Preparation and electrochemical properties of flexible Ni-BTA@CNTs composite films

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Introduction

With the development of energy storage devices, the demand for flexible energy storage devices is increasing. In this study, flexible carbon nanotubes (CNTs) film is used as the substrate, flexible Ni-BTA@CNTs composite film is fabricated by a hydrothermal method and investigated as a cathode material for Zinc ion battery. Ni-BTA is formed by active organic ligands and metal ions through coordinate bonds. Its porous structure and high electrical conductivity are beneficial to the rapid transport of Zinc ions. In addition, CNTs film provides flexibility and long-range conductivity. Based on this, flexible Ni-BTA@CNTs composite film possesses a high specific capacity (203.8 mAh g^{-1} at 0.1 A g^{-1}) and long cycle durability (after 600 cycles with a capacity retention of 78 %), and indicates the application potential in flexible Zinc ion storage devices.

Results & Discussion

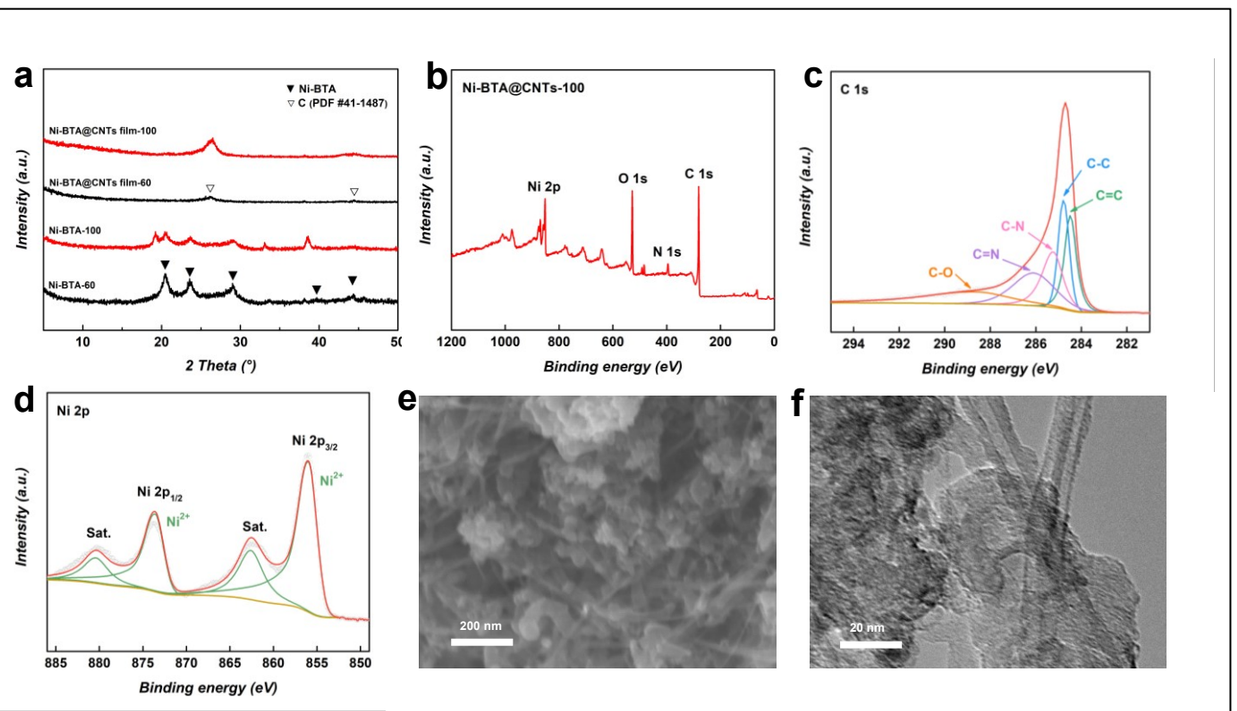

Fig. 1 Structure and morphology of Ni-BTA@CNTs composite film.

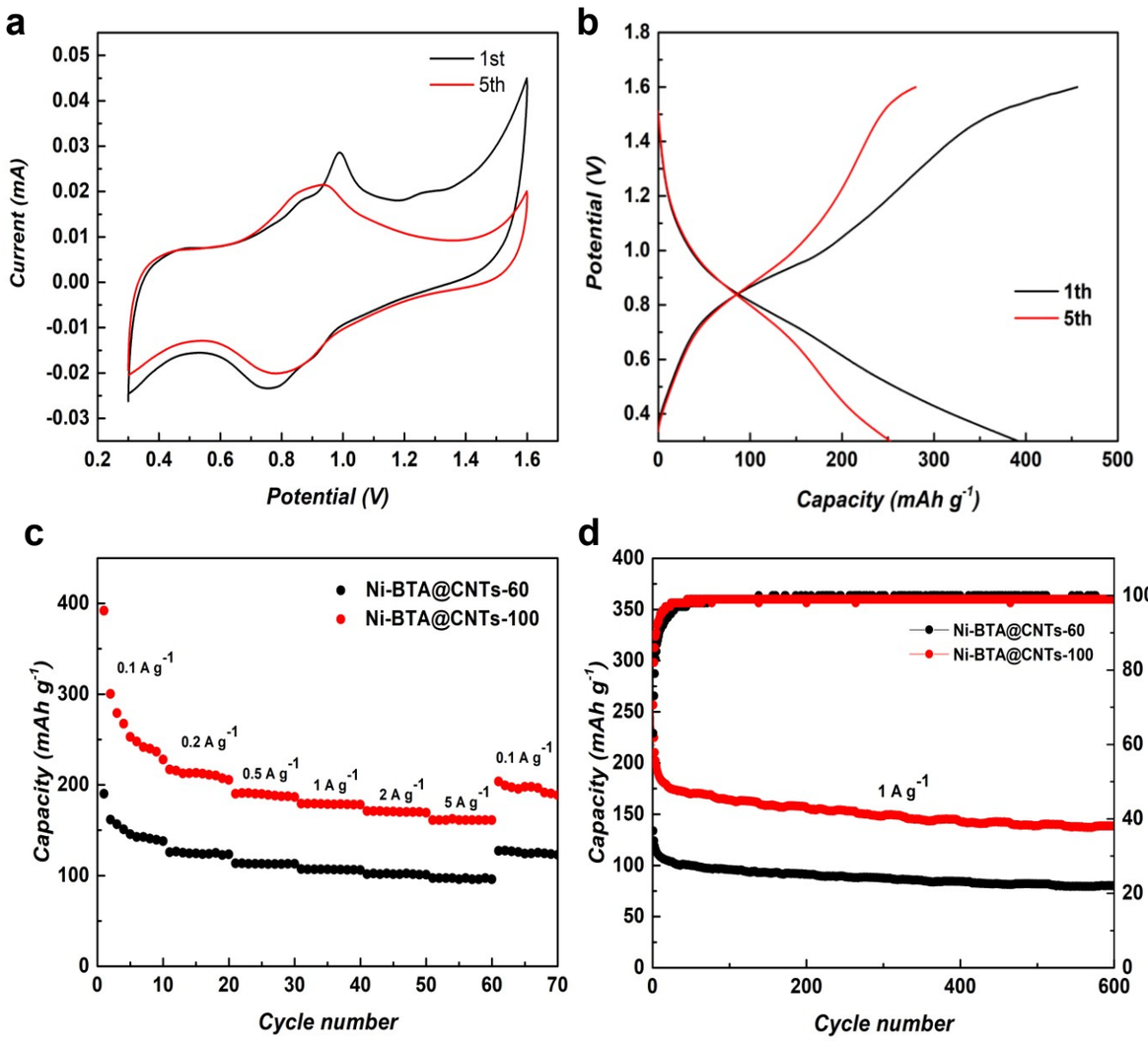

Fig. 2 Electrochemical performance of Ni-BTA@CNTs composite film.

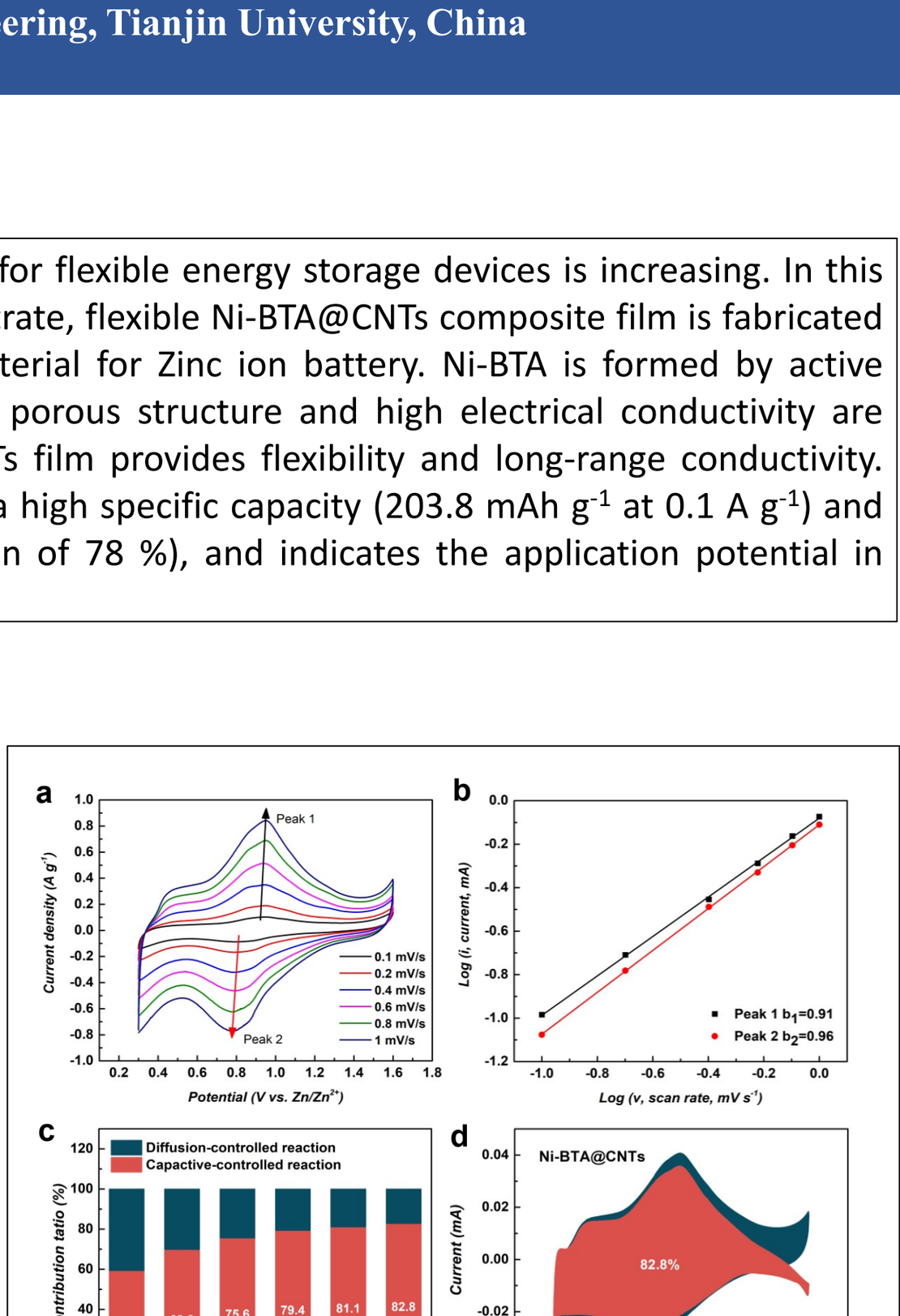

Fig. 3 Electrochemical mechanism of Ni-BTA@CNTs composite film.

Conclusions

- The Ni-BTA@CNTs composite film was successfully prepared by hydrothermal method, and exhibit good flexibility.
- The electrochemical performance of Ni-BTA@CNTs composite film increases with the increase of reaction temperature. The Ni-BTA@CNTs composite film possesses a specific capacity of 203.8 mAh g^{-1} at 0.1 A g^{-1} with a reaction temperature of 100 ℃.

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