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Communication

Hydrotalcite modified coatings for corrosion protection of steel and Zn sacrificial layers

T.D. Nguyen[1,2], T.T. Pham[1,2], J. Rodriguez[1], T.X.H. To[2], M.-G. Olivier[1]

[1] Materials Science Department, Université de Mons, 7000, Mons, Belgium; thuthuy.pham@umons.ac.be justine.rodriguez@umons.ac.be marjorie.olivier@umons.ac.be,
[2] Institute of Tropical Technology, Vietnam Academy of Science and Technology Hanoï; Vietnam; ntd0801@gmail.com, ttxhang60@gmail.com,

* Correspondence: marjorie.olivier@umons.ac.be

Abstract:

Steel is recognized for its good mechanical properties but also for being prone to corrosion leading to the formation of red voluminous products. The most used protection systems consist in the application of a zinc sacrificial coating and a conversion layer as phosphatizing or chromate-based ones which are known for toxicity or slurry production. Hydrotalcites (HT) are a class of anionic and basic clays made of a double layer hydroxide structure. Due to their lamellar morphology and negative global charge, these clays can be used for the intercalation of anionic species such as carbonate, chloride or inhibitive ones. The synthesis is performed by using low cost and environmentally friendly compounds. In this talk, different uses of these HT clays for the corrosion protection will be presented: 1) Incorporation of hydrotalcite powders modified by different inhibitive species in an epoxy coating for the corrosion protection of steel and Zn sacrificial layer, 2) In-situ growth of hydrotalcites on Zn sacrificial layers. Parameters such as the role of the intercalated organic inhibitive species, their release, the nature of the substrate, the corrosion protection mechanisms will be discussed. Characterization was carried out by scanning electron microscope (SEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), zêta potential measurement, TOC analysis and ultraviolet-visible spectroscopy (UV-vis). The corrosion mechanisms were studied in saline solution using electrochemical impedance spectroscopy (EIS) and polarization measurements.

Keywords: Corrosion; steel; sacrificial layer; hydrotalcite; epoxy coating; organic inhibitor.