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Influence of Rolling Processing on Discharge Performance of Al-0.5Mg-0.1Sn-0.05Ga-0.05In Alloy as Anode for Al-air Battery

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In this study, as-cast and as-rolled Al-0.5Mg-0.1Sn-0.05Ga-0.05In (wt.%) aluminum alloy anodes were prepared. The microstructure, corrosion property and discharge performance of the as prepared materials were investigated. Compared with the as-cast Al-0.5Mg-0.1Sn-0.05Ga-0.05In alloy anode, the Al-air battery with as-rolled alloy anode has higher battery voltage, anode efficiency and energy density in 2 mol L^{-1} NaCl or 4 mol L^{-1} NaOH solution. The as-rolled alloy anode exhibits optimal discharge performance due to dispersive segregation phases and more grain boundaries produced by rolling processing. The dispersive segregation phases provide more sources of pitting corrosion and more grain boundaries provide more channels for anode reaction. This study demonstrates that it is feasible for as-rolled Al-0.5Mg-0.1Sn-0.05Ga-0.05In alloy to be used as anode material for Al-air battery in 2 mol L^{-1} NaCl or 4 mol L^{-1} NaOH solution.

Keywords: Rolling processing; Aluminum alloy; Self-corrosion; Aluminum-air battery discharge performance; NaCl and NaOH electrolytes

FULL TEXT