



UV PROTECTION ABILITY OF SINGLE WALL AND MULTI WALL CARBON NANOTUBES FOR MODIFICATION OF POLYMERIC COATINGS

Matin Mahmoudi Fard¹, Mahdi Safi², Ahmad Mousavi Shoushtari¹, Samaneh Rahmani³, Ali Zarei³

¹ Amirkabir University of Technology, ² Institute for Colorant, Paint and Coatings, ³ Kar University of Qazvin email :

matinmahmodifard@yahoo.com

UV radiation which has damaging effect on coatings is well known. Excessive exposure to this kind of radiation especially UVB not only can damage polymeric coatings but can threaten the health of human beings as well. A protective layer shouldn't allow UV radiation, that fall on it, to pass through it and reach beneath layers and this is just possible by absorption or reflection of UV radiation. In this paper, the UV protection ability of single-wall carbon nanotubes (SWCNT's) and multi-wall carbon nanotubes (MWCNT's), for modification of polymeric materials, was studied and compared with the other UV-absorber. In the first step, the absorptions spectrum of the both fine powders and homogeneous dispersions of CNTs, TiO₂, ZnO (in both micro and nano size) and conventional organic absorber were obtained. On other hand, the mentioned materials were applied to the surface of the cotton fabric as a representative of polymeric materials and the UV blocking ability of the treated and untreated fabric was studied with the help of the two different approaches. Results show that compare to the other known UV-absorber, carbon nanotubes, especially SWCNT's, have extraordinary ability to block out UV radiation. Furthermore, the UV protection factor of cotton fabric treated with SWCNT's is approximately 2 orders of magnitude larger than the UV protection factor of cotton fabric treated with MWCNT's and 3 orders larger than nano TiO₂.