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# NANOSCALE LAYERED DOUBLE HYDROXIDE MATERIALS FOR CORROSION RESISTANCE

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## Abstract

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 $[M^{I}M^{III}_{2}(OH)_6[A^{n-}_{1/n}].zH_2O]$, where $M^{I}$, $M^{II}$, $M^{III}$ are mono-, di- and tri-valent metal cations, are being researched as anion-exchange materials which interesting intercalation chemistry that accommodate a wide range of applications from heterogeneous catalysis to storage and subsequent controlled release of bioactive agents.

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. Hybrid systems are produced by intercalation which involves a guest molecule introduced into the host structure replacing the existing interlayer ion, without affecting the host structure opening new applications according to desired functionalities namely as thin films in corrosion protection. Li based conversion coatings are easily formed under open circuit conditions on Al surfaces [1-3].

Formation of LDH´s on the metal surface of copper-rich 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. Intergranular corrosion was found to be inhibited in Al-Li 8090 alloy by action on copper containing T-phases located at the grain and sub-grain boundaries. 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.

## References

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