



## Electrochemical impedance spectroscopy study of electrodeposited TiO<sub>2</sub> thin films

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Electrochemical impedance spectroscopy (EIS) provides a very useful information to determine interfacial and transport phenomena and evaluate the resistance and capacitance occurring at the semiconductor / electrolyte interface. The effect of calcination temperatures (pre-calcined, 450, 550 and 650 degree Celsius) on interfacial behavior of titanium dioxide (TiO<sub>2</sub>) thin film was investigated by EIS. The TiO<sub>2</sub> thin film on conducting glass was synthesized via electrodeposition method using titanium trichloride as a starting material. This method is one step preparation, consisting of the synthesis and deposition of TiO<sub>2</sub> thin film, which is useful for many applications in particular for photocatalysis, solar cell and water splitting applications. EIS experimental results were fitted with a Randles equivalent circuit model comprising a double layer capacitance in parallel with an impedance of a faradaic reaction and active electrolyte resistance in series. Nyquist plot show a semicircle by mean of a good contact at TiO<sub>2</sub> thin film / conducting glass interface which is important for coating materials on the substrate. Moreover, the charge transfer resistance decreases when increasing of calcination temperatures which would suggest the good conductivity of the film.

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