

MS18-P13 | LOCAL STRUCTURE OF GLASS-CERAMIC SODIUM SULFIDIC SOLID STATE

ELECTROLYTES

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Sodium thiophosphates are promising candidates for the use as solid state electrolytes in sodium batteries. [1] These classes of materials is derived from its lithium equivalents with the recently well-described stoichiometries Li_3PS_4 and $\text{Li}_7\text{P}_3\text{S}_{11}$. [2] Sodium thiophosphates show a more diverse formation of crystalline phases, occurring in different symmetries, compared to their lithium equivalents. The presence of the different crystalline phases has to be studied more thoroughly in order to find relations between the local structure and sodium ion conductivity.

Different sodium thiophosphate glassy ceramics (50-90% $\text{Na}_2\text{S}:\text{P}_2\text{S}_5$) were synthesized by mechanical milling. Dependent on the ratio of the reagents, the mixtures showed a different amorphisation behaviour, resulting in the formation of different properties such as sodium ion mobility. The local structure of the amorphous *as synthesized* samples was investigated with NMR and pdf technique. In addition to that, the samples were heated to observe the crystallization behaviour of the amorphous glasses.

For the first time, the synthesis of $\text{Na}_8\text{P}_2\text{S}_9$ and Na_9PS_7 with 80% and 90% Na_2S is described. Different characterization methods such as Raman, ^{31}P -, ^{23}Na -NMR and pdf provided information on how the electronic and crystallographic structure of these samples differs from the other phases.

[1] M. Tatsumisago, A. Hayashi, Int. J. Appl. Gl. Sc., 5 (2014).

[2] H. Stöffler et al., J. Phys. Chem. C, 123 (16), (2019).