Active Corrosion Protection by LDHs

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The active corrosion protection of metallic substrates can be achieved by the addition of corrosion inhibiting compounds to the protective coatings. However, direct mixing of an inhibitor with coating formulations can lead to important drawbacks decreasing barrier properties of the coating and diminishing activity of the inhibitor. Moreover the complexity of the corrosion mechanisms and variety of the conditions where metallic structures can be used calls for the combination of different inhibitors in the same corrosion protection system. This is very problematic in the case of direct addition of different inhibitors due to cross-reactions between them.

The present work shows a new contribution to the development of a novel protective coating with self-healing ability on the basis of nanocontainers that release entrapped corrosion inhibitor in response to presence of corrosive species. The new nanocontainers for organic and inorganic corrosion inhibitors were developed in this work employing mainly layered double hydroxide (LDH) as nanocarriers. The combination of nanocontainers in the same coating system has proved important synergistic effect without deactivation of inhibiting compounds.