ADVERTISEMENT

RETURN TO ISSUE

ENERGY, ENVIRONMENTA... < PREV NEXT >

Get e-Alerts

Off-Planar, Two-Dimensional Polymer Cathode for High-Rate, **Durable Rechargeable Magnesium Batteries**

Debashis Tripathy, Viswanatha H. M, Harish Makri Nimbegondi Kotresh, P. Vinoth Babu, and Srinivasan Sampath*

Cite this: ACS Appl. Mater. Interfaces 2022, 14, 23, 26671–26681

Publication Date: May 31, 2022 >

https://doi.org/10.1021/acsami.2c03389 Copyright © 2022 American Chemical Society

Request reuse permissions

Article Views Altmetric Citations 5 1475

LEARN ABOUT THESE METRICS

Add to Export









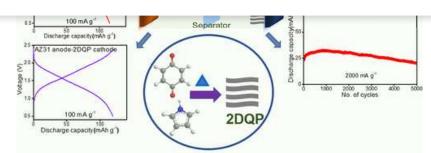
Access Through Your Institution

Other access options

SI Supporting Info (1) »

SUBJECTS: Batteries, Electrical properties, Electrodes, Magnesium, Polymers

Abstract



Rechargeable magnesium batteries are of considerable interest due to their high theoretical capacity, and they are projected as good alternates for stationary energy storage and electric vehicles. Sluggish $\rm Mg^{2+}$ kinetics and scarce availability of suitable cathode materials are major issues hindering the progress of rechargeable magnesium batteries. Herein, a conjugated, off-planar, two-dimensional (2D) polymer is explored for reversible magnesium storage. The polymer cathode reveals high capacity and high cycling stability with high rate capability. Replacing the Mg metal anode with the Mg alloy, AZ31 further enhances the ion storage performance. At a high current density of 2 A g⁻¹, stable capacity is shown for almost 5000 cycles with 99% Coulombic efficiency. A composite of carbon nanotube with the polymer delivers capacity values higher (>1.5 times) than that of a pristine polymer at a current density of 2 A g⁻¹ and shows cycling up to 5 A g⁻¹. Electrokinetic studies reveal a contribution of pseudocapacitive nature, and the mechanism is investigated by ex situ X-ray photoelectron spectroscopy and infrared spectroscopy. The use of 2D polymer electrodes opens up opportunities for developing high-rate, high-capacity, and stable rechargeable magnesium ion batteries.

KEYWORDS: magnesium storage, conjugated polymer, magnesium alloy, anode interface, carbon composite

Read this Article

To access this article, please review the available access options below.

This website uses cookies to improve your user experience. By continuing to use the site, you are accepting our use of cookies. Read the ACS privacy policy.