



-RAY DIFFRACTOMETRIC STUDY OF THE EFFECTS OF LAUNDERING ON THE MICROCRYSTALLITE SIZE OF NATURALLY COLORED COTTON

Hsiou-Lien Chen

Oregon State Univ., Corvallis, OR 97331

The unique characteristic of color darkening after laundering of naturally colored cottons could be due to either fibers' chemical or physical properties or both. Characterization of the physical microstructure will provide a partial understanding of the origins of the special properties of naturally colored cottons. The purpose of this research is to study how the crystallite sizes of naturally colored cottons are affected by repeated laundering.

Traditional white pima and naturally green and brown cottons were washed in hot water for 3 to 80 wash/rinse cycles. Fibers taken from each fabric were studied by x-ray diffraction. For each diffraction peak, the average crystallite size in the corresponding direction was assessed via analysis of the peak broadening.

The results indicated that crystallite sizes of unwashed naturally green and brown cotton were comparable to those of unwashed white cotton except the 10 crystallite sizes are slightly larger in the white cotton. For the effects of repeated laundering on the cotton crystallite size, the results indicated that after 50 washes, most fibers showed either similar or slightly larger crystallite sizes compared to those of the unwashed cottons. Increasing fiber moisture content of the fibers after washing could cause an increase in the crystallite size due to the arrangement of associated chains in the amorphous areas. This may explain why, after 50 or 80 washes, the crystallite sizes were found either similar or slightly larger compared to the unwashed cottons.