Investigation into the supramolecular properties of fibres regenerated from cotton based waste garments

Abstract

This paper investigated the supramolecular properties and accessibility of fibres regenerated from cotton-based waste garments and compared to typical lyocell fibres. The supramolecular and accessibility properties of the cotton-based waste garments fibres regenerated from three sources (waste denim garments, easy care finished cotton fabrics and a blend of cotton-based waste garment with wood pulp) were analysed and compared to the lyocell fibres. The Attenuated Total Reflectance Fourier Transform Infrared (ATR-FTIR) spectroscopy and Wide Angle X-ray Diffraction (WAXD) analyses indicated that the fibres from cotton waste garments had supramolecular properties similar to the typical lyocell fibres. The exception was spun from the cotton pulp reclaimed from easy care treated cotton fabrics and maybe related to increased amorphous cellulose content in its structure. The fibreâ€™s accessibility by reagents behaviour correlated well with the supramolecular properties. The results indicate that the waste garment purification process may affect the properties of the pulp and hence the supramolecular properties of the resultant fibres. Further research on the purification and regeneration of fibres from waste garments may lead to the use of cotton waste garments as an alternative feedstock source to the lyocell process