

Students' Annual Seminar

Studies on the Solid State Ion Transport Membranes

Sudeshna Patra

Ion transport membranes having high ionic conductivity and selectivity are inevitable in many fields including in energetics. Graphene oxide (GO) membranes have shown tantalizing promises as potential candidates for water purification and energy storage devices. But structural stability of the membrane is very much essential for their applications. Initial part of the talk will be on the role of intercalated water in deciding the mechanical properties of GO membranes, studied using dynamic mechanical analysis. Inspired from the superior proton conductivity of GO membranes, a noteworthy endeavour has been directed towards the development of a multifunctional Li ion transporting solid polymer electrolyte membrane using polyethylene oxide (PEO), polydimethylsiloxane (PDMS) & Lithium perchlorate (LiClO_4) as the base material. While experimenting this strategy, we have synthesized a novel solid state proton conducting polymer electrolyte membrane using perchloric acid as the proton source, and the detailed results on its performance in water electrolysis (working only with pure water) will be discussed. Further, other possibilities of developing high ion conductivity solid state membranes from bio-inspired materials such as egg membrane will also be discussed during the talk, and future perspective of other solid state ion transport membranes will be discussed at the end.

References:

1. Enhanced Viscoelastic Properties of Graphene Oxide Membranes, Sudeshna Patra, T V Vineesh, and T. N. Narayanan,* Carbon 124, 576-583 (2017)
2. Transparent Flexible Lithium Ion Conducting Solid Polymer Electrolyte, Anand B P, Sudeshna Patra, Shubhadeep Pal, Manoj M, Aravind P B, S. Jayalekshmi, and T. N. Narayanan,* Journal of Materials Chemistry A 5, 11152-11162(2017)

Monday, Feb 26th 2018

02:30 PM (Tea/Coffee at 02:00 PM)

Seminar Hall, TIFR-H