Jueves, 18 de enero 18:35 – 18:48

Study of mixed molybdates of lanthanum and praseodymium, La5.4-xPrxMo1-yNbyO12-δ, for H2 separation membranes.

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This research explores the impact of praseodymium and niobium doping on the La5.4-xPrxMo1-yNbyO12- _series (x= 1.35, 2.7, 4.05, 5.4; y= 0, 0.1) as materials with mixed proton-ionic conductivity suitable for hydrogen separation membranes with two main objectives: i) enhancing the electronic conductivity through praseodymium doping, and ii) increasing oxide ion vacancies to improve the ionic conductivity via niobium doping [1].

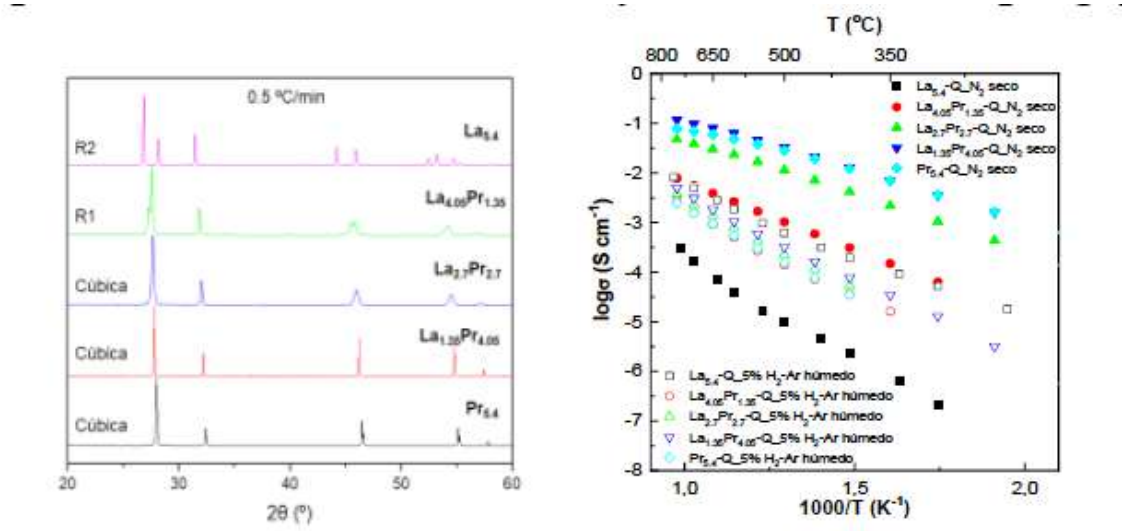

Figure 1. X-ray diffractograms of La5.4-xPrxMo1-yNbyO12- _are presented on the left, accompanied by the Arrhenius diagram illustrating the conductivity on the right.

Material synthesis involves the freeze-drying method, and characterization includes X-ray diffraction (Rietveld method), X-ray photoelectron spectroscopy, scanning and transmission electron microscopy and complex impedance spectroscopy. The symmetry of the materials (cubic or rhombohedral) is influenced by synthetic conditions and composition, compositions with higher praseodymium content exhibit a consistent cubic fluorite-type structure. Optimal conductivity is observed in a nitrogen atmosphere for compositions with high praseodymium content due to the presence of the Pr4+/Pr3+ pair. In a reducing atmosphere (wet 5%H2-Ar), conductivity significantly decreases due to the reduction of Pr4+ to Pr3+.

References

1. López-Vergara *et al., Chemistry of Materials*, 2017, *29*, 6966-6975. https://doi.org/10.1021/acs.chemmater.7b02481

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Transmission electron microscopy study of porous metal-organic frameworks (MOFs)

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Metal-Organic Frameworks (MOFs) are an emerging family of crystalline and porous micro/nanomaterials composed of a extended network comprising