The Research on Zn-AL-Mg Alloys with different Mn contents

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Abstract Hot dip galvanized products are widely used in various aspects of production and life due to their excellent corrosion resistance. Some studies have added a fourth microalloy element to the zinc aluminum magnesium coating to form a quaternary alloy for better performance. In this paper, three kinds of micro Mn added Zn-Al-Mg alloy ingots with different compositions, Zn1Al1Mg0.5Mn, Zn1Al1Mg1.2Mn, and Zn1Al1Mg2.5Mn, were prepared by induction melting, and solidified in a heating furnace with an argon protective atmosphere. The solidification structure and corrosion behavior of ZnAlMg alloy with Mn addition were studied through microstructure characterization and electrochemical testing. The types of aluminum and manganese compounds were predicted through phase diagram calculations. The microstructure and phase types of the alloy were analyzed using scanning electron microscopy (SEM) and X-ray diffraction (XRD). From the results of electrochemical Tafel curves and Nyquist curves of Zn1AL1MgXMn with different Mn content, it can be seen that with the increase of Mn content, the self corrosion current density decreases and the impedance value increases, indicating that the corrosion resistance of Zn1Al1Mg2.5Mn alloy has been improved. At present, there is little research on the structure and properties of manganese containing quaternary alloys, so it is important to study the effect of manganese content on the structure and properties of quaternary alloys.

Keywords Mn added ZnAlMg quaternary alloy; The solidified microstructure; Corrosion resistance; AlMn alloy compounds;Quaternary Alloy