# Development of porous α- $LiAlO_2$ electrolyte support reinforced by nano-scale γ-$Al_2O_3$ for molten carbonate fuel cells

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Recently, as matrix materials for molten carbonate fuel cells(MCFCs), α-$LiAlO_2$ matrix has been mainly selected because α-$LiAlO_2$ is more stable than γ-$LiAlO_2$at MCFC conditions.The objective of this study is to develop a reinforced α-$LiAlO_2$ matrix for MCFC by using nano-scale γ-$Al_2O_3$ (50-60nm), which was chosen for reinforcing α-$LiAlO_2$ matrix because it was reacted with $Li_2CO_3$, producing α- $LiAlO_2$. Another reason for selecting γ -$Al_2O_3$ is the easy control of viscosity during ball mill process. In a previous literature, the sol coating of $LiAlO_2$ has been studied for reinforcing electrolyte support. But, this process has suffered from the control of the slurry viscosity, which results in impossible tape casting process. In contrast, there is no viscosity problem because the form of γ -$Al_2O_3$ used is powders. So, the tape casting can be easily conducted. The physical properties of α-$LiAlO_2$ electrolyte support reinforced by γ-$Al_2O_3$ were examined by 3-point bending strength test, scanning electron microscope and X-ray powder diffraction. The electrochemical performance was also examied by electrochemical impedance spectroscopy and an electric load.