Investigation on the Fiber Separation Techniques for Fabric Waste Made from Cotton/Spandex Blends

W.A.M. Fonseka
Department of Textile and Apparel Engineering
University of Moratuwa
Moratuwa, Sri Lanka
181016L@uom.lk

C.D. Vithanage
Department of Textile and Apparel Engineering
University of Moratuwa
Moratuwa, Sri Lanka
181050J@uom.lk

Gayani K. Nandasiri
Department of Textile and Apparel Engineering
University of Moratuwa
Moratuwa, Sri Lanka
gayanin@uom.lk

Abstract- This study addresses the challenge of reusing pre-consumption waste generated during the cutting process in apparel manufacturing, particularly in the context of blended textiles containing cotton and spandex fibers. Currently, due to the lack of fiber separation techniques, significant quantities of these textiles are being disposed of through landfill or incineration, squandering the opportunity for reutilization. The technique investigated in this study involves selective degradation of spandex fibers while recovering the cotton. A crucial aspect of this process is subjecting the cotton and spandex blended textiles to heat treatment exceeding 150°C, followed by a subsequent wash treatment to eliminate the thermally degraded spandex fibers. Through systematic experimentation, several solvents, including ethanol, acetone, acetic acid, and methanol, for removing the thermally degraded spandex has been identified. The outcomes of this study offer a promising avenue for the successful separation of constituent cotton and spandex fibers within blended textiles. This advancement holds significant implications for the transition from a linear to a circular economy in the textile industry, contributing to the reduction of waste and the sustainable utilization of valuable resources.

Keywords—Selective degradation; Circularity; Spandex; Recycling; Sustainability