POSTER EXPOSITION

Poster 2

Effect of environmentally friendly additives on Zn-Mn alloys morphology and structure

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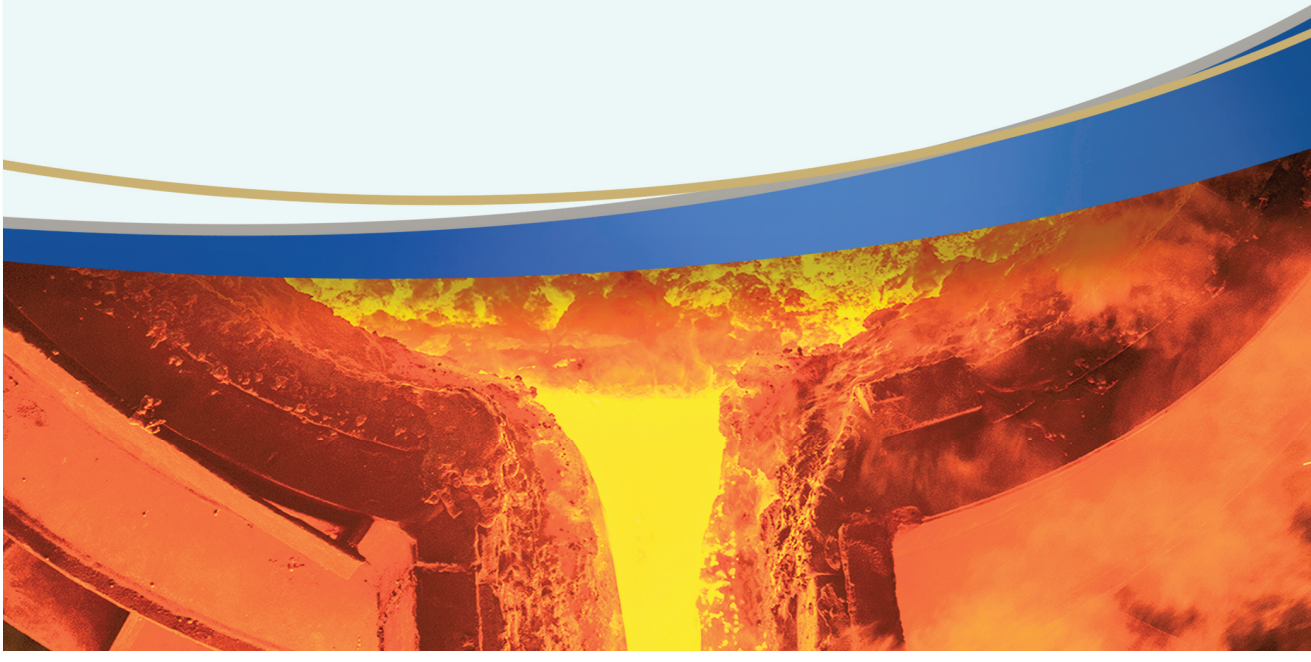
ABSTRACT:

Pure Zn coating commonly used for the protection of steel is not sufficient in some industrial applications due to its high dissolution rate. There is a growing interest in Zn-Mn coatings owing to the highest corrosion resistance compared to that of pure zinc coatings. However, Mn-rich alloys electrodeposition is a difficult issue since there is a gap between standard redox potentials of the two alloying elements Zn ($E°$ (Zn^{2+}/Zn) = - 0.76 V/HSE) and Mn ($E°$ (Mn^{2+}/Mn) = - 1.18 V/HSE). Besides to that, hydrogen evolution reaction is a concurrent reaction that inhibits Mn co-deposition as the two potentials are notably more negative than that of hydrogen evolving. Mn-rich deposits that require high current densities are burned, powdery and non-adherent. To overcome these difficulties, fundamental research in this work has been made to develop the Zn-Mn electroplating process. Stringent environmental concerns have restricted the complexing agent regularly incorporated in the bath as they induce serious problems related to wastewater treatment. In this work, new electroplating formulations containing effective and environmentally friendly additives have been developed. These additives facilitate Zn-Mn co-deposition. Thus, Zn-Mn alloys were successfully electrodeposited with suitable properties. The Mn content reaches 20% under low current density. SEM data reveal that Zn-Mn exhibits fine morphology.



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