

演題：**Nitrided phosphate glasses for solid-state Li-batteries**

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要旨：The use of glassy electrolytes in all-solid-state devices may provide numerous advantages, like increased safety, facility of fabrication and miniaturization. Indeed, the amorphous nature of lithium containing glasses allows reaching higher conductivities than those of similar crystalline materials. Lithium phosphates glasses have demonstrated their suitability to be applied in lithium micro-batteries; in particular LiPON amorphous thin films with ionic conductivity of $2 \cdot 10^{-6} \text{ S} \cdot \text{cm}^{-1}$ at RT.

Phosphate glasses typically present low electrical conductivity and poor chemical stability. However, the nitridation of phosphate glasses through ammonolysis provokes a sharp increase of the ionic conductivity for low N/P ratios, related to the nitrogen/oxygen substitution that also enhances the chemical durability. Anionic replace has also been studied for fluoro/oxygen substitution in the glass network, also verifying a related increase in the ionic conductivity.

Amorphous thin films can be obtained from these systems through sputtering techniques as RF-magnetron, amplifying the potential to be applied as all-solid electrolytes.

In the present talk, the nitridation of lithium-phosphate glasses within a wide composition range is revised to demonstrate how nitrogen affects the ionic conductivity. The modification of lithium phosphate glasses by anionic fluoro/oxygen is also presented, as well as the effect on electrical properties of simultaneous presence of F and N in the glass network. The analysis is focused on the relationship among composition-structure-electrical properties, for both bulk and thin film compositions.

本講演は、大学院総合化学院『化学研究先端講義／総合化学特別研究第二』の一部として認定されています。

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