particles. Electrons transfer occurs only with Au. The same effect was obtained after low temperature treatment [2].

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TiO_2/epoxy composites as effective anticorrosion coatings for steel

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Epoxy resins are thermosetting polymers which have been widely used in different fields including anticorrosive protection [1]. Incorporation of nanoparticles in epoxy matrix can enhance corrosion resistance as well as improve optical, thermal and mechanical properties of the epoxy coatings [2]. Among different nanoparticles used as additives for epoxy resins, TiO_2 is the most perspective owing to unique properties, relative low cost and wide-spread application. The aim of the present work was to prepare TiO_2/epoxy coatings on steel and to study the influence of TiO_2 additive on anticorrosive properties of the coatings.

In the experiments, commercially available water-based epoxy resin CHS-Epoxy 200v55 and Telalite 180 amine hardener were used for preparation of the epoxy coatings. The TiO_2 particles were fabricated according to the method described in [3]. TiO_2/epoxy composite coatings with 0.5, 1 and 2 wt. % of TiO_2 were prepared by adding an appropriate amount of TiO_2 particles into the epoxy resin followed by mechanical dispersing and then addition of the curing agent. The obtained mixture was deposited onto steel plates using casting blade method.

The resultant cured coatings with a thickness of 60 ± 3 μm were partly transparent, non-porous and demonstrated excellent adhesion to steel surface. The distribution of TiO_2 particles in the cured epoxy matrix was studied by SEM and EDX mapping. In addition, RAMAN spectroscopy was applied for characterization of 3D distribution of titania particles in the coatings. TiO_2 particles were found to be rather uniformly distributed in epoxy network. The corrosion resistance of the epoxy coatings modified with TiO_2 nanopaticles was investigated by standard salt spray test. Unmodified epoxy coatings were failed

with rust formation after 24 h. Incorporation of TiO_2 particles into polymer matrix increased the corrosion resistance of the epoxy coating up to 96 h.

In conclusion, the epoxy coatings loaded with TiO_2 nanoparticles were deposited onto steel substrate by casting blade technique. The addition of TiO_2 to epoxy resin led to enhance of anticorrosion performance of the coatings.

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Role of plasma electrolytic oxidation treatment for in-situ growth of LDH-nanocontainers for active corrosion protection of aluminum alloy

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Nowadays, the use of chromates is prohibited in many industrial applications due to their high toxicity. Recently, layered double hydroxides (LDH) have been extensively studied as environmentally friendly nanocontainers, useful for corrosion protection of active metal substrates (e. g. aluminum alloy 2024) [1]. Being loaded with corrosion inhibitors, LDH act as "smart" nanocontainers: the release of a corrosion inhibitor and the formation of a protective layer occurs only when defects occur and corrosion begins. The same idea was extended in order to add self-healing properties to aluminum alloys treated with plasma electrolytic oxidation (PEO) [1, 2, 3]. This combination is important because, since the properties of solid and well-adhering ceramic layers formed during PEO processing, are strongly compromised by the presence of defects (different types of pores and cracks).

The structure, morphology and composition of PEO coatings with parental ZnAl LDH-nitrate and LDH loaded with corrosion inhibitor (vanadate) were studied in the frames of this work. It was demonstrated that the amorphous bohemite phase is suitable for the LDH growth, while crystalline α- and γ-Al_2O_3 can not be converted to LDH structure. Corrosion behavior of PEO+LDH coated AA2024 loaded with a corrosion inhibitor was evaluated and a significant increase in corrosion resistance was demonstrated.