Electrochemical Performance of $\text{Li}_2\text{FeSiO}_4$ as Anode Material for Lithium-ion Batteries

Er-Qian Liang^{1,3}, Li-Jun Song^{1,3}, Shuang-Shuang Liu^{1,3}, Yuan Guo^{2,3}, Bao-Jun Yu^{2,3},
Cheng-Yang Wang^{2,3}, Ming-Wei Li^{1,3,*}

¹ Department of Chemistry, Tianjin University, Tianjin 300072, China

² Key Laboratory for Green Chemical Technology of Ministry of Education, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

³ Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Tianjin University, Tianjin 300072, China

*E-mail: mingweili@tju.edu.cn

doi: 10.20964/2017.06.08

Received: 1 March 2017 / Accepted: 29 March 2017 / Published: 12 May 2017

The conventional cathode material $\text{Li}_2\text{FeSiO}_4$ (lithium iron orthosilicate) crystallites are synthesized by a solid state reaction, and used as the anode material for lithium-ion batteries. During the initial discharge, $\text{Li}_2\text{FeSiO}_4$ irreversibly decomposes and transforms. Although the resulted anodes hardly contain $\text{Li}_2\text{FeSiO}_4$ crystal phase, they show nice capacities and well cycling stability. At a current density of 50 mA g^{-1} , the anode exhibits an initial discharge/charge of $799/569 \text{ mAh g}^{-1}$, and keeps a discharge/charge capacity of $550/542 \text{ mAh g}^{-1}$ after 60 cycles with 95.3% charge capacity retention. At a current of 1000 mA g^{-1} , the anode shows a charge capacity of 191 mAh g^{-1} with 99.5% coulombic efficiency during the 300th cycle. The anode material after 300 cycles presents many microcrystal structures. It is proposed that the $\text{Li}_2\text{FeSiO}_4$ anodes transfer energy via a reversible conversion reaction.

Keywords: Lithium iron orthosilicate; anode material; lithium-ion battery; cycling stability

[FULL TEXT](#)

© 2017 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/>).