

Latest advances in Anion-Exchange Membrane Fuel Cells

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After a few years of intensive research, recent studies of Anion-Exchange Membrane Fuel Cells (AEMFCs) finally show cell performance at the required levels for automotive (and other) applications. This was mainly achieved by the successful development of anion-exchange membranes (AEMs) with high hydroxide conductivity (100 mS cm^{-1} and above). Based on these high-performance membranes, AEMFCs with power densities and limiting current densities higher than 1 W cm^{-2} and 4 A cm^{-2} have been recently achieved, which only a couple of years ago seemed far from possible. In addition to the remarkable progress in AEMs, improvements in the development of catalysts are now well noted. Still, in order to make further breakthroughs and bring the AEMFC technology to the next practical levels, the following challenges need to be addressed: (A) the need for PGM-free catalysts, highly active towards hydrogen oxidation and oxygen reduction reactions in alkaline medium, (B) carbonation issues while working with ambient air feed, and (C) barriers in cell performance stability, due to the chemical degradation of the cationic polymer (ionomer functional groups). Dekel's group at Technion focuses its activities on these (and other related) topics, aiming to make a significant impact on the fuel cell research community. The latest achievements of our group in these AEMFC challenging fronts will be presented and discussed during the talk.