Investigation of Al₂O₃ Crucible Contamination induced by extra Li₂CO₃ during Li₇La₃Zr₂O₁₂ Solid Electrolyte Sintering process

Wei jie Lan¹, Dongliang Lu², Ruirui Zhao^{1,*}, Hongyu Chen^{1,*}

¹ School of Chemistry and Environment, South China Normal University, Guangdong Guangzhou, 510006, China

² Guangdong Polytechnic of Environmental Protection Engineering, Foshan, 528216, China

*E-mail: zhaoruirui@m.scnu.edu.cn, hychen@scnu.edu.cn

doi: 10.20964/2019.10.22

Received: 23 May 2019 / Accepted: 29 July 2019 / Published: 30 August 2019

Al₂O₃ crucible is commonly used during the sintering process of Li₇La₃Zr₂O₁₂ pellets, which always introduces unintentional Al-containing impurities to the final product. Rare investigations are focused on the mechanism of this crucible contamination up to now. Based on the study in this work, it is found that the extra Li₂CO₃ in the Li₇La₃Zr₂O₁₂ powder is a crucial factor in forming this kind of Al-containing impurities in the obtained pellets. The pyrolytic Li₂O from Li₂CO₃ will react with Al₂O₃ at high temperature, forming liquid Li-Al-O eutectic and further promoting the dissolution of aluminum oxide crucible. Besides, the extra Li₂CO₃ can also affect the compactness and the distribution of Al element in the pellets, resulting in crystal structure transformation.

Keywords: Li₂CO₃; Li₇La₃Zr₂O₁₂ garnet; gain conductivity; solid-state electrolyte

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).