

Alkaline Membrane Fuel Cells
Technology Challenges and Approaches to Their
Resolution

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Development of Alkaline Membrane Fuel Cells (AMFCs) at Cellera Technologies has reached recently the phase of pilot testing of a 2.5kW system serving as backup power unit for a cell phone tower located near our Caesaria facility.

The 2.5kW AMFC stack operates on hydrogen and air and uses no liquid electrolyte nor any supply of water from an external source. It is air cooled by fan and was demonstrated to date to operate at ambient temperatures as high as 40degC.

Central challenges in AMFC technology development have included :

- Demonstrated performance of Pt-free AMFCs comparable to that obtained with similar cells employing Pt catalysts
- Achieving power densities approaching more closely those obtained in PEMFCs , in spite of this being a hydroxyl ion rather than proton conducting ionomer and the polymer backbone being a polyhydrocarbon , rather than perfluorocarbon
- Practically removing any effect of air-CO₂ on AMFC performance

This talk will report on approaches to and advancements in the three key AMFC areas described above.

In the area of electrocatalysis in AMFCs, the discussion will include comparison of expected activities and stabilities of various non-Pt catalysts in AMFCs vs. corresponding activities and stabilities in PEMFCs.

The talk will include report on achievement of AMFC power density at [0.6V, 60⁰C] which is 40% that of a PEMFC at [0.6V, 80⁰C].

Finally, regarding the “immunization” of the AMFC vs. conversion of hydroxyl anions to carbonate anions by air-CO₂, the nature of the process of electrochemical purge of CO₂ will be discussed, together with the viability of this process as solution for the need of full immunization vs. air-CO₂.

Acknowledgement:

The technical work described in this talk was performed by Cellera’s Technical Team, led by Dr. Dario Dekel, VP R&D and Drs. Miles page and Nir Haimovich, Team Leaders.