ABSTRACT BOOK

INTERNATIONAL KHAZAR SCIENTIFIC RESEARCHES CONFERENCE - III

JANUARY 7-9, 2022

BAKU, AZERBAIJAN, KHAZAR UNIVERSITY

EDITORS

PROF. DR. HACER HUSEYNOVA

ALINA AMANZHOLOVA

ISBN: 978-625-8423-85-3

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January 7-9, 2022
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Alina Amanzholova

Issued: 15.01.2022

ISBN: 978-625-8423-85-3

NEW ANTIBACTERIAL BIOCOMPOSITE FILMS AND EVALUATION OF THEIR PROPERTIES

Ulku SOYDAL

Selcuk University, Konya/Turkey

ORCID ID: 0000-0001-8894-3940

Fadim SOYLEMEZ GUNBATTI

Selcuk University, Konya/Turkey

ORCID ID: 0000-0002-0435-8187

Gulnare AHMETLI

Konya Technical University, Konya/Turkey

ORCID ID: 0000-0002-9381-4139

ABSTRACT

The rapid consumption of synthetic polymers and their products, as well as the widespread use of plastic waste, has become one of the major environmental problems. The use of bio-based polymers is increasing to reduce the use of petroleum-based plastics due to their negative effects on the environment. However, the use of biodegradable polymers is limited for reasons such as performance (such as brittleness, poor barrier properties), processing (such as low thermal withstand temperatures), and cost. The application of nanotechnology to polymers provides new advantages in both improving the properties of these materials and reducing their costs. In addition, technological developments have increased the quality standards of people and, in parallel, increased expectations about cleaning. Therefore, in recent years, the interest in the production and application of environmentally friendly and natural plant-based antibacterial materials has been increasing day by day. Research on the use of supplements such as nanoclay, different polymer combinations, antioxidant/antibacterial additives to improve or change the properties of biobased composite films has become more widespread. In this study, to produce fully renewable and biodegradable composite films; Bio-based acrylated epoxidized soybean oil (AESO) and two different reinforcement materials were used as polymeric matrix. First of all, the antibacterial properties of the films formed by adding thyme oil, a strong essential oil with proven antibacterial properties, to the matrix at different rates (0%, 1%, 2%, 3%, 4%, 5% by weight) were examined and the most appropriate ratio was determined. By keeping this ratio constant, nanocomposite films were prepared by adding different ratios of nanoclay (1%, 2%, 3%, 4%, 5% by weight) in the second stage of the study. The antibacterial activity tests of the obtained materials were carried out, and the effect of the reinforcement ratio on the pH, swelling-solubility-water content and thermal properties were investigated. In addition, the prepared films were characterized with FT-IR spectra to determine possible interactions of functional groups.

Keywords: Thyme oil, antibacterial activity, nanoclay, biobased film composite