

Layered Double Hydroxides for Aluminium Alloys Corrosion Resistance

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Layered Double Hydroxides (LDH's), represented by the general formula $[M^{II}_{(1-x)}M^{III}_x(OH)_2[A^{n-}_{x/n}].zH_2O$ or $[M^IM^{III}_2(OH)_6[A^{n-}_{1/n}].zH_2O]$, where M^I , M^{II} , M^{III} are mono-, di- and tri-valent metal cations, are being researched as anion-exchange materials with interesting intercalation chemistry that accommodate a wide range of applications including corrosion resistance.

In this work, layered double hydroxides containing a monovalent (Li^+) and trivalent (Al^{3+}) matrix cations, have been synthesized and characterised using X-ray diffraction, FTIR and SEM. LDH's were prepared by a simple co-precipitation method using metal hydroxides and metal salts in an alkaline solution.

Formation of LDH's on the metal surface of Al alloys were attempted with excellent results. Pitting corrosion was inhibited on Aluminium 2024-T3 with an extensive capability to withstand the presence of high concentrations of chloride ions. The formation of DHL's is thought to be responsible for inhibition which is demonstrated to be under diffusion control. The action of DLH's on copper is demonstrated in separated experiments using pure copper samples in similar experimental conditions as for the alloy, in an extensive electrochemical study.