Int. J. Electrochem. Sci., 17 **(2022)** Article Number: 22057, doi: 10.20964/2022.05.11

International Journal of
ELECTROCHEMICAL
SCIENCE
www.electrochemsci.org

3D Hollow ZnO Spheres Embedded withTiO_2 Nanoparticles as Anodes for High-Performance of Lithium-ion Batteries

Xiaona Zhao[1], *Ziying Zhang*[1,*], *Huizhen Zhang*[2], *Xingran Xu*[1], *Xuanxuan Fan*[1], *Sijia Wang*[1]

[1] School of Materials Engineering, Shanghai University of Engineering Science, Shanghai 201620, China
[2] School of Management, University of Shanghai for Science and Technology, Shanghai 200093, China
[*]E-mail: zzying@sues.edu.cn

Received: 1 December 2021 / *Accepted:* 6 January 2022 / *Published:* 5 April 2022

Despite ZnO was considered as an ideal anode material for lithium-ion batteries owing to its high theoretical capacity, the defects of its conductivity and volume expansion hinder its further development in the field of energy storage. Under the guidance of the synergistic effect of the two materials, 3D hollow ZnO/TiO_2 composite spheres were fabricated by solvothermal method and low temperature hydrolysis. The unique hollow porous structure highlighted a large specific surface area and promoted the transport of lithium ions. TiO_2 nanoparticles closely embedded in the voids of porous hollow ZnO spheres, which effectively improved the structural stability of the final products during charge and discharge. The 3D hollow ZnO/TiO_2 composite sphere electrodes exhibited a good cycling stability. Their discharge capacity stabilized at 709 mA hg^{-1} at current density of 500 mA g^{-1} after 500 cycles. Even at the high current density of 1000 mA g^{-1}, their discharge capability remained at 540 mA h g^{-1}, showing a good application prospect.

Keywords: hollow composite spheres, ZnO, TiO_2, lithium-ion batteries, anodes

FULL TEXT