UNIVERSITI TEKNOLOGI MARA

5th I-CReST 2025

INTERNATIONAL CONFERENCE ON RESEARCH AND PRACTICES IN SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES

SYNERGY FOR FUTURE SUSTAINABILITY:
BRIDGING SCIENCE, TECHNOLOGY AND HUMANITIES

Abstract Book

UNIVERSITI TEKNOLOGI MARA
CAWANGAN SELANGOR, KAMPUS DENGKIL
MALAYSIA

13th SEPTEMBER 2025

ORGANISED BY: Centre of Foundation Studies

STRATEGIC PARTNER: UiTM Global

IN COLLABORATION WITH: UTM

I-CReST 2025: 047-023 – Optimization of Sodium Iodide Content in Cornstarch -Based Biopolymer Electrolytes for Enhanced Ionic Conductivity

*[1]F. H. Muhammad, [2]M. N. Azlan, [3]R. Zakaria

[1]*Center of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia.*

[2]*Physics Department, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia.*

[3]*Faculty of Applied Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia.*

*E-mail: fadiatul@uitm.edu.my

ABSTRACT

This study investigates the effect of sodium iodide (NaI) concentration on the ionic conductivity and structural properties of cornstarch-based solid polymer electrolytes (SPEs) synthesized via the solution casting method. A series of films containing 0–20 wt% NaI were prepared and characterized using electrochemical impedance spectroscopy (EIS) and Fourier transform infrared spectroscopy (FTIR). The results revealed that ionic conductivity increased with NaI content up to 15 wt%, reaching a maximum of 9.43×10^{-9} S/cm, due to enhanced ion dissociation and interactions between Na^+ ions and hydroxyl groups in the starch matrix. FTIR analysis confirmed the complexation through peak shifts and intensity changes in the O–H and C–O–C functional groups. However, further salt addition beyond 15 wt% resulted in conductivity decline, attributed to ion aggregation and reduced polymer chain mobility. This work demonstrates the importance of salt optimization to achieve a balance between ionic conductivity and structural stability in bio-based electrolytes, contributing to the development of sustainable materials for electrochemical energy storage applications.

Keywords: Cornstarch biopolymer; Sodium iodide (NaI); Solid polymer electrolyte; Ionic conductivity; FTIR analysis