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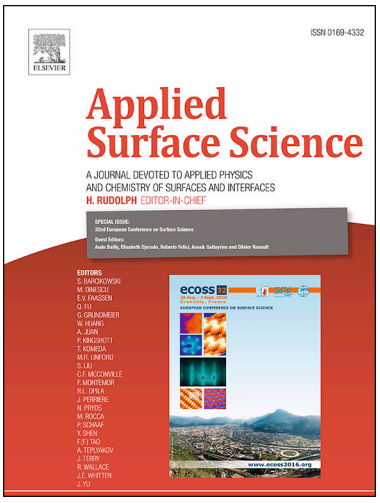

Full Length Article

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ACCEPTED MANUSCRIPT

Shell of black titania prepared by sputtering TiO_2 target in H_2+Ar plasma

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Abstract

Black titania films that resemble the shell of recently reported black TiO_2, were deposited by DC sputtering a conductive TiO_2 target in hydrogen-containing plasma. Synchrotron radiation was used for identifying the phases present in the samples. Anatase- defective rutile transformation, with further amorphization and transformation into intermediate Ti oxides were observed. Samples became black and conductive at the stage of transformation into defective rutile already and the amorphous sample showed flat absorbance in the visible region. The amount of O-H groups on the film surface reaches 80% with increasing hydrogen in the plasma. Nevertheless, the black samples are inferior photocatalytically to transparent titania. Based on the results, some new insights into the phenomenon of the black TiO_2 are provided.

Keywords: Black titania; Hydrogenation; Magnetron sputtering; synchrotron measurements; TiO_2; photocatalysis

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