

Structural Changes in CORONA Discharged Cotton Submitted to Mercerization

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Abstract

The cleaning and swelling operations in cotton's pré-treatment make it prepared for posterior dyeing and finishing. From those, mercerization is the one able to confer a major increase in overall quality of the fibrous material and consists of a very strong alkaline treatment of the material, which is kept under controlled tension. The properties are changed in the sense of a more intense luster, higher mechanical resistance, higher dyeability, higher absorption of liquids and finishing compounds and a better dimensional stability. Changes in supramolecular organization namely in the type of crystallinity occur, as well as a morphological variation concerning the circularity of the transversal section of the fibre.

The present study proposes new conditions for mercerization assuming that a CORONA plasmatic discharge previously made is able to provide stronger effects by means of a more intense and faster reaction between the alkali and the cellulose.

CORONA treatment consists on the application of an electrical discharge of high voltage (around 10.000V) through air between two electrodes, using frequencies around 40 kHz, at normal atmospheric temperature and pressure, on dry cotton fabric. Structural changes analysis was made using FT-IR technique, microscopic studies, dyeing tests and determination of barium activity number for evaluation of mercerization degree.

Results show an important improvement of mercerization level meaning the possibility of a lower ecological impact and lower costs of processing.