Charge Carrier Transport in Garnet-based Solid Electrolytes

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Providing a fundamental understanding of the interrelation of composition, defect chemistry, structure, and morphology on the ion transport properties of promising solid electrolytes to create design strategies to boost material properties to realize advanced Li-ion battery technologies belongs to the great challenges of academia and industry.

The most promising and most intensively studied oxide-based solid electrolytes are cubic $Li_7La_3Zr_2O_{12}$ (LLZO) garnet variants, which attracted great attention having exceptional suitable prerequisites, such as high ionic conductivity, as well as chemical and electrochemical stability.[1] Despite all the research performed many question remain, however, unanswered. In particular, these include the fundamental ones. Hence, in this presentation, *e.g.*, the interplay of "dopants", Li-content, symmetry and Li-ion short-range properties and long-range properties, as well as the impact of other charge carrier (such as oxygen and hydrogen) and inhomogeneities, will be discussed.

[1] R. Murugan, V. Thangadurai and W. Weppner, Angew. Chem. Int. Ed. 46 (2007), 7778.