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TiO_2 - based decorative coatings deposited on the AISI 316L stainless steel and glass using an industrial scale magnetron

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Abstract

This paper presents a study of optical and microstructural properties of the TiO_2/316L, TiO_2/Ti/316L and TiO_2/Ti/glass interference systems obtained by gas injection magnetron sputtering technique (GIMS) employing a commercial magnetron line. The samples are examined by means of spectrophotometry, spectroscopic ellipsometry, confocal optical microscopy, x-ray photoelectron spectroscopy and atomic force microscopy. The investigation is completed by colorimetric analysis. Our analysis shows the significant differences in the color of samples with a TiO_2 layer with the thickness of this layer in the range 30-35 nm.

Keyword

decorative coatings; titanium dioxide; magnetron sputtering; GIMS; CIE Lab color space; optical properties

1. Introduction

Titanium dioxide has found many high-tech applications in varous fields, including dye-sensitized solar cells, optical filters, antireflection and wear coatings as well as electrochromic devices [1-6]. Yet another application of TiO_2 is using it as a decorative coating in architecture, automotive industry and jewelry [7-10]. In the visible spectral range, the titanium dioxide is a non-absorbing material. The