Electrodeposited PbO₂ Thin Films with Different Surface Structure as Positive Plate in Lead Acid Batteries

Xuan Zhao, Cheng Li, Yaqiong Wang and Wenlin Xu*

College of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225002, PR China.

*E-mail: wlxu@mail.yzu.edu.cn

doi: 10.20964/2018.04.52

Received: 17 December 2017 / Accepted: 5 February 2018 / Published: 6 March 2018

PbO₂ thin film is essential for applications in lead acid batteries system. In this work, PbO₂ thin films with different surface microstructure were fabricated through electrodeposition technique by controlling the deposition current density. Though PbO₂ thin films with porous structure are achieved at a high electrodeposition current density, the softening and leaching of the active materials on the electrode leads to a bad cycling charge-discharge ability. PbO₂ thin film fabricated at a low current density (PbO₂-20) has a compact and dense surface, and an activation process is needed to reach its maximum discharge ability with an improved cycling charge-discharge ability. Meanwhile, a porous structure is formed due to the active material expansion-contraction process, and then the discharge capacity is gradually reduced as observed in PbO₂ thin films obtained at high current density. Specifically, when PbO₂-20 film is assembled in a laboratory battery, the cycle charge-discharge life is 553 times at 1C with 30% depth of discharge much higher than that of PbO₂ thin film electrodeposited at a high current density.

Keywords: PbO₂ thin film; electrodeposition; lead acid battery; discharge capacity

[FULL TEXT](#)

© 2018 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).