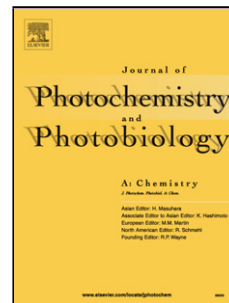


Accepted Manuscript

Title: Radiochromic gels for UV radiation measurements in 3D

Authors: Marek Kozicki, Klaudia Kwiatos, Mariusz Dudek,
Zbigniew Stempień



PII: S1010-6030(17)30267-8
 DOI: <https://doi.org/10.1016/j.jphotochem.2017.10.025>
 Reference: JPC 10950

To appear in: *Journal of Photochemistry and Photobiology A: Chemistry*

Received date: 28-2-2017
Revised date: 11-10-2017
Accepted date: 12-10-2017

Please cite this article as: Marek Kozicki, Klaudia Kwiatos, Mariusz Dudek, Zbigniew Stempień, Radiochromic gels for UV radiation measurements in 3D, Journal of Photochemistry and Photobiology A: Chemistry <https://doi.org/10.1016/j.jphotochem.2017.10.025>

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 proof before it is published in its final 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.

Radiochromic gels for UV radiation measurements in 3D

Marek Kozicki^{a,b,*}, Klaudia Kwiatos^a, Mariusz Dudek^c, Zbigniew Stempień^d

^aDepartment of Man-Made Fibres, Lodz University of Technology, Poland

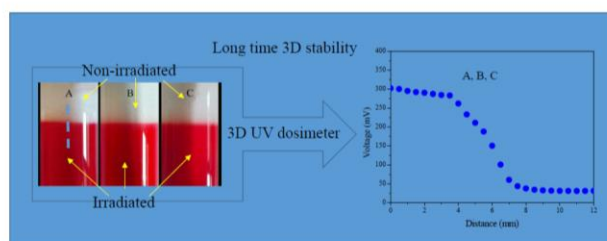
^bGeVero Co., Poland (<http://polygevero.com>)

^cInstitute of Materials Science and Engineering, Lodz University of Technology,
Lodz, Poland

^dInstitute of Architecture of Textiles, Lodz University of Technology, Poland

*E-mail: marek.kozicki@p.lodz.pl; gevero@polygevero.com

Graphical abstract:



Highlights:

- A new 3D UV radiochromic dosimeter is proposed
- It is made of Pluronic physical gel and TTC or LMG
- Excellent 3D dose distribution stability over time has been observed
- The dosimeters are of a high sensitivity to UV light

Abstract

In this work, we present for the first time three-dimensional (3D) gel dosimeters for 3D UV dose distribution measurements. These new gel dosimeters are aqueous compositions containing 2,3,5-triphenyltetrazolium chloride or 4,4'-benzylidenebis(*N,N*-dimethylaniline) (leucomalachite green) and poly(ethylene oxide)-*block*-poly(propylene oxide)-*block*-poly(ethylene oxide) (Pluronic F-127), which form a physical gel matrix. The unique feature of these gels is their high transparency and colourlessness, comparable to crystal clear water. This differentiates them from 3D gel dosimeter compositions that are made of gelatine and used for radiotherapy dosimetry purposes only. If UV irradiated, the gels become coloured (red or green); the colour depends on the radiation sensitive compound in the composition. Both gels were examined versus UVA (range: 315-400 nm; a peak at 369 nm), UVB (range: 280-360 nm; a peak at 306 nm) and UVC (253.7 nm) irradiation. The typical parameters of such dosimeters were derived after obtaining their calibrations: linear dose range, dynamic dose range, dose threshold and dose sensitivity, as well as the UV subranges to which the gels were the most sensitive. The 2,3,5-triphenyltetrazolium chloride gels were the most sensitive to UVA radiation, whereas the leucomalachite green gels were sensitive to UVB. The highest dose sensitivity of the gels was obtained for 3

Download English Version:

<https://daneshyari.com/en/article/6492904>

Download Persian Version:

<https://daneshyari.com/article/6492904>

[Daneshyari.com](https://daneshyari.com)