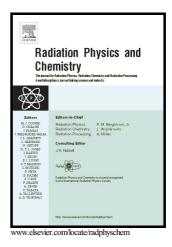
### Author's Accepted Manuscript

Fabrication, characterization and gamma rays shielding properties of nano and micro lead oxide-dispersed-high density polyethylene composites

Mohamed E. Mahmoud, Ahmed M. El-Khatib, Mohamed S. Badawi, Amal R. Rashed, Rehab M. El-Sharkawy, Abouzeid A. Thabet



 PII:
 S0969-806X(17)30838-1

 DOI:
 https://doi.org/10.1016/j.radphyschem.2017.10.017

 Reference:
 RPC7676

To appear in: Radiation Physics and Chemistry

Received date: 1 August 2017 Revised date: 25 October 2017 Accepted date: 29 October 2017

Cite this article as: Mohamed E. Mahmoud, Ahmed M. El-Khatib, Mohamed S. Badawi, Amal R. Rashed, Rehab M. El-Sharkawy and Abouzeid A. Thabet, Fabrication, characterization and gamma rays shielding properties of nano and micro lead oxide-dispersed-high density polyethylene composites, *Radiation Physics and Chemistry*, https://doi.org/10.1016/j.radphyschem.2017.10.017

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Fabrication, characterization and gamma rays shielding properties of nano and micro lead oxide-dispersed-high density polyethylene composites

# Mohamed E. Mahmoud<sup>1,\*</sup>, Ahmed M. El-Khatib<sup>2</sup>, Mohamed S. Badawi<sup>2, 3</sup>, Amal R. Rashed<sup>1</sup>, Rehab M. El-Sharkawy<sup>4</sup>, Abouzeid A. Thabet<sup>5</sup>

<sup>1</sup>Chemistry Department, Faculty of Science, Alexandria University, Alexandria, Egypt, Mobile: +2-01140933009, E-mail: memahmoud10@yahoo.com

<sup>2</sup>Physics Department, Faculty of Science, Alexandria University, Alexandria, Egypt.

<sup>3</sup>Department of Physics, Faculty of Science, Beirut Arab University, Beirut, Lebanon.

<sup>4</sup>Basic Science Department, Faculty of Engineering, Pharos University in Alexandria, Alexandria, Egypt

<sup>5</sup>Department of Medical Equipment Technology, Faculty of Allied Medical Sciences, Pharos University in Alexandria, Alexandria, Egypt.

#### Abstract

Polymer composites of high-density polyethylene (HD-PE) were filled with powered lead oxide nanoparticles (PbO NPs) and bulk lead oxide (PbO Blk) prepared with filler weight fraction [10% and 50%]. These polymer composites were investigated for radiation-shielding of gamma-rays radioactive point sources <sup>241</sup>Am, <sup>133</sup>Ba, <sup>137</sup>Cs, and <sup>60</sup>Co]. The polymer was found to decrease the heaviness of the shielding material and increase the flexibility with the metal oxide fillers acted as principle radiation attenuators in the polymer composite. The prepared composites were characterized by Fourier transform infrared spectrophotometer (FT-IR), X-ray diffraction (XRD), thermogravimetric analysis (TGA), scanning electron microscope (SEM), Brunauer-Emmet-Teller surface area (BET) and field emission transmission electron microscope (FE-TEM). The morphological analysis of the assembled composites showed that, PbO NPs and PbO Blk materials exhibited homogenous dispersion in the polymer-matrix. Thermogravimetric analysis (TGA) demonstrated that the thermal-stability of HD-PE was enhanced in the presence of both PbO Blk and PbO NPs. Among the composite combinations, HD-PE/PbO nanocomposite yield better density polymer matrix. The results declared that, the density of polymer composites was increase with the percentage of filler contents. The highest density value was identified as 1.745 g.cm<sup>-3</sup> for 50

Download English Version:

## https://daneshyari.com/en/article/8251574

Download Persian Version:

https://daneshyari.com/article/8251574

Daneshyari.com