

Evaluation of the Photo Stability of Photochromic Ormosil-Polyoxometalate Hybrid films by FTIR

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Photochromic materials have been focus of much attention on account of their potential technological applications in molecular electronics, electro-optical devices, UV dosimeters, smart windows, information displays and other high-technology fields¹. For all these applications, materials with long-term photostability are required. In this work, we prepared photochromic films based on ormosil (organically modified silicates) and a Keggin type heteropolyoxometalate² by the sol-gel route and evaluated their photostability by FTIR. The silanes used in the sol-gel process were the tetraethylortosilicate, 3-glycidoxypropyltrimethoxysilane, 4-butyronitriletriethoxysilane and 3-aminopropyltriethoxysilane. The phosphotungstic acid was added in a mixed silane solution with acetone. The films were deposited by dropping the solution on Ge(111) windows. The photostability evaluation was made by the irradiation with a solar light simulator with increasingly dose of UV-B and analysis on a FTIR spectrophotometer under N₂ purging.

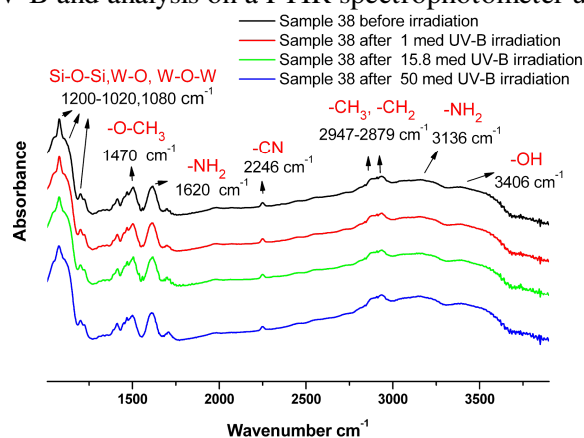


Figure 1. FTIR spectra of ormosil-phosphotungstate film on germanium wafers before and after been irradiated increasingly dose of UV-B irradiation

Lost of photochromic response could be caused by the decomposition of the films, i.e., the oxidation of the organic groups in the ormosil matrices promoted by the photoinduced reduction of the phosphotungstate. No significant changes in the infrared spectra of any of the ormosil-phosphotungstate films, Figure 1, with the increasingly dose of UV-B irradiation was observed. Therefore, the hybrid materials displayed good photostability.

Keywords: Polyoxometalate, sol-gel, photochromism, organic-inorganic hybrid materials

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