

Nanostructure of the aqueous phase and impact on proton transport in radiation-grafted fuel cell membranes

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We present a SANS study of radiation-grafted fuel cell membranes containing styrenesulfonic acid. The influence of the nano-structure of the aqueous phase on the proton conductivity is studied.

We model the structure of the aqueous phase using a stochastic approach and estimate the tortuosity of the aqueous phase via the self-diffusion of a Brownian walker. We find a strong dependence of the tortuosity on the volume fraction of the aqueous phase. The long-range proton diffusion clearly correlates with tortuosity and is found to govern the proton conductivity.

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