

## **High Temperature Polymer Electrolyte Nanocomposite Membrane Technology (NMR-HTPEMT)**

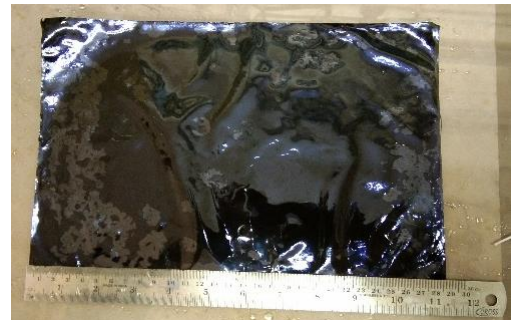
Polymer electrolyte membrane is the heart of a fuel cell which is an electrochemical device that converts chemical energy into electrical energy from the reaction between Hydrogen and oxygen/air. The role of the membrane is to transport the protons generated at the anode to the cathode to complete the electrochemical reaction. It also performs the function of a separator between the two electrodes. To fulfil the criteria of an electrolyte the membrane should possess excellent thermo-mechanical properties coupled with high proton conductivity.

NMRL, Ambernath has developed a nanocomposite polybenzimidazole based membrane (Indian patent applied) for application in HTPEMFC and realized a 100W stack using the same. The membrane is made from indigenously available precursors. The membrane possesses high thermo-mechanical stability and has excellent chemical resistance coupled with high proton conductivity on doping with phosphoric acid. Since it does not require water for conduction, it is most suitable for fuel cell operation in the temperature range of 120-180°C. In-house studies have demonstrated a high endurance under accelerated fuel cell conditions.

It is also useful as a separator for battery and a solid polymer electrolyte for high temperature supercapacitors.

### **Salient features:**

- Nanocomposite high temperature membrane
- Thermally stable upto 600°C
- Proton conductivity in the range of 35-50 mS/cm at 180°C
- High oxidative stability
- Stable fuel cell performance for more than 700 hours of operation



### **Application areas:**

- High Temperature Fuel Cell
- Electrolyte in high temperature supercapacitor
- Separator in battery