

## ABSTRACT

**Salsabila Azzahra Taufik. 24020221140088. The Effect of Adding *Zinc Oxide* as an Antimicrobial Agent in the Development of Kitosan-Pullulan-Based Biopolymer Food Packaging. Supervised by Sri Pujiyanto and Lanjar.**

Exposure to microorganisms in food is an important issue because it can cause food to be unhygienic and unfit for consumption. Eco-friendly food packaging innovations such as biopolymers are potential solutions, one of which is through the use of chitosan and pullulan. Both materials have good film-forming and biodegradability properties, but their antimicrobial activity still needs to be improved. The addition of Zinc Oxide (ZnO), which has been FDA-approved as a broad-spectrum antimicrobial agent, was done to improve the effectiveness of the film. This study aims to assess the effect of ZnO addition on the antimicrobial and mechanical properties of chitosan-pullulan-based biopolymer films. Formulations were made with varying concentrations of ZnO (1%, 2%, 3%) and chitosan (1.5% and 2%). The tests conducted included antimicrobial activity tests against *Staphylococcus aureus* and *Escherichia coli*, as well as physical properties, FTIR, SEM, and tensile strength tests. The results showed that the addition of ZnO increased the antimicrobial activity against *S. aureus*, especially in the combination of 3% ZnO and 2% chitosan (KZ6) with an inhibition zone of 18.25 mm. However, no inhibitory activity against *E. coli* was found. FTIR tests indicated interactions between ZnO and polymer functional groups, and SEM tests showed the distribution of ZnO which affected the homogeneity of the film surface. The addition of ZnO also increased the mechanical strength of the film up to a tensile stress of 0.53 MPa. In conclusion, the addition of ZnO is effective in increasing antimicrobial activity against Gram-positive bacteria and improving the mechanical properties of the film, although it is not yet effective against Gram-negative bacteria.

**Keywords:** *Antimicrobial, Biopolymer, Kitosan, Pullulan, Zinc Oxide.*