

Obtaining Composite Cotton Fabric by Cyclodextrin Grafting

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Abstract : Finishing is an important part of fabric processing with which a wide range of features are imparted to greige or colored fabrics for various end-uses. Especially, by the addition or impartation of nano-scaled particles to the fabric structure composite fabrics, a kind of composite materials can be acquired. Composite materials, generally shortened as composites or in other words composition materials, are engineered or naturally occurring materials made from two or more component materials with significantly different physical, mechanical or chemical characteristics remaining separate and distinctive at the macroscopic or microscopic scale within the end product structure. Therefore, the technique finishing which is one of the fundamental methods to be applied on fabrics for obtainment of composite fabrics with many functionalities was used in the current study with the same purpose. However, regardless of the finishing materials applied, the efficient life of finished product on offering desired feature is low, since the durability of finishes on the material is limited. Any increase in durability of these finishes on textiles would enhance the life of use for textiles, which will result in happier users. Therefore, in this study, since higher durability was desired for the finishing materials fixed on the fabrics, nano-scaled hollow structured cyclodextrins were chemically imparted by grafting to the structure of conventional cotton fabrics by the help of finishing technique in order to be fixed permanently. By this way, a processed and functionalized base fabric having potential to be treated in the subsequent processes with many different finishing agents and nanomaterials could be obtained. Henceforth, this fabric can be used as a multi-functional fabric due to the encapsulating ability of cyclodextrins to molecules/particles via physical/chemical means. In this study, scoured and rinsed woven bleached plain weave 100% cotton fabrics were utilized because textiles made of cotton are the most demanded textile products in the textile market by the textile consumers in daily life. Cotton fabric samples were immersed in treating baths containing β -cyclodextrin and 1,2,3,4-butanetetracarboxylic acid and to reduce the curing temperature the catalyst sodium hypophosphite monohydrate was used. All impregnated fabric samples were pre-dried. The reaction of grafting was performed in dry state. The treated and cured fabric samples were rinsed with warm distilled water and dried. The samples were dried for 4 h and weighed before and after finishing and rinsing. Stability and durability of β -cyclodextrins on fabric surface against external factors such as washing as well as strength of functionalized fabric in terms of tensile and tear strength were tested. Presence and homogeneity of distribution of β -cyclodextrins on fabric surface were characterized.

Keywords : cotton fabric, cyclodextrine, improved durability, multifunctional composite textile

Conference Title : ICTCME 2016 : International Conference on Textile Composites, Materials and Engineering

Conference Location : New York, United States

Conference Dates : June 06-07, 2016