Sustainability in processing of man-made cellulose fibres for various end-uses

Abstract

Key aspects of the down-stream conversion processes of fibers to products include mechanical, thermal, and chemical processing. Automation and robotics are gaining impact on textile and clothing production and facilitate textile production closer to customers and become more efficient and sustainable. Raw materials with their mechanical and chemical processing should not appear as a weak link in the chain and must fulfil sustainability requirements.

The increased use of cotton-like MMCF`s reduces the cleaning and fiber dimension controlling stages of the in a spinning factory and no alkaline pretreatments are needed. It is necessary that textile chemicals, such as dyes, finishing agents and auxiliaries are produced as biobased, and used efficiently for minimizing waste-water contamination. Coloration with more than 25000 possible industrial dye molecules involves a complex application of dyestuffs on textiles because of the variety of fibres, filaments, yarns, and fabrics. Textile and materials requiring coloration and the diverse nature of the end-use and performance requirements are setting multiple requirements. Coloration is mainly carried out in aqueous media may be carried out by dyeing the materials to a uniform colour, or by printing to impart a design or motif to textile. While biobased textile dyes offer several advantages, there are challenges to be solved related to colour fastness, scalability, and cost.

Instead of fabric aftertreatment masterbatch and dope-additive technologies offer possibilities for MMF`s for producing functional textiles, such as flame retardant, conductive, bioactive, traceable and repellency-controlled textiles. However, the fiber recyclability effects of the additives should be considered.

The effect of PET textiles to release micro-particles in laundry processes demands preventive technologies to be developed. MMCFs will have a crucial role in the future by evolving along the entire supply chain to minimize the carbon footprint, marine pollution and leaving behind green footprint. Recycling of synthetic fibers and cotton from full-cotton and PET blends and using alternative cellulose sources for regenerated fibers is needed for reducing CO2 emissions and sustainable use of forests.

Forestbiofacts as a unique scientific digital platform content of 16 themes covers the whole up-to-dated value chain of forest-based bioeconomy, such as biomass technologies, natural fibre products, bio-based nanomaterials wood processing, paper and pulping technologies and man-made biobased cellulose fibres, as well.