

In situ growth mechanism and corrosion resistance of layered double hydroxide coating prepared under mild condition

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Abstract: In-situ growth of layered double hydroxide (LDH) coatings on magnesium alloy through hydrothermal reaction with high-temperature and high-pressure reaction conditions by an autoclave is not conducive to large-scale production and large-size magnesium alloy parts and increases the experimental risk. This presentation reports the results of an investigation of the design and preparation of several different anions-inserted (including hydroxyl OH^- , tungstate WO_4^{2-} , metavanadate VO_3^- , and phosphate PO_4^{3-}) MgAl-LDH coatings on magnesium alloy under relatively mild conditions. The optimum coating exhibited good adhesion and corrosion protection with an exceptionally low corrosion current density and a very high charge transfer resistance comparable to a hydrothermal method. The in-situ growth of LDH coating in an aqueous solution under atmospheric conditions and the corrosion protection mechanism of the modified LDH coating will also be discussed. These findings demonstrate the possibility of achieving strongly adhesive and highly corrosion-resistant LDH coatings under atmospheric pressure throughout the preparation process, significantly promoting the industrial application of LDH-based smart coatings for corrosion protection of light alloys.

Keywords: Magnesium alloy; corrosion; coating; layered double hydroxide

References

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