

Corrosion Prevention of Magnesium Alloys via Surface Conversion Treatments using Ionic Liquids

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Technology Summary

Magnesium alloys are great candidate lightweight materials for automotive applications, but their corrosion susceptibility issues are yet to be sufficiently solved. Chemical conversion coatings are commonly applied to Mg alloys as paint bases and in some cases as stand-alone protection. Traditional conversion coatings are based on hexavalent chromium compounds that are undesirable due to severe environmental risks. In an on-going ORNL Seed Money project, the inventors have demonstrated the proof-of-concept of a novel Mg surface conversion coating using environmentally benign ionic liquids (ILs). Compared with conventional conversion chemistry, ILs have several advantages, such as higher flexibility in molecular design, hydrophobicity, and potentially better bonding to paints. Unlike the approaches in the limited literature that involve extended exposure to ILs at room temperature or an electrical potential bias, this study proposes to apply thermal and/or mechanical stresses to promote rapid conversion coating formation.

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