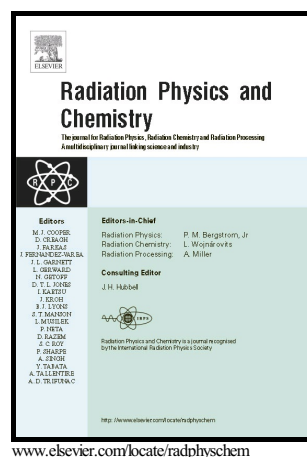


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Effects of proton irradiation on structures and photo-catalytic property of nano-TiO₂/CNTs films

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Abstract

Thin nano-TiO₂ films were prepared using aqueous SILAR (successive ionic layer adsorption and reaction) technique on the carbon nanotubes (CNTs) films using titanium trichloride and water as precursors. TiO₂-deposited carbon nanotubes (TiO₂/CNTs) films were irradiated with 120 keV proton beam, and then analyzed using Raman spectroscopy (Raman), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM) and photocatalytic degradation tests. The results indicate that irradiation could transfer the amorphous deposited TiO₂ films to a crystalline state, while the CNTs substrate would also be damaged, namely CNT tube diameter shrinkage and the Raman peak ratio of I_D/I_G decreases with increasing proton fluences. It was also found that the TiO₂ modification could result in more damage to the CNTs substrate as the proton fluence is lower. This is largely due to the fact that the process of activation before deposition could cause damage to the CNTs to some degree. It is interesting to be noted that proton irradiation would induce the

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