Title: Roles of inorganic oxide nanoparticles on extraction efficiency of electrospun polyethylene terephthalate nanocomposite as an unbreakable fiber coating

Author: Habib Bagheri Ali Roostaie

PII: S0021-9673(14)01839-1
DOI: http://dx.doi.org/doi:10.1016/j.chroma.2014.11.059
Reference: CHROMA 356045

To appear in: *Journal of Chromatography A*

Received date: 17-5-2014
Revised date: 9-11-2014
Accepted date: 22-11-2014

Please cite this article as: H. Bagheri, A. Roostaie, Roles of inorganic oxide nanoparticles on extraction efficiency of electrospun polyethylene terephthalate nanocomposite as an unbreakable fiber coating, *Journal of Chromatography A* (2014), http://dx.doi.org/10.1016/j.chroma.2014.11.059

Roles of inorganic oxide nanoparticles on extraction efficiency of electrospun polyethylene terephthalate nanocomposite as an unbreakable fiber coating

Habib Bagheri[1], Ali Roostaie

Environmental and Bio-Analytical Laboratories, Department of Chemistry,

Sharif University of Technology, P.O. Box 11365-9516, Tehran-Iran

Abstract

In the present work, the roles of inorganic oxide nanoparticles on the extraction efficiency of polyethylene terephthalate-based nanocomposites were extensively studied. Four fiber coatings based on polyethylene terephthalate nanocomposites containing different types of nanoparticles along with a pristine polyethylene terephthalate polymer were conveniently electrospun on stainless steel wires. The applicability of new fiber coatings were examined by headspace-solid phase microextraction of some environmentally important volatile organic compound such as benzene, toluene, ethylbenzene and xylene (BTEX), as model compounds, from aqueous samples. Subsequently, the extracted analytes were transferred into a gas chromatography by thermal desorption. Parameters affecting the morphology and capability of the prepared nanocomposites including the type of nanoparticles and their doping levels along with the coating time were optimized. Four types of nanoparticles including Fe_3O_4, SiO_2, CoO and NiO were examined as the doping agents and among them the presence of SiO_2 in the prepared nanocomposite was prominent. The homogeneity and the porous surface structure of the SiO_2-polyethylene terephthalate nanocomposite was confirmed by scanning electron microscopy indicating that the nanofibers diameters were lower than 300 nm. In addition, important parameters influencing the extraction and desorption process such as temperature and extraction time, ionic strength and desorption conditions were optimized. Eventually, the developed method was validated by gas chromatography-mass spectrometry. Under optimized conditions, the relative standard deviation values for a double distilled water spiked with the selected volatile organic compounds at 50 ng L^{-1} were 2–7% (n = 3) while the limits of detection were between

[1]Corresponding author. Tel.: +98-21-66005718; Fax: +98-21-66012983
E-mail address: bagheri@sharif.edu (H. Bagheri)