Preparation of Ni-Al alloy powder using $AlCl_3$ for molten carbonate fuel cells

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Ni-Al alloy material is widely used for automobile engines, air craft, and electricity generation and energy conversion equipment because of its high melting points, good strength and high oxidation resistance. Especially, of all applications, Ni-Al alloy powder has been used as anode materials for molten carbonate fuel cell (MCFC) because of its sufficient creep resistance. However, its high cost become the obstacle to the commercialization of MCFC. The most preparation methods of the Ni-Al alloy require the high temperature around 1400 oC, which process raise the fabrication cost of Ni-Al alloy material dramatically. In point of reducing fabrication cost, synthesis of Ni-Al alloy at low temperature is very attractive. In this study, Ni-Al alloy powder was prepared using AlCl3 activator at low temperature in vacuum atmosphere. It was confirmed that Ni-Al alloy powder could be prepared at 400~600 oC. the effect of temperature, AlCl3 amount was also investigated. The crystal structure and morphology of as-prepared Ni-Al alloy powder was examined using XRD and SEM.