

Effect of Plasma Treatment on UV Protection Properties of Fabrics

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Abstract : UV protection by fabrics has recently become a focus of great interest, particularly in connection with environmental degradation or ozone layer depletion. Fabrics provide simple and convenient protection against UV radiation (UVR), but not all fabrics offer sufficient UV protection. To describe the degree of UVR protection offered by clothing materials, the ultraviolet protection factor (UPF) is commonly used. UV-protective fabric can be generated by application of a chemical finish using normal wet-processing methodologies. However, traditional wet-processing techniques are known to consume large quantities of water and energy and may lead to adverse alterations of the bulk properties of the substrate. Recently, usage of plasmas to generate physicochemical surface modifications of textile substrates has become an intriguing approach to replace or enhance conventional wet-processing techniques. In this research work the effect of plasma treatment on UV protection properties of fabrics was investigated. DC magnetron sputtering was used and the parameters of plasma such as gas type, electrodes, time of exposure, power and, etc. were studied. The morphological and chemical properties of samples were analyzed using Scanning Electron Microscope (SEM) and Fourier Transform Infrared Spectroscopy (FTIR), respectively. The transmittance and UPF values of the original and plasma-treated samples were measured using a Shimadzu UV3101 PC (UV-Vis-NIR scanning spectrophotometer, 190-2, 100 nm range). It was concluded that, plasma which is an eco-friendly, cost effective and dry technique is being used in different branches of the industries, and will conquer textile industry in the near future. Also it is promising method for preparation of UV protection textile.

Keywords : fabric, plasma, textile, UV protection

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