



Aalborg Universitet

AALBORG UNIVERSITY
DENMARK

Structure dependence of fracture toughness and ionic conductivity in glassy electrolytes for solid-state batteries

Smedskjær, Morten Mattrup; Chen, Zhimin; Du, Tao

Publication date:
2023

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Smedskjær, M. M., Chen, Z., & Du, T. (2023). *Structure dependence of fracture toughness and ionic conductivity in glassy electrolytes for solid-state batteries*. Abstract from 2023 Glass and Optical Materials Division Annual Meeting, New Orleans, Louisiana, United States.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Structure dependence of fracture toughness and ionic conductivity in glassy electrolytes for solid-state batteries

Morten M. Smedskjaer, Zhimin Chen, Tao Du

Department of Chemistry and Bioscience, Aalborg University, Aalborg, Denmark

Abstract

Glasses are promising candidates as solid electrolytes for all-solid-state batteries due to their isotropic ionic conduction, formability, as well as high chemical, thermal and electrochemical stability. However, their ionic conductivity and mechanical properties need to be improved, which is a complicated task due to the disordered structure and non-equilibrium nature of glasses. Here, we focus on two series of glassy electrolytes, namely lithium borophosphate and lithium thiophosphate glasses. Based on combined experimental and simulation studies, we investigate the structural origin of the variation in fracture toughness and ionic conductivity in the glassy electrolytes with varying compositions. We analyze the changes in glass structure using topological data analysis and classification-based machine learning in order to establish composition-structure-property relations, with important implications for the design of future glassy electrolytes.

Session: Charge and Energy Transport in Disordered Materials