MICROWAVE-ASSISTED SYNTHESIS OF NASICON-TYPE $Na_3Zr_2Si_2PO_{12}$: EFFECT OF PROCESSING PARAMETERS ON PHASE FORMATION

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Abstract

NASICON-type $Na_{1+x}Zr_2Si_xP_{3-x}O_{12}$ ($0 \leq x \leq 3$) materials are promising solid electrolytes due to their high ionic conductivity and structural stability. In this work, $Na_3Zr_2Si_2PO_{12}$ ($x = 2$) powders were synthesized *via* a microwave-assisted method, followed by calcination at 1100 °C for 2 h. Microwave irradiation was carried out at 800 W for 3 h. The effects of precursor solution pH and precursor molar ratios on phase evolution were investigated. Phase formation and crystallinity were analyzed using X-ray diffraction (XRD), while particle size and morphology were examined by scanning electron microscopy (SEM). The results reveal that both pH and precursor ratios play crucial roles in phase evolution, influencing phase purity and the formation of secondary phases.

Keyword: NASICON-type materials, Solid electrolyte, Microwave-assisted synthesis