Title:
A review on advancement and future perspective of 3D hierarchical porous aerogels based on electrospun polymer nanofibers for electrochemical energy storage application.

Journal:
Journal of Environmental Chemical Engineering, Volume 9, Issue 4, August 2021.

Document Type:
Article

Authors:
Awang, N.,
Nasir, A.M.,
Yajid, M.A.M.,
Jaafar, J.

Full text link:
Publisher : https://www.sciencedirect.com/science/article/abs/pii/S2213343721004140

Scopus preview:
https://www.scopus.com/record/display.uri?eid=2-s2.0-85105093190&doi=10.1016%2fj.jece.2021.105437&origin=inward&txGid=5d6dcf15d0b45ae2e7fea5049fbcb6c7

Abstract:
Nanotechnology provides innovative approaches and prospects for maintaining renewable resources and future ecosystems. Nanofibrous morphological materials are desirable in solving various energy and environmental problems. Electrospinning can effectively generate nanofibers, which is a simple and inexpensive technique. Three-dimensional (3D), highly compressible and robust aerogels derived from 1D electrospun polymer nanofibers will have wide technical implications for areas ranging from bioengineering, electrical devices and energy storage; however, aerogels derived from these electrospun polymer nanofibers have proved too challenging to develop. In this review, new strategies for the development of 3D structured aerogels with a hierarchical cellular structure and super elasticity for fibrous, isotropically bonded elastic reconstructed 1D electrospun polymer nanofibers were reported by combining electrospun nanofibers and various fibrous freeze-shaping techniques. The contents of this review article are arranged in the following way. The first section will present aerogel manufacturing technology with a focus on how the electrospinning technology can be used to make a significant impact as aerogel reinforcement. The analysis of nanocellulose-derived aerogels and chitins will then be addressed with a focus on nanofiber network aerogels and potential properties in energy storage. The applications of the electrospun nanofibers and electrospun carbon nanofibers aerogels will be defined after that. There will be examples of energy converters, secondary battery electrodes, and supercapacitors made of lightweight carbon nanofiber aerogels. Finally, it will raise opportunities for potential research.