In vanadium redox batteries (VRBs), the membrane is considered as one of the core components in battery systems, as it transfers ions and blocks the crossover of active materials. Nafion™ membranes are proven technology with supply capability to meet the rapidly growing global flow battery market. Nafion™ membranes have been serving as the benchmark material in both commercialized RFBs and new type redox active material exploration.

The structure of Nafion™ membrane consists of a flexible hydrophobic backbone and a side chain with highly hydrophilic terminal sulfonic acid functional groups. The hydrophobic Teflon™ like backbone provides a membrane with excellent mechanical and chemical stability, while the pendent sulfonated groups deliver high proton conductivity. With the profound knowledge and experience of Nafion™ by Chemours, its properties such as ion conductivity and crossover could be tuned at various levels from monomer, polymer, and membrane processing techniques. Improved performance in VRBs has been observed in the sophisticatedly engineered Nafion™ membrane. New types of Nafion™ products specifically designed for RFB application are expected to better serve the market needs for VRBs, as well as RFB research society.

Accelerating our pace with growing market adoption



Nafion™ Benefits for Flow Battery Application

- Excellent chemical stability
- Superior proton conductivity
- Lower electrical resistance
- Low self-discharge
- Improved mechanical properties
- Reduced electrolyte crossover
- Adaptable for alternative electrolyte systems
- Improved efficiency, while maintaining excellent mechanical properties
- Demonstrated through industry-leading field experience
- Stable in harsh environments
- Recyclable super acid catalyst
- Excellent moisture transport

BE OUR GUEST...Don't miss this talk: Advancement of Nafion™ Membrane for Vanadium Redox Flow Battery

Presenter: Ruidong Yang, Nafion™ Principal Investigator **When:** Wednesday, January 9, 2019, 10:55 am-11:20 am
Room: Storage Session **Location:** International Coalition for Energy Storage and Innovation and Pacific Power Source Symposium Joint Meeting, January 5-10, 2019, Hilton Waikoloa Village, HI, USA

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