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

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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 highthrough-put screening at 140 °C. Their crystal structures, solved from synchrotron X-ray powder diffraction data, corresponds to layered frameworks where the acidic groups, -CPO₃H or -SO₃H, 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.