

Synthesis and Characterization of Pineapple Leaf Cellulose Nanofibers as an Anode Material for Lithium Batteries

Ilman Daris Maulidin, Zahra Zhafira Arsyah, Hilda Aprillia Sari, Amandeus Calvin. Supervised by
Mohamad Alief Ramdan

Vocational School IPB University

Corresponding author's email: aailman27@gmail.com

The utilization of biomass as a functional material for lithium-ion batteries is an important strategy to support sustainable energy development. Pineapple leaf waste, which is rich in cellulose, has the potential to be developed into nanocellulose fibers as a supporting material for anodes. This study aims to synthesize nanocellulose fibers through 45% sulfuric acid hydrolysis with variations in the cellulose-to-acid ratio (1:5; 1:10; 1:15; and 1:20), and to evaluate their effects on material characteristics and the performance of silicon-based electrodes. Characterization was conducted using FTIR, SEM, and XRD, while electrochemical testing included Cyclic Voltammetry (CV), Galvanostatic Charge–Discharge (GCD), and Electrochemical Impedance Spectroscopy (EIS). This research is expected to provide insights into the role of nanocellulose fibers in improving the stability and performance of silicon anodes and to support the valorization of biomass waste as a value-added material.

Keywords: *Acid hydrolysis; lithium-ion battery; nanocellulose fiber; pineapple leaves; silicon anode.*