Mechanical and Electrochemical Properties of Conductive Oxide Glasses

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Abstract

In this study, mechanical and electrochemical properties of ionic conductive oxide glasses have been measured. The fracture toughness, crack resistance, hardness, and elastic moduli of Li-rich oxide glasses were characterized. Glasses become softer, less resistant to crack-initiation and -growth, as the lithium content is increased. In parallel, their ionic conductivity and activation energy show that the ionic diffusion of lithium is easier in the Li-rich compositions. Following our previous study (1), the measurement of the ionic conductivity under a compressive load aligned with the electric field demonstrated the existence of a mechano-electrical coupling. The change of the activation energy with the stress is associated with an activation volume that increases with the lithium content.

Keywords: Glass, Electrolyte, All-Solid-State Battery, Mechanics, Electrochemistry

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