$Li_{1.3}Al_{0.3}Ti_{1.7}(PO_4)_3$ Solid Electrolytes Synthesized by a Microwave-assisted Hydrothermal Reaction for Li all-solid-state Battery Applications

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In this study, we prepare sub-μm LATP solid electrolytes by using a facile microwave-assisted hydrothermal method (Fig. 1). The hydrothermal temperature plays an important role on surface morphology and uniform particle size distribution of LATP. The as-prepared LATP synthesized at different hydrothermal temperatures are characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and impedance analyzer (AC). The condition-optimized LATP synthesized at a hydrothermal temperature of 180oC exhibits a higher ionic conductivity of 1.4×10^{-4} S/cm with lower activation energy of 0.253 eV, which might be due the uniform particle size distribution, highly crystallinity and a relatively density of as high as 97%. Finally, we assemble a NCM523/LATP/Graphite pouch cell, which exhibits a stable capacity retention of 92.5% for more than 407 cycles. The results indicate that our LATP synthesized by a microwave-assisted hydrothermal reaction is a potential candidate as a solid electrolyte for all solid-state battery applications[1].

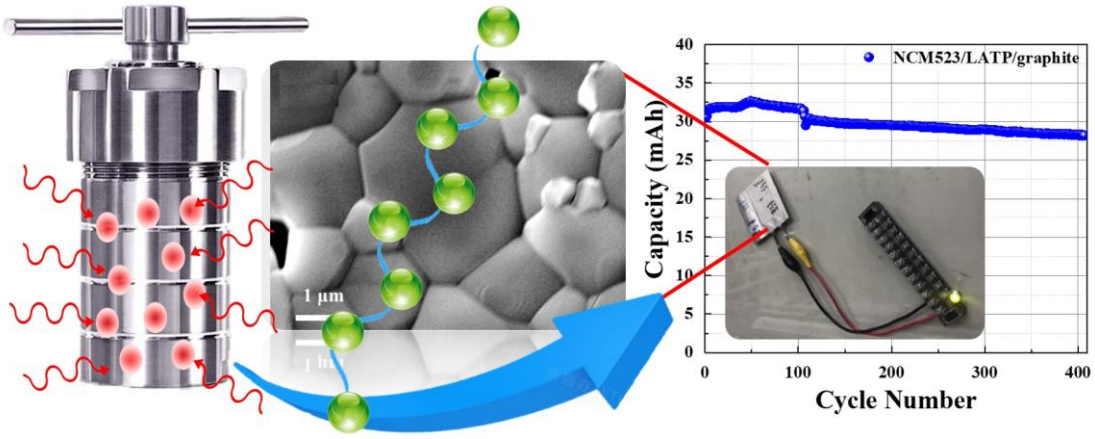

Figure. 1. Scheme, SEM image and cycle life tests of LATP samples.

Reference:

[1] Cheng-En Yu, Duncan H. Gregory and Wei-Ren Liu,* "$Li_{1.3}Al_{0.3}Ti_{1.7}(PO_4)_3$ (LATP) solid electrolytes synthesized by microwave-assisted hydrothermal reactions for Li all-solid-state battery applications," Surface & Coatings Technology, 481, (2024) 130671.