SURFACE MODIFICATION OF COTTON FABRICS USING $ZN(CH_3COO)_2$, TDI AND PVS-BASED HYDROPHOBIC AGENTS

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Abstract : *This in the article hydrophobic substance with processing given cotton fibrous textile of materials surface properties , hydrophobicity level , mechanical and thermal stability analysis Synthesis made coatings water push , to cleanliness endurance and surface energy such as parameters through Hydrophobization for Zn ($CH_3COO)_2$, TDI and PVS based polymer used .*

Key words *: hydrophobicity , cotton fabric , Zn ($CH_3COO)_2$, TDI, PVS, contact angle , surface energy , lotus effect .*

1. Introduction

Textile in the industry cotton fibers wide widespread are , they are his/her own ecological safety , softness , air conductivity and hygienic features with separated However , naturally cotton fibers hydrophilic to the feature has water easy absorbs , this and their many functional in areas such as sports clothes , medicine fabrics or protection coatings — use limits . This because of cotton fabrics hydrophobicization , i.e. water pusher property has to do , modern textile in science important direction Hydrophobic processing to give through to fabrics to the water resistance to pollution resistance , fast build and himself purification (lotus) effect) like advantages This is given . and of fabrics functional and aesthetic value increases Lotus leaf surface from the structure inspired without , superhydrophobic surfaces create idea first times Barthlott and Neinhuis by described [1]. They are more than 150° contact to the corner has of surfaces oneself cleaning feature scientific based on those who gave . Similar situation fabric in textiles nano/ micro surface structure

with change through done Polymer based on hydrophobic substances , particularly TDI (toluene-2,4-diisocyanate) and PVS (polyvinyl alcohol) compounds cotton on the surface hydroxyl groups with to react entering , urethane gardens harvest does this and the surface to the water resistant [2,3]. Zhang and by etc. take visited in the study [4,5] cotton on the fabric polydiisocyanate reasonable processing to give through contact angle up to 145–155° increased record This is hydrophobic of the effect that it has increased This surface means energy reduces , coating stability increases and to wash endurance provides . Surface of energy decrease , contact corner increase with related that in the Young, Wenzel and Cassie-Baxter models based on [6] Hydrophobic in fabrics this dependency practical also proven in terms of : water drop surface on spherical in the form remains , contact angle and 150 ° enough .

This in research $Zn(CH_3COO)_2$ (zinc acetate), TDI (toluylene-2,4-diisocyanate) and PVS (polyvinyl alcohol) based synthesis made hydrophobic composition coating using cotton of fabrics surface features studied . Synthesis process , fabric processing to give , also , contact corner , water absorbency and surface energy such as parameters through assessment works take went .

Research results hydrophobic processing efficiency showing , such modified cotton materials protection clothes , outerwear environment under the circumstances used textile and technician fabrics working in the release application opportunities open gave .

2. Experimental briefly description

Cotton fabrics $Zn(CH_3COO)_2$, TDI (toluylene-2,4-diisocyanate) and PVS (polyvinyl alcohol) based synthesis made hydrophobic compound with at 70–80°C processing Then at 120 °C for 15 minutes during in the oven dried . Materials contact corner , water absorbency , surface energy and mechanic tests based on was evaluated .

Contact the **angle** is water drop of fabric surface with connected on point harvest to do It is hydrophobic . level main indicator is considered and of the fabric water with how in a relationship to be clear represents .

Hydrophobic processing given cotton of fabrics contact angle between 130–150° It happened . This of water to the surface without sticking spherical drop in case to stay means .

Table 1 .

Hydrophobicity properties comparison

Special	Simple cotton fabric	Hydrophobized fabric
Contact angle (°)	72	150
Water absorbency (%)	98	1
Surface energy (mJ /m²)	48	18

Contact angle is 72 ° simple cotton fabric hydrophilic to the surface has water to oneself pulls .

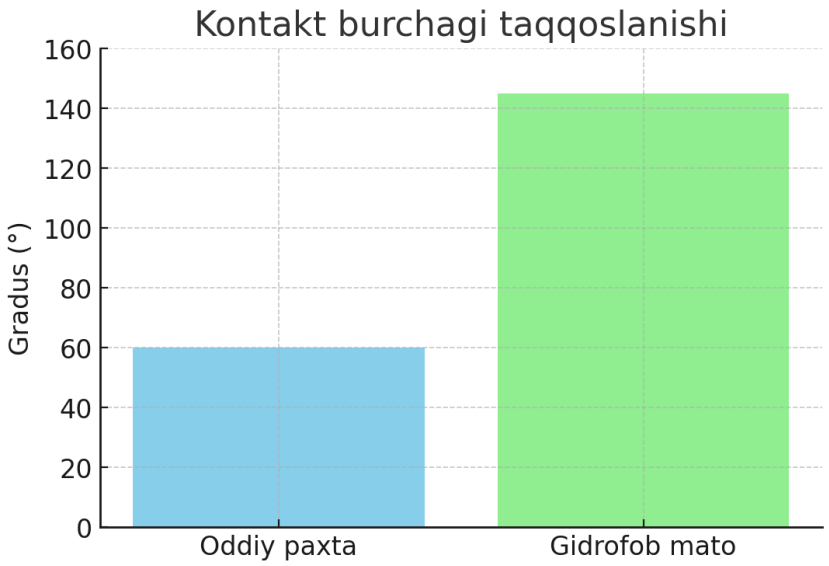
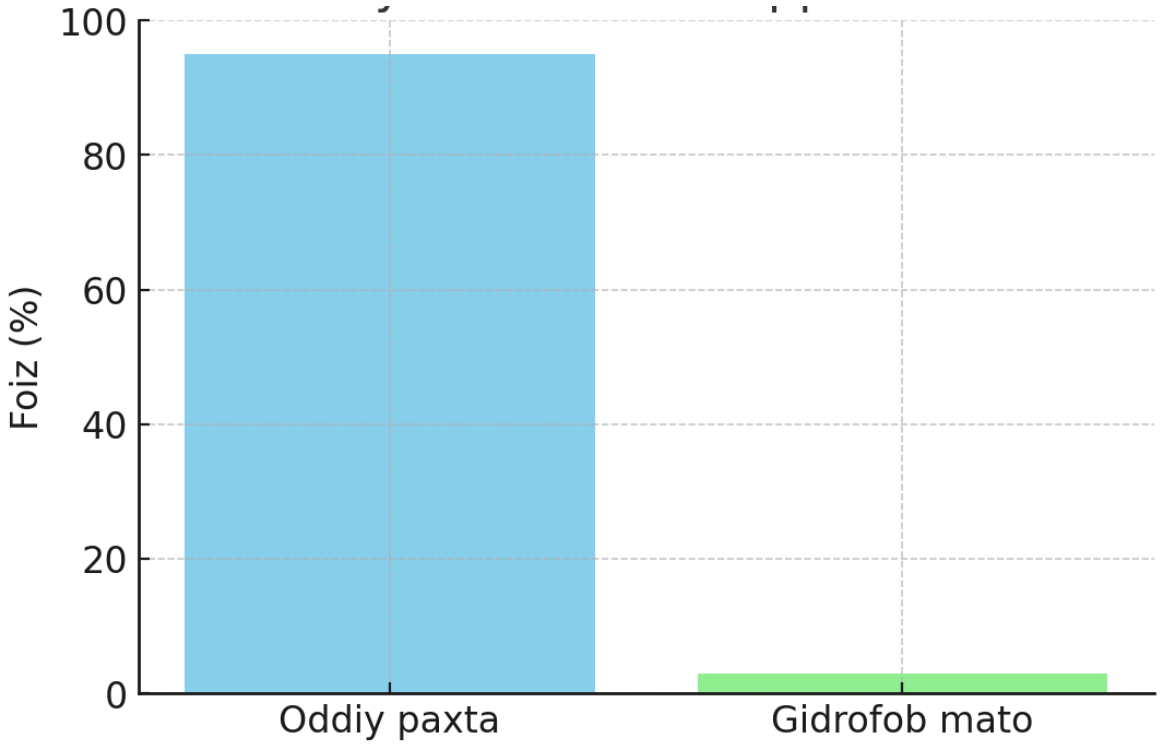


Figure 1. Non-hydrophobized and hydrophobic cotton fibrous of the fabric contact angle .

Simple cotton fabric water drop disperse sends water to the surface sticks (72°). Hydrophobized fabric and water drop spherical in the form (150 °), this and water to the surface not to enter means . Hydrophobic from processing then angle up to 150° increases , this and superhydrophobic close feature that it is shows .

Water absorbency 98% to 1% decreased — this surface modification efficiency clear represents . Surface energy decrease and water with surface between mutual of influence slowed down Water absorption . Normal cotton fabric up to 90–

100% water won if it is hydrophobic of fabrics water The absorbance was <5% . This the material external to the environment relatively resistant does .



Simple cotton fabric water complete sucking gets (98%), this and in the humidity swelling , microorganisms growth and fast to pollution reason will be .

Hydrophobic coating with processing given fabric to the water resistant to the surface has will be (1%) and hygienic in terms of more convenient .

Hydrophobized cotton in fabrics contact angle – to the water endurance level directly measurement tool become service does . This parameter through surface modification efficiency is determined and of the fabric practical application field is determined .

Conclusion

This in research cotton fibrous textile materials Zn ($CH_3COO)_2$, TDI and PVS based hydrophobic polymer with processing to give through their surface features to change successful divided . Research results this showed that hydrophobic from processing after cotton of fabrics contact angle up to 150° increased , this and their water repulsive (hydrophobic) property noticeable at the level Also , water improves absorbency 98% to 1 % decreased , surface energy and

from 48 mJ / m² to 18 mJ /m² fell . This indicators surface water with mutual impact decreased and hydrophobicity level increased proves .

Mechanical properties point of view from the point of view when viewed , hydrophobic coating of the fabric to tear and to friction resistant increases . Thermal stability also improved : such coatings up to 140°C at temperature structural integrity save remains. From this outside , to wash relatively stability up to 20–50 times preserved it remains , this them practical in use far for a period of time resistant does

Hydrophobic coating because of in fabrics lotus to the effect similar himself cleaning feature observed , that is water drops from the surface dust and morals in itself take slipping falls . This and hygiene and care requirements simplifies .

Such materials water impermeable sports clothes , medicine in the field usable one disposable fabrics , special protection clothes , ecological coatings and technician textile products for wide opportunities creates .

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