The New "Smart" Corrosion Protective Pigment based on Tripolyphosphate- intercalated Zn-Al Layered Double Hydroxide: Synthesis and Characterisation

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Paint coatings are widely used in the modern world, especially for corrosion protection of the metal with simultaneously formation decorative image. But the main disadvantage of pain coating is a passive type of corrosion protection. The current research project aim is to determine the possibility of synthesis of “smart” pigment, based on inhibitor-intercalated layered double hydroxide (LDH), with high pigments properties and active metal protection with water presence. Zn4Al LDH as a nanocontainer and tripolyphosphate as an intercalating inhibitor was selected for “smart” pigment. Pigment samples were synthesized by direct co- precipitation at the equilibrium pH and characterized by PXRD, DTG, DSC, SEM, EDX, IR, Color Comparator and anodic voltammogram of mild steel without and with pigment extract. By PXRD, TG, DSC, EDX and IR it was established that samples are bi-phase (high crystalline ZnO+XRD-amorphous Zn-Al- P3O10 LDH). Advanced pigment properties (manual grinding easiness and particle diameter <2 μm) are shown. Extra whiteness of pigment (coefficient of diffusion reflection 90%, lightness L=96.1, color purity 1%) was detected by color measurements. Anodic voltammogram curves exhibited the high corrosion-protective activity of the synthesized pigment: the presence of the pigment extract leads to a reduction the current density of steel corrosion by 3.2 times. Conclusion. Suggested and synthesized tripolyphosphate-intercalated Zn4Al layered double hydroxide is perspective “smart” pigments with advanced pigment properties and active corrosion-protective properties. The revealed softness and plasticity of the pigment make it possible to study its application in oils and for metals rolling.

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