Swansea University Prifysgol Abertawe

Speaker 2

The effect of antimony additions on the microstructure and performance of automotive Zn-Al-Mg steel coatings

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ABSTRACT:
Since the early 2000's, additions of 1-2wt.% Al and Mg have brought about improvements in the corrosion protection and processability of traditional zinc galvanized coatings. Despite these benefits, the brittle MgZn2 binary eutectic phase that forms in these alloys can cause the coating to crack during automotive body panel pressing. Therefore, a strategy to mitigate these issues but retain the corrosion benefits is investigated here. Additions of 0-2wt.% Sb were added to Zn-Mg-Al alloy and fast cooled from 800oC, resulting in the formation of Mg3Sb2 intermetallics which tie up Mg and reduce the volume fraction of the MgZn2 phase. Scanning Vibrating Electrode Technique showed an addition of 1wt.% antimony resulted in a 45% improvement in corrosion-induced metal loss, whilst Linear Polarisation Resistance found increasing this addition further led to a rise in the kinetics of corrosion. Open-Circuit Potential testing revealed mixed results regarding the effect of antimony on thermodynamic potential.