Investigation of unstabilized Polyvinyl chloride (PVC) for use as a long-term UV dosimeter: preliminary results

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A new chemical UV dosimeter with a larger dose-capacity than the existing chemical dosimeters has been investigated for long-term UV measurements. Unstabilized Polyvinyl chloride (PVC), cast in 40 µm thick film, has been found to respond to at least 745 *SED (Standard Erythema Dose = 100 J/m^2)* of erythemal solar UV radiation. This is equivalent to about two to three summer weeks of exposure in subtropical sites. The UV-induced changes in the PVC dosimeter were quantified using a Fourier Transform Infrared (FTIR) spectrophotometer and the decrease in the absorption intensity of the 1064 cm^{-1} peak was employed to quantify these changes. Dose response curves have been established by relating the decrease in the PVC dosimeter's absorption intensity at 1064 cm^{-1} to the corresponding erythemal UV exposure. The spectral response of the dosimeter was measured and found to be comparable to the erythema action spectrum. Some other optical characteristics of the dosimeter, such as the dose-rate dependency and the angular response were analysed. The dosimeter was found to have the potential to measure long periods of exposure to solar UV radiation as well as exposures to artificial UV.

Key Words

Dosimetry; UV; Erythemal; Exposure