

## ABSTRACT

The paper, research related to the application of a thin layer (~3 nm) of precious metals (Au and Pt) on the surface of rutile  $\text{TiO}_2(001)$  is presented, providing a closure to previous studies. The experiment was designed to extend previous knowledge with related to the effect reversible segregation of metals (e.g. Fe, Co and Ni) on the surface rutile  $\text{TiO}_2(001)$ . This is an interesting phenomenon, as it allows single metal atoms to migrate inside and outside the rutile  $\text{TiO}_2(001)$  in a controlled manner, leading to the growth of nanoparticles on the researched surface. In this paper results collected by techniques: XPS, STM, SEM and XRD were presented and discussed. The work proposed two parameters that may be responsible for the obtained results and conclusions that should be taken into account in further experiments related to the effect of secondary metal precipitation from the rutile  $\text{TiO}_2(001)$  surface.

In the second part of paper, thin films of  $\text{Ti/TiO}_2$  (~3 nm) were deposited by ion sputtering technique on: (i) naturally grown  $\text{SiO}_2$  layer on  $\text{Si}(100)$ , (ii)  $\text{HOPG}(0001)$  and (iii)  $\text{graphene}/4\text{H-SiC}(0001)$ . In these studies, the interaction of titanium/titanium oxide with the substrates played a crucial role, which was verified by: XPS, AFM and Raman spectroscopy. The most interesting observations came from the  $\text{SiO}_2/\text{Si}(100)$  substrate, where Ti-Si and Ti-Si-O components were observed. In the case of the  $\text{HOPG}(0001)$  surface titanium/titanium oxide surface diffusion occurred. Furthermore, the interaction of the deposited  $\text{Ti/TiO}_2$  layer with the  $\text{graphene}/4\text{H-SiC}(0001)$  surface resulted in its defect formation, which may be a desirable aspect in future research.

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