Uniwersytet Wrocławski

Repozytorium

Plik pochodzi z repozytorium Wydziału Chemii Uniwersytetu Wrocławskiego

Lithium ion intercalation in partially crystalline TiO_2 electrodeposited on platinum from aqueous solution of titanium(IV) oxalate complexes.

Autorzy

Paweł Dziewoński

Maria Grzeszczuk

Rok wydania

2009

Czasopismo

Journal of Power Sources

Numer woluminu

190

Strony

545-552

DOI

10.1016/j.jpowsour.2009.01.041

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Starting from the aqueous solution of titanium(IV) oxalate complexes and controlling electrochemical conditions using a cyclic voltammetry (CV) method, the thin layers of TiO_2 on platinum were obtained, which after additional heat treatment, at 450 °C, were still of amorphous nature. The amorphous state of the samples, containing an admixture of crystalline anatase, was confirmed by Raman spectroscopy and by a variety of electrochemical techniques. The new electrochemical procedure allows preparing the oxide with different morphologies. By the comparison with the peroxotitanium route, the oxalate precursor method offers the possibility of the synthesis of amorphous TiO_2 at higher temperatures that is the essential key for the cycling stability of the oxide if one is used as an anode material in lithium ion batteries. The results from cycling voltammetry revealed that electrodeposited TiO_2 reversibly and fast intercalates lithium ions due to its high internal surface area. Therefore, the nanostructural morphology facilitates lithium ion intercalation which was monitored and confirmed in all electrochemical testing. The specific capacity of the TiO_2 approaches the value of 145 mAh g^{-1} at 8 C-rate in the best case. From the electrochemical impedance spectroscopy (EIS) measurements in connection with SEM investigations, it was concluded that Li^+ diffusion is the finite space process and its rate is depending on the size of the crystallites building the oxide films. Evaluated values of the *D*-coefficients are of the order of 10^{-14} cm^2 s^{-1}.

Słowa kluczowe

Titanium(IV) oxide, Li+ intercalation, Cyclic electrodeposition, Impedance analysis

Adres publiczny

https://doi.org/10.1016/j.jpowsour.2009.01.041

Strona internetowa wydawcy

http://www.elsevier.com

Plik został wygenerowany dnia 2026-11-13 00:43:45

Adres w repozytorium https://old.chem.uni.wroc.pl/pl/repozytorium/-4tUicy.