

# SYNTHESIS AND PROTON CONDUCTION PROPERTIES OF LANTHANIDE AMINO-SULFOPHOSPHONATES

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Crystalline acid-functionalized metal phosphonates are potential candidates as proton conducting electrolytes. Their frameworks can be chemically modified to contain proton carriers such as acidic groups (P-OH; -SO<sub>3</sub>H, -COOH,...) and guest molecules (H<sub>2</sub>O, NH<sub>3</sub>,...) that generates hydrogen bond networks stable in a wide range of temperature [1,2].

In this work, focus is laid on properties derived from the combination of lanthanide ions with the amino-sulfophosphonate ligand (H<sub>2</sub>O<sub>3</sub>PCH<sub>2</sub>)<sub>2</sub>-N-(CH<sub>2</sub>)<sub>2</sub>-SO<sub>3</sub>H. Highthrough-put screening was followed to reach the optimal synthesis conditions under solvothermal conditions at 140 °C. Isolated isostructural polycrystalline solids, Sm[(O<sub>3</sub>PCH<sub>2</sub>)<sub>2</sub>-NH-(CH<sub>2</sub>)<sub>2</sub>-SO<sub>3</sub>H]·2H<sub>2</sub>O (Ln= Sm, Eu and Gd), crystallize in the orthorhombic system with unit volume of ~2548 Å<sup>3</sup>. Preliminary proton conductivity measurements for Sm derivative have been carried out between 25° and 80 °C at relative humidity (RH) values of 70 % and 95 %. The sample exhibits enhanced conductivity at high RH and T (Figure 1) and constant activation energies of 0.4 eV, typical of a Grothuss mechanism of proton.

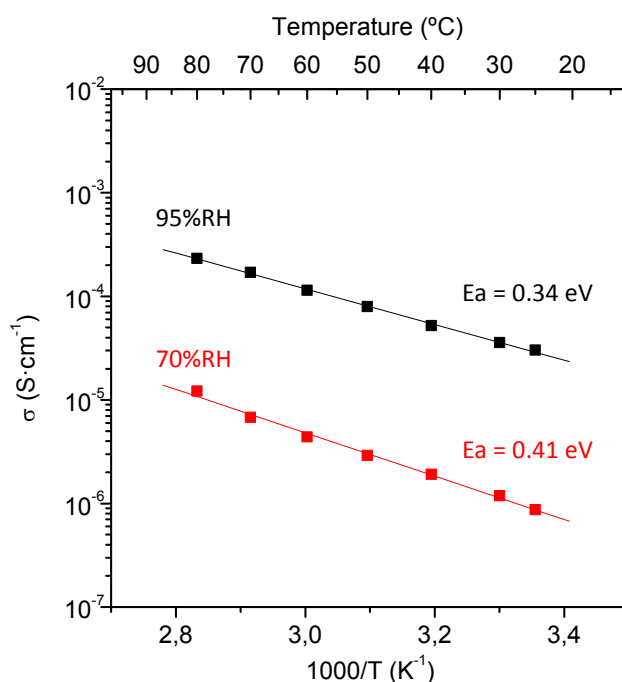


Figure 1. Arrhenius plot for Sm- KJHKJHKJHK at different relative humidity values.

## References

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