Corrosion and Air Batteries Discharge Behavior of Mg-Al-Zn and Mg-Li-Al-Zn Alloys

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Abstract The Mg-Al-Zn and Mg-Li-Al-Zn alloys were used as the anode materials for magnesium-air batteries. The effects of texture, second phase, grain size, twins, and discharge products on the discharge performance of Mg-Al-Zn and Mg-Li-Al-Zn alloys were investigated by controlling the microstructure of the above alloys. The results showed that the prismatic oriented (10-10) and (11-20) grains had higher discharge activities than that of the basal oriented (0002) grains. Because both grain boundaries and twins were preferentially dissolved, grain refinement and the introduction of twins was helpful to improve the discharge performance of Mg-Li-Al-Zn alloys with low Li content. The suitable microstructure characteristics of Mg alloys for the anodes of magnesium-air batteries were summarized as follows: fine grain size, a high content of (11-20)/(10-10) orientated grains, introduction of twins and uniform distribution of fine second phases.

Keywords: Magnesium alloys, Microstructure, Mg-air batteries, Discharge properties