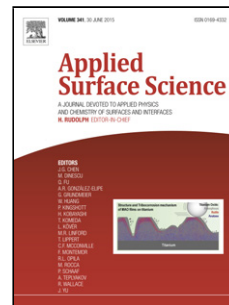


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<AT>The black and white coatings on Ti-6Al-4V alloy or pure titanium by plasma electrolytic oxidation in concentrated silicate electrolyte

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<ABS-Head><ABS-HEAD>Graphical abstract

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<ABS-HEAD>Highlights ► PEO of Ti-6Al-4V alloy and pure titanium in concentrated silicate electrolyte. ► Black and white coatings respectively are formed by varying the PEO time. ► Black color is attributed to Ti^{2+} and Ti^{3+} in the coatings. ► The white coating shows super hydrophilicity. ► Coating formation mechanisms have been discussed.

<ABS-HEAD>Abstract

<ABS-P>Black TiO_2 has triggered scientific interest due to its unique properties such as enhanced solar-driven photocatalytic activity. In this paper, plasma electrolytic oxidation (PEO) treatment of Ti-6Al-4V alloy has been carried out in concentrated sodium silicate electrolyte. Silica-based black and white TiO_2 coatings respectively have been obtained by controlling the oxidation time. The black coating, which was formed with a short treatment time, shows good corrosion resistance and the black appearance can be attributed to the presence of Ti^{2+} and Ti^{3+} in the coating. The lower valence titanium ions are absent in the white coatings and they also contain relatively higher Na content compared to the black coatings. The white coatings have great surface roughnesses and super hydrophilicity. The bonding strengths of the black and white coatings

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