

Feasibility of Antibacterial Finishing of Leather with the Nano-SiO₂ Quaternary Derivative

*Xinggong Jia, Zhengjun Li, Tingyou Zhang **

National Engineering Laboratory for Clean Technology of Leather Manufacture, Chengdu 610065, P. R. China

*Corresponding author, Email: zhangty911@163.com, sulizhangtymail@163.com

Abstract: The preliminary coated leather was top coated with the mixture of antibacterial material of nano-silica derivative with quaternary ammonium group (NSDQA) and polyurethane gloss finishing agent (PGF) / nitrocellulose. The spray operation can be easily carried out, and both of the leather had definite antibacterial power against to E.coli (15min inhibitory ratio over 70%), but the permanence by nitrocellulose was poor. In top coating by PGF, effect of NSDQA quantity on the physical properties of the final leather was evaluated. Comparing with that of the no NSDQA top finished leather, the smoothness and color of the leather with NSDQA changed little, the resistance of dry and wet rubbing decreased a little, however, after being heated, the changes were invisible. There is suitable NSDQA quantity in which NSDQA has no bad effect on leather properties. After being used 6 month as cushion, the antibacterial role of the leather sample has been kept.

SEM micrographs of the antibacterial leather show that the interactions of bacterial membranes with NSDQA cause the fundamental changes in both membrane structure and function, and induce the leakage of cytoplasmic contents. The loss of the connection between the outer membrane and the underlying peptidoglycan induces the abnormality of nodular structures and bleb formation of the cell envelope of E. coli.

Key words: leather; finishing; antibacterial; nano-silica derivative; quaternary ammonium salt