Infiltration of $40SiO_2–40P_2O_5–20ZrO_2$ sol-gel in sSEBS membranes for PEMFCs application

P.G. Escribano, C. del Río, E. Morales, M. Aparicio, J. Mosa

www.elsevier.com/locate/memsci

PII: S0376-7388(17)32557-7
DOI: https://doi.org/10.1016/j.memsci.2018.01.044
Reference: MEMSCI15898

To appear in: *Journal of Membrane Science*

Received date: 5 September 2017
Revised date: 15 January 2018
Accepted date: 20 January 2018

Cite this article as: P.G. Escribano, C. del Río, E. Morales, M. Aparicio and J. Mosa, Infiltration of $40SiO_2–40P_2O_5–20ZrO_2$ sol-gel in sSEBS membranes for PEMFCs application, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.01.044

Infiltration of $40SiO_2$-$40P_2O_5$-$20ZrO_2$ sol-gel in sSEBS membranes for PEMFCs application

P.G.Escribano[a], C. del Río[a*], E. Morales[a], M. Aparicio[b] and J. Mosa[b]

[a]*Instituto de Ciencia y Tecnología de Polímeros ICTP-CSIC, Juan de la Cierva 3, 28006 Madrid, Spain.*

[b]*Instituto de Cerámica y Vidrio ICV-CSIC, Kelsen 5, 28049 Madrid, Spain.*

Corresponding author: C.del Río, Instituto de Ciencia y Tecnología de Polímeros ICTP-CSIC, Juan de la Cierva 3, 28006 Madrid, Spain. Tel.:+34 915622900; fax: +34 915644853

e-mail adresses: pilar.garcia@ictp.csic.es (P.G. Escribano), cdelrio@ictp.csic.es (C. del Río), emorales@ictp.csic.es (E. Morales), maparicio@icv.csic.es (M. Aparicio), jmosa@icv.csic.es (J. Mosa).

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 ($40SiO_2$-$40P_2O_5$-$20ZrO_2$) 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 60ºC, atmospheric pressure and