**Modified PBIs and their use in high temperature proton exchange membrane fuel cell applications**

High temperature proton exchange membrane fuel cell technology (HT-PEMFC) is highly suitable for heavy-duty mobility applications1. Phosphoric acid doped PBI membranes (PA-PBIs) are used as a standard component for HT-PEMFC. Nevertheless, PA-PBIs have a few limitations such as trade-off relation between phosphoric acid (PA) uptake and mechanical stability, low intrinsic chemical stability towards radical induced degradation. Furthermore, PA leach out from the membrane, a process which accelerates at high current densities and thus restricts the maximum usable current density to about 200-400 mA cm-2. For successful commercialization, the membranes should bind the PA more tightly. They should also be made more resistant to radical attack, and the trade-off between phosphoric acid uptake and mechanical stability should be recalibrated to achieve more favorable balance. In this presentation, the fabrication of modified PBI high temperature proton exchange membranes (HTPEMs), their properties and HT-PEM fuel cell performances are going to be discussed2,3. PA doped PBI blends were tested in the HT-PEM single cell4 and one composition of PBI-blend HTPEM showed more than >2000 hours stable, high-performance operation at a very challenging high current density of 800 mA cm-2. It is one of the best results in the world.

Reference

1. K.H. Lim et al., Nature Energy, 7, 248-259, 2022.

2. N. N. Krishnan et al., J. Membr. Sci. 588, 2019.

3. Unpublished results.

4. N. N. Krishnan et al., J. Membr. Sci. 614, 2020.