Modifikasi Self Cleaning Textile sebagai Bahan Antibakteri dan Antikotor melalui Penambahan Nanopartikel Perak secara Green Chemistry

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ABSTRACT

The objective of this research was to develop hydrophobic and antibacterial textile material by reaction with silane compound and by coating with silver nanoparticles prepared by green chemistry using plant extract in the form of mangosteen skin extract, purple yam skin extract, and ketapang plant extract. The research target was the success of applying silver nanoparticles prepared by green chemistry on textile materials on the market include cotton, nylon, polyester, and spandex which have been hydrofobized by silane compound. The development of superhydrophobic and antibacterial textile material was carried out for 2 years of project. Year I has been synthesized to produce silver nanoparticles by reduction of chemical oxidation using reducing agent and stabilizer, development of surface-modified textile material so that it is hydrophobic. Characterization of colloidal silver nanoparticles using UV / Visible Absorption Spectrophotometry. Year II was done preparation of silver nanoparticles using plant extract and application of silver nanoparticles on finished textile materials that already exist in the market so that the resulting polymer can be applied as antibacterial material. Further modification of the material to produce superhydrophobic surface properties. Characterization of textile materials includes the determination of functional groups using Infra Red techniques, surface observation using Scanning Electron Microscopy, as well as antibacterial activity test and water contact point test from nanoparticle coated textile material and surface dihydrophobic. Antibacterial activity of textile materials coated in silver nanoparticles was carried out against gram-negative bacteria (*Escherichia coli*) and gram-positive bacteria (*Staphylococcus aureus*). The results showed that purple yam skin extract, mangosteen skin extract, and Ketapang plant extracts could serve as reducing agents converting silver nitrate solution into silver nanoparticles. The success of silver nanoparticles is represented by the presence of new absorption peaks on the UV-Vis spectrum respectively at wavelengths 434, 436, and 448.50 nm for the reduction of mangosteen skin extract, purple yam skin extract and Ketapang plant extract. The results of the analysis with ATR-FTIR showed that cotton, polyester, and nylon fabrics without and with modification showed the same functional group. Thus modification with silver nanoparticles and silane compounds does not affect the functional groups of textile materials. The success of silver nanoparticle deposits on textile materials is demonstrated by SEM photographs. Modifications with silver nanoparticles can improve the antibacterial properties of textiles in inhibiting the growth of *S.aureus* and *E.coli* bacteria. Nylon-nanosilver-HDTMS showed the highest antibacterial activity in inhibiting the growth of *S.aureus* and *E.coli* bacteria. Polyester-HDTMS-nanoAg has the highest antibacterial activity against *S.aureus* and polyester-HDTMS bacteria has the highest antibacterial activity against *E.coli*. Cotton-HDTMS-Ag has the highest antibacterial activity against *S.aureus* while cotton-HDTMS exhibits the highest antibacterial activity against *E.coli*. The addition of silane compound can increase the contact angle of textile material. The textile material with the addition of the silane compound has the highest contact angle. HDTMS compounds produce textile materials with surfaces more hydrophobic.

Kata Kunci: *antibacterial, biosynthesis, silver nanoparticles, self cleaning textile, superhydrofob.*