Investigation of Morphology and Antibacterial Properties of Nylon 6, 6/PANI/ZnO Nanocomposite

Behnam Mahdavi[1], Maryam Farbodi*[,2]

[1] *Department of Chemistry, Ahar Branch, Islamic Azad University, Ahar, Iran,*

[2]*Department of Chemistry, Tabriz Branch, Islamic Azad University, Tabriz, Iran,*

* *Email Address:* m.farbodi@iaut.ac.ir

Abstract

In this paper, the Nylon 6,6/Polyaniline/Zinc oxide nanocomposite with different weight loadgings of each component were prepared. Antibacterial properties of the prepared nanocomposites were investigated against gram-positive Staphylococcus and gram-negative Escherichia coli (E. coli) bacteria using Resazurin indicator and optical density measurements. The results showed that the addition of equal quantities of Polyainine and ZnO nanoparticles with 5% wt. of each component to Nylon 6,6 produce the best antibacterial effect. The antibacterial effect of nanocomposite is higher on gram-negative bacteria in compared to gram-positive one. Investigation of the morphologies of optimum nanocomposite by FESEM showed its proper morphology, sufficient porosity, and high surface area for contact with bacteria. Elucidation of functional groups in optimum specimen by FT-IR revealed the existence of them in nanocomposite representing the successful formation of nanocomposite.

Keywords: *polyaniline, ZnO, nylon 6,6, antibacterial*

1. Introduction

As a challenge in food industry, microbial contamination reduces the shelf-life of foods and increases the risk of foodborne illness. Traditional methods in preserving foods include thermal processing, drying, freezing, refrigeration, addition of chemicals, modified atmosphere-packaging, and irradiation have some disadvantages such as deforming of food products, uneconomic, and limited preservation time [1]. A relatively novel approach to food preservation is antimicrobial food packaging [2]. Antimicrobial packages have been studied in the last thirty years and active packages with incorporated antioxidants [3] and UV-light absorbers [4] are available. Examples of antimicrobial materials evaluated for food packages include imazalil-impregnated low-density polyethylene to control mold growth on cheese [4] and bell peppers [5], and benomyl coupled to Surlyn to inhibit molds [6]. Cohen et al. [7] demonstrated that UV-irradiated nylon exhibits antimicrobial activity,