

# Nafion Dielectric Polarization Effects on the Fuel Cell I-V Curve

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The central objective of this work is to use different complex plane representations of the electric spectra of Nafion within blocking electrodes and in polymer electrolyte fuel cell (PEFC) (non-blocking electrodes) in order to reveal the role of the charge transport polarization within the polymer sample in the PEFC I-V polarization losses. In this work, 2 and 4-probe (through-plane setup) impedance and dielectric spectroscopies measurements were performed in order to evidence the genuine *dc* conductivity and dielectric strength values of Nafion. Such electric properties characterization revealed that Nafion displays a colossal dielectric strength of  $\Delta\epsilon \sim 10^6$ , and the effect of such highly polarizable electrolyte on the polymer electrolyte fuel cell (PEFC) performance is, to the best of our knowledge, unexplored. In addition, PEFC performance were investigated by impedance spectroscopy in the impedance and dielectric spectra representations in order to identify the contributions from electrode and electrolyte to the total electric response, which allowed to propose an alternative proton transport mechanism as effective during PEFC operation.

## References

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