Código Presentación: PP-323
S24.Metal-Organic (MOFs) and Covalent Organic Frameworks (COFs)

TUNING PROTON CONDUCTIVITY PROPERTIES OF LANTHANIDE AMINO-SULFOPHOSPHONATES-LOADED NAFION® COMPOSITE MEMBRANES

M. Bazaga-García[1], I. R. Salcedo[1], R. M. P. Colodrero[1], D. Villemin[2], A. Cabeza[1], P. Olivera-Pastor[1], E. R. Losilla[1], C. del Río[3] and M. López-González[3]

[1]Departamento de Química Inorgánica, Universidad de Málaga, Campus Teatinos s/n 29071-Málaga, Spain, m.bazaga@uma.es
[2]Laboratoire de Chimie Moléculaire et Thioorganique, UMR CNRS 6507, INC3M, FR 3038, ENSICAEN & Université de Caen, Caen, France
[3]Instituto de Ciencia y Tecnología de Polímeros (CSIC), Juan de la Cierva 3, 28006 Madrid, Spain

Palabras Clave: *PEMFCs, Metal sulfophosphonates, Polymer membranes, Nafion, Proton conductivity, Crystal structure.*

Polymer-based electrolytes in proton exchange membrane fuel cells (PEMFCs) utilize acidic groups as proton carriers and hydrogen bonding networks as proton-conducting pathways to facilitate proton transport. Crystalline acid-functionalized metal phosphonates are potential proton conductors while maintaining a high hydration degree below 100 °C. This property may be combined with Nafion®-like polymers which tend to dehydrate at the operating conditions of PEMFCs [1,2].

In this work, preliminary results of the preparation of lanthanide amino-sulfophosphonates-loaded Nafion® composites membranes and the corresponding electrical properties are reported. Synthesis conditions of lanthanide derivatives were optimized following a hightrough-put screening at 140 °C. Their crystal structures, solved from synchrotron X-ray powder diffraction data, corresponds to layered frameworks where the acidic groups, -CPO_3H or -SO_3H, point toward the interlamellar region interacting by H-bond with the lattice water. The composites were prepared by mixing the metal phosphonates with Nafion® solution at different loadings. The membranes were characterized by SEM, XRD and FT-IR. A study of the proton conductivity as a function of the composite membranes was carried out at 90 °C and 95% RH.

Referencias

[1] Y. Gao, R. Broersen, W. Hageman, N. Yan, M. C. Mittelmeijer-Hazeleger, G. Rothenberg, S. Tanase. *J. Mater. Chem. A*, **2015**, *3*, 22347–22352.
[2] A. Cabeza, P. Olivera-Pastor, R. M. P. Colodrero. *Tailored Organic-Inorganic Materials*, Brunet, E., Colón, J.L., Clearfield, A., Eds.; John Wiley & Sons, Inc. **2015**; Ch. 4, 137−191.