

## Accepted Manuscript

Shape memory polyurethane nanocomposites with porous architectures for enhanced microwave shielding

Aishwarya V. Menon, Giridhar Madras, Suryasarathi Bose

PII: S1385-8947(18)31281-6  
DOI: <https://doi.org/10.1016/j.cej.2018.07.048>  
Reference: CEJ 19446

To appear in: *Chemical Engineering Journal*

Received Date: 7 April 2018  
Revised Date: 14 June 2018  
Accepted Date: 6 July 2018



Please cite this article as: A.V. Menon, G. Madras, S. Bose, Shape memory polyurethane nanocomposites with porous architectures for enhanced microwave shielding, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.07.048>

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.

## Shape memory polyurethane nanocomposites with porous architectures for enhanced microwave shielding

Aishwarya V. Menon<sup>1</sup>, Giridhar Madras<sup>2</sup>, Suryasarathi Bose<sup>3</sup>

<sup>1</sup>Center for Nano Science and Engineering, Indian Institute of Science, Bangalore-560012, India

<sup>2</sup>Department of Chemical Engineering, Indian Institute of Science, Bangalore-560012, India

<sup>3</sup>Department of Materials Engineering, Indian Institute of Science, Bangalore-560012, India

### Abstract

Thermoplastic Polyurethanes (TPU) are versatile smart materials exhibiting shape memory property and have wide usage in the field of microwave shielding through incorporation of microwave active nanoparticles. The incorporation of high aspect ratio particles into the shape memory polymer matrix may however lead to increase in stiffness and thereby loss of shape memory property. To successfully incorporate high aspect ratio nanoparticles in the polymer matrix, porous polyurethane membranes were prepared by phase inversion technique using polyethylene glycol (PEG) as pore forming agent. The pore sizes were tuned of the order of 1-3  $\mu\text{m}$  in size by varying the PEG concentration in the dope solution to facilitate the vacuum filtration of an aqueous nanoparticles solution through the porous structure. This technique helped to preserve the shape memory property of PU which would otherwise be disturbed if nanoparticles were incorporated into the polymer matrix. From the results obtained it was clear that this strategy of coating nanoparticles onto the porous membranes helped in achieving good shielding effectiveness at relatively lower membrane thickness without compromising much on the shape memory property of the membranes which otherwise is impeded at higher filler content. When stacked to form a sandwich structure of about 400  $\mu\text{m}$  thickness, the membranes showed a high shielding effectiveness of -32 dB manifesting in 99.9 % attenuation of electromagnetic radiations.

Download English Version:

<https://daneshyari.com/en/article/6578181>

Download Persian Version:

<https://daneshyari.com/article/6578181>

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