XXIV International Symposium "Advances in the Chemistry of Heteroorganic Compounds"

Organized by:

Centre of Molecular and Macromolecular Studies
Polish Academy of Sciences

Section of Heteroorganic Chemistry
of the Polish Chemical Society

Jan Dlugosz University in Czestochowa

Łódź, November 24, 2023

Wydawnictwo Naukowe Uniwersytetu Humanistyczno-Przyrodniczego im. Jana Długosza w Częstochowie.

ISBN: 978-83-66536-91-3

The Symposium Materials were edited by:

Tomasz Cierpiał

Józef Drabowicz

achhc.cbmm.lodz.pl

P-038

Synthesis of Conducting Polymers for High Energy Efficiency

Mohammad Ali Haghighat Bayan[1], Filippo Pierini[1]

[1]*Institute of Fundamental Technological Research, Polish Academy of Sciences,*
Adolfa Pawińskiego 5B, 02-106 Warsaw, Poland
e-mail: mbayan@ippt.pan.pl

Polyaniline and polythiophene are prominent conductive polymers with remarkable properties that make them ideal candidates for various energy applications.[1] This study focuses on synthesizing polyaniline and polythiophene and explores their potential for excellent energy-related uses, including energy storage and conversion. These materials are synthesized via various methods, such as chemical oxidative polymerization, electrochemical deposition, and solution-based techniques, particularly optimizing their electrical conductivity, morphological characteristics, and environmental sustainability.[2]

These polymers' electrical conductivity and charge storage capacity are critical factors in their effectiveness for energy storage applications, including supercapacitors and solar cells. Furthermore, their compatibility with various substrates and the ability to be incorporated into flexible and lightweight devices make them promising candidates for next-generation energy storage solutions.

In addition, the versatility of polyaniline and polythiophene extends to energy conversion applications, including photovoltaic devices and energy harvesting technologies. Their unique optical and electrochemical properties can be harnessed to enhance the efficiency of solar cells and create novel approaches for converting environmental energy sources into electricity.

This study examines the recent advances in synthesizing polyaniline and polythiophene, their structural modifications, and their integration into practical energy applications. By exploring the synthesis and characterization of these conductive polymers, this research contributes to the growing knowledge surrounding innovative materials for sustainable energy solutions, offering promising avenues for developing efficient, eco-friendly, and high-performance energy devices.

References

[1] Peringath, Anjana Ramesh, et al. "Chemical synthesis of polyaniline and polythiophene electrodes with excellent performance in supercapacitors." Journal of Energy Storage 73 (**2023**): 108811.

[2] Haghighat Bayan, Mohammad Ali, et al. "Enhanced efficiency in hollow core electrospun nanofiber-based organic solar cells." Scientific Reports 11.1 (**2021**): 21144.