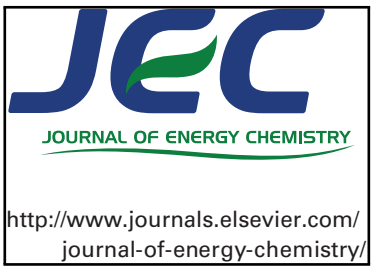

Metal–organic framework derived hierarchical porous TiO_2 nanopills as a super stable anode for Na-ion batteries

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Metal–organic framework derived hierarchical porous TiO_2 nanopills as a super stable anode for Na-ion batteries

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Abstract

Hierarchical porous TiO_2 nanopills were synthesized using a titanium metal-organic framework MIL-125(Ti) as precursor. The as-synthesized TiO_2 nanopills owned a large specific surface area of 102 m^2/g and unique porous structure. Furthermore, the obtained TiO_2 nanopills were applied as anode materials for Na-ion batteries for the first time. The as-synthesized TiO_2 nanopills achieved a high discharge capacity of 196.4 mAh/g at a current density of 0.1 A/g. A discharge capacity of 115.9 mAh/g was obtained at a high current density of 0.5 A/g and the capacity retention was remained as high as 90% even after 3000 cycles. The excellent electrochemical performance can be attributed to its unique hierarchical porous feature.

Key words: Hierarchical porous structure; TiO_2 nanopills; Metal–organic framework; Na-ion batteries

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1. Introduction

In recent years, Na-ion battery is considered to be a type of highly promising energy storage device, due to the abundance of sodium, the low cost of the production methods, and higher system safety [1–4].