DEVELOPMENT OF ANTIMICROBIAL PICKLE SKIN THROUGH APPLICATION OF NANOPARTICLES PREPARED USING ALGAE PLANTS WITH VARIOUS METHODS

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ABSTRACT

The objective of this study was to determine the characteristics of pickled goat leather that has been modified using silver nanoparticles preparated from green algae (*Ulva lactuca)*, which is done by 3 methods including: extraction, microwave, and ultrasound. The characteristics tested on the pickled goat leather was including hydrophobicity, mechanical, antimicrobial, and biodegradation properties.

The research was started by synthesized silver nanoparticles using green algae (*Ulva lactuca*) extract. The following variations of the samples in this study are unmodified leather (K0), microwaved leather (KnpM), ultrasounded leather (KnpU), and extracted leather (KnpE). The silver nanoparticles colloids are characterized using UV-Vis sphectophotometer and Particles Size Analyzer (PSA). Characterized of pickled goat leather include hydrophobicity properties was tested using contact angle test, mechanical properties was tested using tensile strength test, antimicrobial activity against *E. coli*, *S. epidermidis*, and *C. Albicans* were tested using the diffusion method, biodegradable properties was tested using simulated methods with a mixed culture of active sludge. Statistical test are conducted with ANOVA and DMRT.

The success of silver nanoparticles synthesis was indicated by maximum absorption peak and diameter size of siler nanoparticles. Extraction (449.5 nm; 98.7 nm), microwave (426 nm; 68.8 nm), and ultrasound (448.5 nm; 94.3 nm). Contact angle test showed KnpM (63.6), KnpU (74.47), and KnpE (60.21) are hydrophilic. Tensile strength test showed KnpE is hard and tough with tensile strength was 93.9 MPa and elongation was 66,14 %. Antimicrobial test showed significant different in antimicrobial activity between KnpM compared to the K0 against *E. coli*, also in all modified leather against *S. epidermidis*, meanwhile there was no significant differences between all modified leather compared to the K0 against *C. albicans*. Those antimicrobial test also showed, different antimicrobial activitiy against *E. coli* and *S. epidermidis.* Biodgradation test showed significant differences between KnpM, KnpE, and KnpU compared to K0. KnpE and KnpU have low biodegradability compared to the K0, while the KnpM has low biodegradability on day 5, but it became higher on day 10 and 15 compared to the K0.

Kata Kunci: *silver nanoparticles, pickled goat leather, microwave, ultrasound, extraction, hydrophobicity, mechanical properties, antimicrobial activity, biodegradation*