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Application of Silver Nanoparticles Synthesized by Using *Ipomoea batatas L.* Waste to Improve Antibacterial Properties and Hydrophobicity of Polyester Cloths

Eli Rohaeti* [a] and Anna Rakhmawati [b]

[a] Department of Chemistry Education, FMIPA, Yogyakarta State of University, Karangmalang Yogyakarta 55281, Indonesia.

[b] Department of Biology Education, FMIPA, Yogyakarta State of University, Karangmalang Yogyakarta 55281, Indonesia.

* Author for correspondence; e-mail: eli_rohaeti@uny.ac.id

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ABSTRACT

Synthesis of colloidal silver nanoparticle by using peel extracts of *Ipomoea batatas L.*, its deposition on polyester cloths, and the modification with hexadecyltrimethoxysilane (HDTMS) have been conducted in this work. The silver nanoparticles were characterized by using Uv-Vis spectrophotometer, functional groups of unmodified polyester and those of modified polyester were characterized by ATR-FTIR spectrophotometer, surface images of polyester were observed by Scanning Electron Microscopy tool, antibacterial activity of unmodified polyester cloth and modified polyester against *Staphylococcus aureus* and *Escherichia coli* were determined with a diffusion method, and hydrophobicity of polyester was measured by using sessile drop method. Silver nanoparticles were successfully produced using peel extracts of *Ipomoea batatas L.* as indicated by the absorption peaks at 436 nm. SEM images confirm that the silver nanoparticles coat onto polyester cloths. Modification with nanoparticle and HDTMS do not affect the functional groups of polyester. The polyester fabric with the addition of HDTMS compound and silver nanoparticles showed the largest contact angle and the antibacterial activity to inhibit *Staphylococcus aureus*. Samples of polyester, HDTMS - silver nanoparticle show the highest antibacterial activity against *S. aureus* with a strength 1.4 times greater than unmodified polyester. There is a difference in the antibacterial activity of the polyester among the unmodified polyester and the modified polyester fabric at different incubation times inhibiting the growth of *Escherichia coli* and *Staphylococcus aureus*. Each sample of the unmodified polyester and the modified polyester fabric shows the same ability to inhibit the growth of *Staphylococcus aureus* and *Escherichia coli*.

Keywords: Antibacterial Activity, Hydrophobicity, *Ipomoea batatas L.*, Polyester, Silver Nanoparticles

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