

Electrochemical characterization of titanium dioxide films modified with Pb(Cd) chalcogenides and graphene

P. V. Chulkin^a, S. M. Rabchynski^a, G. A. Ragoisha^a, E. A. Streltsov^a, S. Ya. Kuchmiy^b,
O. L. Stroyuk^b, O. Ye. Rayevska^b, N. S. Andryushina^b

^a*Belarusian State University, Minsk, Belarus, e-mail: streltea@bsu.by*

^b*L. V. Pysarzhevskiy Institute of Physical Chemistry, NAS of Ukraine, Kiev, Ukraine*

Mesoporous TiO₂ films and TiO₂ film nanostructures modified with lead and cadmium chalcogenides, graphene and partly reduced graphene oxide were prepared by various chemical and electrochemical techniques and characterized with cyclic voltammetry, photoelectrochemical techniques and potentiodynamic electrochemical impedance spectroscopy (PDEIS). Sensitization of TiO₂ with chalcogenides was monitored by photopolarisation measurements and cyclic voltammetry, while PDEIS provided Mott-Schottky plots derivation from impedance multifrequency *ac* response recorded in a potential scan. The Mott-Schottky analysis was used to monitor TiO₂ flat band potential and doping density. The latter has been found to be dependent on the state of reduction of partly reduced graphene oxide (increased with graphene oxide reduction to graphene).