10th International Conference on Composite Science and Technology
ICCST/10
A. L. Araújo, J. R. Correia, C. M. Mota Soares, et al. (Editors)

Abstract ID-167

DETECTION OF PHOSGENE BY USING TIO2/INDICATOR NANOCRYSTALLINE THIN FILMS

Alejandro P. Vargas, Tania I. Lopes-Costa, María G. Guillén, María Belén Suárez Jiménez, Jose M. Pedrosa

Universidad Pablo de Olavide, Spain
apervar1@gmail.com, tlopcos@upo.es, mariagonzalez88@gmail.com, bsuarezjimenez@yahoo.es, jmpedpoy@upo.es

Keywords: Phosgene, chloroform decomposition, gas sensor, solid sensor, optical sensor, nanocrystalline films

Summary: A new optical solid sensor device for detection of phosgene in chloroform has been developed by incorporating the Harrison's reagent (a solution of diphenylamine and dimethylaminobenzaldehyde in ethanol), to nanocrystalline TiO2 thin films.
The TiO2 thin films were prepared by depositing the 18NR-T Transparent Titania Paste from Dyesol onto a glass substrate through the screen printing method. The active area of the films was 0,16 cm2 with a thickness of 1,8 μm. The composite was obtained by immersion into a solution of the Harrison's reagent during 15 minutes.
As real target analyte we have used chloroform stabilized with amilenes which is known to be slightly decomposed in phosgene and HCl, if storage conditions are not appropriated. We have used chloroforms from different manufacturers were the initial presence of phosgene was checked by using test strips wetted with the indicator.
Further decomposition of chloroform was photoinduced by using a solar simulator.
Nanocrystalline films were used to detect in situ the formation of phosgene by measuring their absorbance spectra under exposure to the sample vapors. A new band at ~450 nm appears in the spectrum due to the presence of phosgene.
The response intensity (absorbance at 450 nm) has been found to be concentration-dependent with response films varying from 1 to 8 minutes.
To the best of our knowledge this is the first solid optical sensor of phosgene. Currently we are working in the detection limits and other operation parameters of this new sensor.