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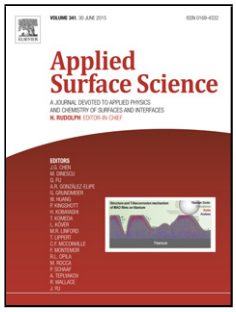

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Structural, photoluminescent and photocatalytic properties of $TiO_2:Eu^{3+}$ coatings formed by plasma electrolytic oxidation

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Abstract

In this paper, we used plasma electrolytic oxidation (PEO) of titanium in water solution containing 10 g/L $Na_3PO_4 \cdot 12H_2O$ + 2 g/L Eu_2O_3 powder for preparation of $TiO_2:Eu^{3+}$ coatings. The surfaces of obtained coatings exhibit a typical PEO porous structure. The energy dispersive x-ray spectroscopy analysis showed that the coatings are mainly composed of Ti, O, P, and Eu; it is observed that Eu content in the coatings increases with PEO time. The x-ray diffraction analysis indicated that the coatings are crystallized and composed of anatase and rutile TiO_2 phases, with anatase being the dominant one. X-ray photoelectron spectroscopy revealed that Ti 2p spin-orbit components of $TiO_2:Eu^{3+}$ coatings are shifted towards higher binding energy, with respect to pure TiO_2 coatings, suggesting that Eu^{3+} ions are incorporated into TiO_2 lattice. Diffuse reflectance spectroscopy showed that $TiO_2:Eu^{3+}$ coatings exhibit evident red shift with respect to the pure TiO_2 coatings. Photoluminescence