

Nafion/sulfonated HNT nanocomposites for DMFC membrane

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Halloysite nanotube(HNT), chemically similar to kaolinite with a molecular formula of $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4 \cdot n\text{H}_2\text{O}$, are multi-walled inorganic nanotubes. The HNT has recently become the subject of research attention as a new type of additive for enhancing the thermomechanical performance of polymer. In this study, organic/inorganic hybrid membrane based on Nafion and sulfonated halloysite nanotube (sHNT) was prepared as a candidate material for proton exchange membrane in direct methanol fuel cell (DMFC) applications. We found that proton conductivity of the Nafion/sHNT hybrid membrane was comparable to that of pure Nafion. Methanol permeability significantly decreased with increasing sHNT content in the hybrid membrane. It was postulated that the HNT can act as a barrier against the methanol permeation across the membrane.