

Sol-gel processing of titanium-containing thin coatings

What is the thickness of anatase TiO₂ sol-gel coating?

Anatase TiO₂ sol-gel coatings with a thickness of 50 nm, 7% open porosity, and a 2.4 nm pore radius were prepared on solid substrates using the dip-coating method.

How hydroxyapatite and composite coatings are formed on titanium?

Pure hydroxyapatite and composite coatings formed by sol-gel process on titanium. ? Interfacial strength of the coatings is determined by a lag shear strain method. ? The coatings have high interfacial strength and very low fretting wear. ? The acid-etched surfaces showed much higher interfacial shear strength. 1. Introduction

Which method is used to develop TiO₂ coatings?

(29) The sol-gel method is a preferred process for the development of TiO₂ coatings since it is cost-effective, requires relatively simple equipment, and utilizes mild conditions, including low temperatures.

How are sol-gel Coatings prepared?

Sol-gel coatings on solid substrates were prepared from the 1-day aged precursor sol by the dip-coating method. Clean quartz and silicon substrates were immersed into the precursor sol and pulled out with a constant speed of 12 cm/min by a dip-coater device (Plósz Mérnökiroda Kft., Hungary).

Can HA coating be used in modifying the surface of titanium implants?

The relatively high strength values obtained for the sol-gel coating of HA on titanium shows that this simple processing route can be successfully used in modifying the surface of load-bearing metallic implants. 3.4. Fretting wear behavior of coatings The results of the fretting tests are provided in Fig. 7, Fig. 8.

Can nanostructured TiO₂ coatings be predicted by Simulations?

However, due to the complexity of the various processes occurring during the sol-gel thin film synthesis (detailed above), which all influence the final properties of the system, predicting the resulting parameters of nanostructured TiO₂ coatings by simulations is a serious challenge.

Applying a chemical substance known as an antimicrobial coating kills pathogenic microorganisms such as fungi, yeasts, bacteria, and molds, and inactivation of viruses. Since some conventional coatings may require high temperatures but sol-gel coating can be completed at low temperatures, it is an easy coating technique for adding antimicrobials to polymeric ...

This review will highlight coating technology utilizing the sol-gel mediated precursor, which delivers high homogeneity, low temperature processing and various other advantages.

In the present work, synthetic HA was synthesized by using the sol-gel method. Hydroxyapatite sol was used to coat metallic substrate ...

Sol-gel processing of titanium-containing thin coatings

Corrosion degradation of materials and metallic structures is one of the major issues that give rise to depreciation of assets, causing great financial outlays in their recovery and or prevention. Therefore, the development of active ...

At depth in the coatings, oxides of Ti (IV) and Sn (IV) are unstable and exhibit stoichiometrical disturbances. The phenomenon is discussed in relation to argon-ion sputtering conditions, the ...

The low density, high specific strength, and good creep properties make TiAl alloys being promising high-temperature structural materials in aerospace and automotive industries. However, the insufficient oxidation resistance limits their extensive practical applications . It is the intention of this review to illustrate the mechanism and development of sol-gel-based coatings, a ...

The sol-gel process is a typical coating method for providing uniform TiO₂ layers on various substrates, where amorphous gel films are made from titanium alkoxide solutions containing water, acidic or basic catalysts, ...

By spin-coating of a sol-gel solution containing TEOS (the silica precursor) and CTAB as soft-templating agent, authors produced functional thin layers/coatings made by mesoporous silica deposited onto commercial Si₃N₄ macroporous (diameter of 500 nm) support. The adopted procedure is as follows: i) to avoid penetration of the silica sol in ...

This research work is focused on the investigation of newly developed titania sol-gel coatings containing silver, calcium and phosphate with appropriate abilities to be implanted into the...

Some investigations of the thickness, spectral transmittance and reflection, refraction index, abrasion protection, ageing, boiling-water and alkaline-solution treatment have been carried out on coatings deposited by the dip-coating process on a glass substrate. As a starting system, Ti(OBu)₄- C₂H₅OH-H₂O was used. The dependence of the properties of the coatings as a ...

Formation of thin sol-gel films is an attractive opportunity and sol-gel BaTiO₃ coatings have been formed using the alkoxide solution, which contains a small amount of ...

The sol-gel method is a simple and low-cost technique that requires low temperature for the reaction process. Sol-gels can be made from a wide variety of ceramic materials, including alumina, chromium, silica, and zirconium. This technique has been used in a variety of applications, including corrosion prevention, biomedical applications, and electronic ...

The process includes dissolution of titanium alkoxide as C₁₆H₃₆O₄Ti and the respective salts in a chosen solvent, followed by hydrolytic polycondensation

Sol-gel processing of titanium-containing thin coatings

The number of layers in the sol-gel spin coating method significantly affects the optical properties and overall performance of TiO₂ thin films. Research by Sadikin et al. examined titania thin films on ITO substrates for DSSC applications, varying the number of spin cycles (Sadikin, 2017). Their findings suggested that increasing spin coatings can reduce titania nanoparticle agglomeration ...

Sol-gel processes are mainly based on hydrolysis and condensation reactions of metal alkoxides M(OR)_n, which provides a low cost, simple, non-hazardous method for preparing coating with controllable composition and microstructure. Alkoxysilanes, such as tetraethoxysilane (TEOS) and tetramethoxysilane (TMOS), and alkoxides of zirconium, titanium, cerium, tin and ...

Titanium dioxide (TiO₂) is a transparent, conductive photocatalyst widely used in photovoltaic cells (perovskites, DSSC, etc.) [1], [2], [3] s low electron-hole separation coefficient due to its limited UV photo-catalytic activity (5%) prevents its optimal use in photovoltaic cells [2] this work, we develop TiO₂ thin films using the sol-gel method combined with the spin ...

Aluminum alloys used in aeronautical industry are susceptible to corrosion. The solution to this problem is base chromate materials, which have been heavily regulated and restricted. The development of alternatives begins in the 1970s and the 2000s, where some potential methodologies were established. The sol-gel process is one of these methods, in ...

In this paper, pure anatase TiO₂ thin films were grown on glass substrates by using sol-gel dip-coating method. To study the physical, chemical and optical properties of the deposits, TiO₂ thin ...

Formation of thin sol-gel films is an attractive opportunity and sol-gel BaTiO₃ coatings have been formed using the alkoxide solution, which contains a small amount of reacting water (H₂O to metal molar ratio, R_w =1-2), a large excess of acetic acid (acid to metal molar ratio, R_{ac} =70-140) and a small amount of acetylacetone as a stabilizing agent for the Ti OH ...

Sol-gel technology for coatings deposition offers several advantages that directly derive from the synthesis process: sol-gel coatings are, in fact, characterized by high purity and chemical homogeneity, as well as superior textural properties which make them particularly suitable for being functionalized with therapeutically active particles and organic molecules, while favoring ...

Web: <https://bardzyndzalek.olsztyn.pl>

Sol-gel processing of titanium-containing thin coatings

