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Cause of "Multi-Ionic Conduction" and "Ionic Conductivity Enhancement" in Carbonate-Based Composite Electrolytes

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Abstract

By re-evaluating the outcome of conductivity measurements recently reported in the literature, it is demonstrated that the disregard of fundamental relationships of electrochemistry makes the interpretation provided in the literature a pure speculation. Therefore, the supposed evidence of multi-ionic conduction and ionic conductivity enhancement must be regarded as completely unfounded.

Keywords: Multi-ionic conduction; ionic conductivity enhancement; carbonate-based composite electrolyte; electrode polarization

1. Introduction

For some time now, mixtures of alkali carbonates dispersed in a porous ceramic oxygen ionic conductor have been regarded as new and promising composite electrolytes for intermediate or low temperature solid oxide fuel cells (IT-SOFC or LT-SOFC). The idea is based on the hypothesis that the dual-phase electrolyte exhibits exceptional conduction properties that are

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