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Infiltration of 40SiO₂-40P₂O₅-20ZrO₂ sol-gel in sSEBS membranes for PEMFCs application

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ABSTRACT

This work describes the preparation of novel and low cost hybrid organic-inorganic membranes via sol-gel chemistry and direct infiltration method using a novel inorganic precursor (40SiO₂-40P₂O₅-20ZrO₂) and sulfonated styrene-ethylene-butylene-styrene triblock copolymer (sSEBS) for their use in fuel cells (PEMFC). sSEBS shows a distinct phase separated morphology which can be used as a template to incorporate the inorganic component preferentially within the ionic domains of the polymer, improving mechanical stability and reducing water uptake. The hybrid membranes are evaluated and compared to sSEBS in terms of swelling in water, IEC and FTIR. Chemical oxidation stability has been investigated using Fenton's reagent and the morphology has been observed using FE-SEM, EDX and AFM. The electrochemical characterization in single cells was carried out at 60°C, atmospheric pressure and

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