

Nanocoatings for corrosion protection of titanium alloys

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The physical, chemical and mechanical properties of titanium alloys make this materials an appropriate candidate for a variety of technical applications [1]. The highest strength to weight ratio and an excellent resistance against wet corrosion due to spontaneous formation of a passivating oxide layer have introduced titanium components into the fields of chemical, aerospace, biomedicine engineering and automotive industry. The oxides layers are barrier between the surrounding environment and the underlying metallic titanium [2]. However, in the presence of aggressive anion species, especially fluoride ions F⁻, oxides layer is not sustainable [3]. Various surface modification technologies have been proposed and investigated with a view to improving the corrosion properties of the surface of titanium alloys. However, the continued search for new methods of surface modification of titanium alloys to improve their corrosion resistance is under way.

The paper focuses on the comparative studies of structural, mechanical and corrosion properties of Ti-6Al-4V titanium alloy after surface modification by nanocoatings i.e.: graphene, TiO₂, TiN, SiN.

The tests were done by means of voltametric measurements in a fluoride solution. Surfaces of the films and titanium alloy were characterized using atomic force microscope, nanoindentation measurements, scanning electron microscope and Ramman microscopy .

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References

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