Photo/electrocatalytic properties of the hydrogenated TiO_2

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TiO_2-based materials are widely used for solar energy conversion applications, however there is still a number of open questions related to the mechanism of charge transport, hole-electron recombination mechanism or to the electrolyte/electrode interaction. In this regard, the urgent objective is to detect, characterize and monitor changes in the surface morphology and chemistry of TO_2 active layers employed in photo/electro chemical devices.

Our approach to this objective is to investigate the effect of various experimental modifications, such as doping, catalyst deposition, or hydrogenation of the mesoporous TiO_2 active layer [1,2], in an attempt to relate structural characteristics to photoelectrochemical or electrocatalytic performance of TiO_2 films. Interestingly, some of the dopants besides having a pronounced effect upon film morphology also undergo aggregation towards film surface – which might be of particular interest for the applications in electrocatalysis. We perform also the hydrogenation of TiO_2 to form substechiometric phases of Ti for electrocatalytic purposes. The XPS analyses, spectral responses and the photo/ electrochemical performance of the produced TiO_2 films will be presented and discussed.

[1]. *Photoanodic reactions occurring at nanostructured titanium dioxide films.*
Renata Solarska, Iwona Rutkowska, Robin Morand, Jan Augustynski, Electrochimica Acta 51(2006) 2230-2236.
[2]. *Increasing solar absorption for Photocatalysis with black hydrogenated titanium dioxide nanocrystals.*
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