Simple, Surfactant-free, Thermally Stable Gamma-Lithium Aluminate Nanorods: Hydrothermal Synthesis and Characterization

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The Molten Carbonate Fuel Cell (MCFC) has attracted special interest because of its high-fuel-to-electricity efficiency (60%), safety and pollution-free operation. The primary challenge is to construct the fuel cell stack which can operate at 600-650 °C without corrosion. The temperature fluctuations create micro-cracks and morphology changes in the electrolyte matrix. Many researchers focused on the utilization of rod-shaped lithium aluminate particles as a matrix material for MCFC, but the problem is the effective fabrication of rod-shaped γ-$LiAlO_2$. To this end, for the first time we produce a surfactant-free, simple, large scale, highly thermally stable (1000 °C) γ-$LiAlO_2$ nanorods by hydrothermal process. The as-obtained nanorods are having the diameter in the range of 40-200 nm and length 1-10 μm. The synthesis parameters such as, effect of hydrothermal temperature, effect of calcination temperature, effect of Li precursor and hydrothermal time has been studied and optimized.