Tohoku Univ. Technology

Nanoporous ceramic composite metal

High specific capacitance, high energy density, and excellent cycling stability

Overview

Nanoporous metals are known to have excellent electrical properties. Manganese dioxide MnO_2 is promising as an electrode material because of its high capacitance, environmental friendliness, and low cost. Lithium-ion batteries (LIB) have remarkably high power density per unit volume. In order to achieve higher capacity, active and inert composite alloy materials are being considered as electrodes for negative electrodes instead of carbon-based compounds. However, MnO_2 is difficult to apply to high-power applications because of its poor electronic conductivity and limited charge/discharge rate. Therefore, the development of MnO_2 with enhanced conductivity has become an important issue.

The present invention makes it possible to provide novel nanoporous metal/ceramic composite materials by combining chemical dealloying and non-electrical plating processes. An example of the present invention is a nanoporous Au/MnO_2 electrode. The present invention not only has activity as a double-layer capacitor, but also functions as a good conductor and enhances the pseudo capacitor performance of MnO_2. Therefore, it has the potential to be an electrode material for LIB with excellent electrical properties and, as an example, ultra-long life.

Product Application

- Dielectric, Electrode for SC, Lithium ion battery, Electrode for LIB
- Energy storage device, Backup power supply, and Power storage device

IP Data

IP No.	:	JP6019533
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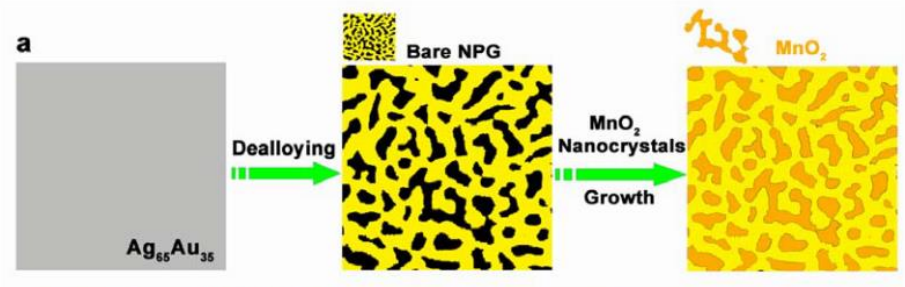
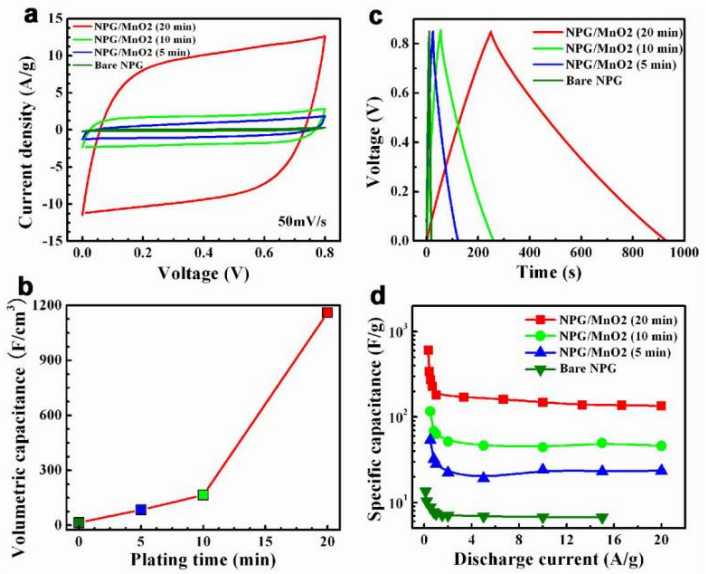
Admin No.	:	T10-061



Battery Performance of NPG (Nanoporous Gold)/MnO_2 Composites



Related Works

[1] Nanoporous metal/oxide hybrid electrodes for electrochemical supercapacitors,Nature Nanotechnology volume 6, pages232–236 (2011)

[2] A nanoporous metal recuperated MnO2 anode for lithium ion batteries, Nanoscale Issue 37(2015)

Contact

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