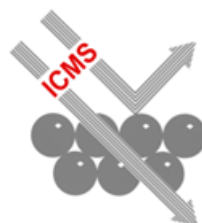


CPSSC 16

Challenges and Prospects for Solid State Chemistry



Book of
Abstracts



Ammonia Effects on Proton Conductivity Properties of Coordination Polymers.

R.M.P. Colodrero^{1,*}, I.R. Salcedo¹, M. Bazaga-García¹, P. Olivera-Pastor¹, L. Moreno-Real¹, E.R. Losilla¹, A. Cabeza¹

¹ *Dpto Química Inorgánica, Cristalografía y Mineralogía, Facultad de Ciencias, Campus de Teatinos s/n, Málaga, 29071, Spain.*

*Corresponding author, email: colodrero@uma.es

Research field: Solid state chemistry and applications.

Abstract:

Crystalline metal phosphonates are referred to as a type of structurally versatile coordination polymers [1]. Many of them contain guest molecules (H₂O, heterocyclics, etc.), acidic sites and, furthermore, their structure can be also amenable for post-synthesis modifications in order to enhance desired properties [2].

In the present work, we examine the relationships between crystal structure and proton conductivity for several metal phosphonates derive from multifunctional ligands, such as 5-(dihydroxyphosphoryl)isophthalic acid (PiPhtA) [3] and 2-hydroxyphosphonoacetic acid (H₃HPAA). Crystalline divalent metal derivatives show a great structural diversity, from 1D to 3D open-frameworks, possessing hydrogen-bonded water molecules and acid groups. These solids present a proton conductivity range between $7.2 \cdot 10^{-6}$ and $1.3 \cdot 10^{-3}$ S·cm⁻¹. Upon exposure to ammonia vapor, from an aqueous solution, solid state transformations are observed accompanied of enhance proton conductivities. The stability of these solids under different environment conditions (temperature and relative humidities) as well as the influence of the ammonia adsorption on the proton conduction properties of the resulting solids will be discussed.

References:

- [1] Shimizu G. K. H., Taylor J. M. and Dawson, K.W. **2012** Metal Organophosphonate Proton Conductors. In *Metal Phosphonate Chemistry: From Synthesis to Applications*; Eds. Clearfield, A., Demadis, K.D. (RSC: Cambridge) Ch. 15; p 493–524.
- [2] Ikawa, H., **1992** *Proton Conductors*; Ed. P. Colomban (Cambridge University Press: Cambridge), p. 511–515.
- [3] Bazaga-García M., Colodrero R.M.P., Papadaki M., Garczarek P., Zoń J., Olivera-Pastor P., Losilla E.R., León-Reina L., Aranda M.A.G., Choquesillo-Lazarte D., Demadis K.D. and Cabeza A., **2014**, *J. Amer. Chem. Soc.*, 136, 5731-5739.

