Layered Double Hydroxides for Aluminium Alloys
Corrosion Resistance

M. A. Travassos and C. M. Rangel
Instituto Nacional de Engenharia e Tecnologia Industrial
Electrochemistry of Materials Unit/DMTP
Paço do Lumiar, 22 1649-038 Lisboa Portugal

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.