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### Photovoltaics of sol-gel processed titanium oxide coating

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Titanium oxide is applied as a photocatalyst in organic synthesis and for waste water treatment and outdoor air purification. In this work, photoelectrochemical (PEC) activity of titanium oxide coating on titanium substrate, prepared by the sol-gel procedure from the oxide sol obtained by forced hydrolysis of chloride was investigated. Electrochemical and PEC parameters at photoelectrode change intensively upon UV illumination when organic compounds (alcohols, aldehydes, acids, etc.) are present in the electrolyte ( $H_2SO_4$ ), which proves coating activity for their oxidation. Electrochemical impedance (EIS) characteristics of the coating are found to be sensitive to the photoelectrode potential and UV light. EIS characteristics are discussed on the basis of the values of parameters of equivalent electrical circuit used to fit experimental impedance data.

### Impedance characterization of LSCF/YDC couple obtained by different technologies

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This work presents conductivity studies of the cathode/electrolyte couple LSCF48/YDC15, which is a building block of a new innovative and competitive design of a high temperature fuel cell, operating in the range 600-700°C. It is based on the idea for a junction between a PCFC anode/electrolyte and a SOFC cathode/electrolyte through a mixed  $H^+$  and  $O^{2-}$  conducting porous ceramic membrane. Thus, in this concept, hydrogen, oxygen and water are located in three independent chambers, which allows for the avoidance of the gases dilution with water. The applicability of different technologies for electrodes deposition as tape casting, screen printing and plasma spraying is analyzed by electrochemical impedance spectroscopy measurements of electrolyte supported symmetrical half cells  $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\alpha}/Ce_{0.85}Y_{0.15}O_{2-\alpha}/La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\alpha}$ . The couple LSF48/YDC15 obtained by the three technologies has appropriate microstructure and high conductivity, comparable with data from the literature. The developed materials were applied in the fabrication of the first model cells of the new design.