**Production of oxide coatings to improve the surface properties**

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The surface appearance and durability and storage stability provide coatings including oxide materials, which are the most stable form of matter. The oxide films can perform various functions, such as anti-static, waterproof, anti-corrosion, thermal barrier, energy saving, anti-fouling, self-cleaning. For protection against UV rays $TiO_2$ coating is most effective [1]. Under the influence of the ultraviolet component of sunlight such coatings are promoted the decomposition of organic contaminants on the surface of the glass and giving it the hydrophilic properties, whereby pollution and their decomposition products can be easily removed from the surface and self-cleaned, for example, by rain [2].

Boats and ships below the water line have the antifouling paint coating against plant and living organisms. The compounds slowly releasing tributyltin are effective, but they are harmful to the coastal water and the living world. Coating which release copper ions are harmful also. In this connection it is of interest to study new antifouling coatings, particularly $TiO_2$ [3].

Modern multi-functional coating is produced by vacuum deposition (ion bombardment of the surface in a vacuum). Its application is exclude the peeling of layers applied at temperature variation when the film are stretched or compressed. [4] $TiO_2$ films may be prepared by hydrolysis in the vapor phase, using as the film-forming raw material $TiCI_4$ and $CCI_4$. Titanium dioxide films were obtained by the photon annealing of coating solution based on titanium alkoxy compound [5].

In our work to produce $TiO_2$ films we used the metalorganic extracts with subsequent thermal decomposition on the substrate. Compared with the titanium alkoxide used in the sol-gel method, organic extracts have better wetting properties and stability of properties over time due to the non-volatility of the organic phase. Complete wetting of the substrate is necessary to achieve coating uniformity and strengthening the binding of the interface substrate-coating, particularly for low energy surfaces (glass, plastic). Wetting agents provide the reduced surface tension, spreading, wetting, improving adhesion, improving the appearance (gloss and color uniformity).

Extracts with different concentrations of titanium, which determines the microstructure, have been prepared and obtained layers were investigated. Fig. 1 shows an AFM micrograph of $TiO_2$ films, prepared from 0.1 M and 0.25 M solutions of extracts of titanium.

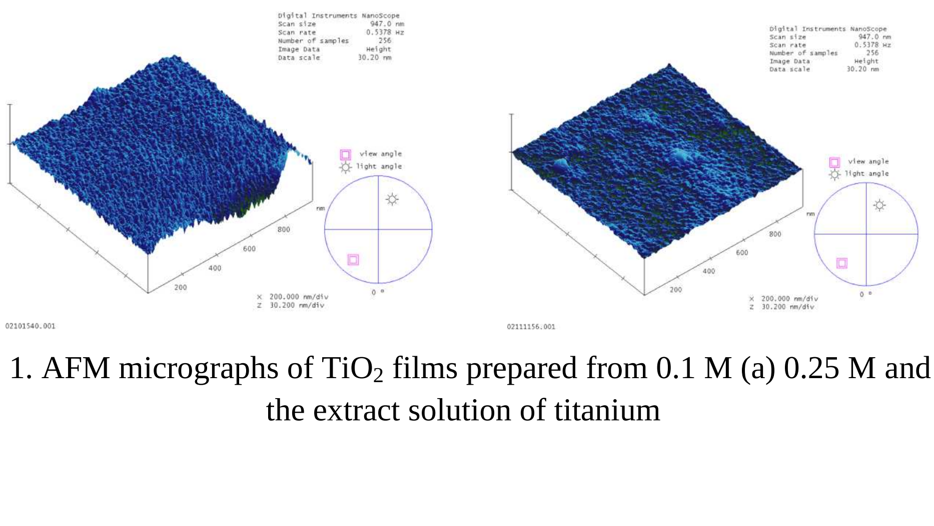

Fig. 1. AFM micrographs of $TiO_2$ films prepared from 0.1 M (a) 0.25 M and (b) the extract solution of titanium

Judging from the microphotographs $TiO_2$ films obtained from dilute extracts solutions are possess of continuity, nonporous and can be used as protective coatings. Nanoscale film structure contributes to the absence of pores and cracks, thereby improving the coating performance.

We investigated the aterproof and photocatalytic properties of $TiO_2$ films. The steel needles protected by $TiO_2$ film and unprotected needle were placed in the water under the open sunlight. After 5 days the not protected needle is covered by rust and the protected by $TiO_2$ film needle retained its original form (Fig. 2).

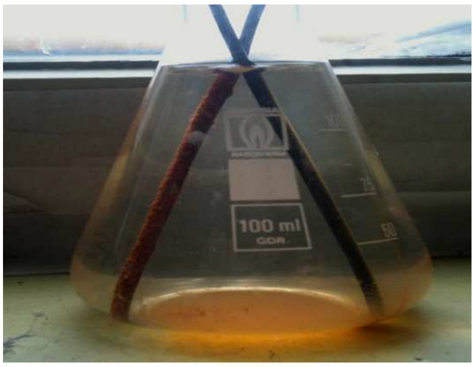

Fig. 2. Needle coated by $TiO_2$ film (right) and not protected steel needle (left).

It is shown that the film $TiO_2$ obtained from the extract solution after pyrolysis at 450 °C, has a protective anti-corrosion and anti-fouling properties.

References

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