

Nanostructured surfaces

The formation of nanoporous TiO₂ surface area during anodizing of Ti-foil.

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Nanostructured materials are getting wide application in different fields of science and technology, in particular nanoporous titania is prospective in photovoltaic and photocatalys sensors and as matrix for other nanomaterials.

Nanoporous TiO₂ was obtained by the one-step anodization of Ti-foil with previously degreasing surface, without polishing. We used water solution of orthophosphate acid (weight 20%) as an electrolyte and copper cathode. The anodization was performed at a direct current and voltage equal 20 V with different time of anodizaion (1-10 min).

Increase of an anodization time changes the color of Ti surface from violet to blue. This effect is caused by formation of TiO₂-pore with different size (200-500 nm). It was shown by SEM analysis. The results of EDX analysis indicated that quantity of oxygen in anodized area increased. Based on microstructure photography of Ti-foil surface after different anodization time treatment the increased number of blue regions and decreased number of red regions was observed.

It should be noted, that for sample with the shortest anodization time (sample 1) the formation of TiO₂-layer (red) with the largest size of pores was observed as the result of already existing surface defects anodization on top of the Ti-foil surface. For samples with the longer anodization time (samples 7-10) the formation of TiO₂-layer (blue) with the smallest size of pores occurs, it cause anodization of non-defects surface. Intermediate samples have a violet color of surface as result of mixing two kinds of pores described above.