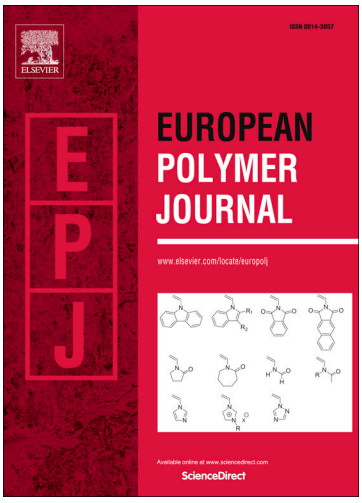

Magnetic nanocomposites based on shape memory polyurethanes

G.D. Soto, C. Meiorin, D. Actis, P. Mendoza Zélis, Oscar Moscoso Londoño, Diego Muraca, M.A. Mosiewicki, N.E. Marcovich

PII: S0014-3057(18)31062-0
DOI: https://doi.org/10.1016/j.eurpolymj.2018.08.046
Reference: EPJ 8559

To appear in: *European Polymer Journal*

Received Date: 11 June 2018
Revised Date: 9 August 2018
Accepted Date: 27 August 2018

Please cite this article as: Soto, G.D., Meiorin, C., Actis, D., Mendoza Zélis, P., Londoño, O.M., Muraca, D., Mosiewicki, M.A., Marcovich, N.E., Magnetic nanocomposites based on shape memory polyurethanes, *European Polymer Journal* (2018), doi: https://doi.org/10.1016/j.eurpolymj.2018.08.046

MAGNETIC NANOCOMPOSITES BASED ON SHAPE MEMORY POLYURETHANES

G. D. Soto[1], C. Meiorin[1], D. Actis[2], P. Mendoza Zélis[2], Oscar Moscoso Londoño[3], Diego Muraca[3], M. A. Mosiewicki[1], N. E. Marcovich[1]*

[1] Instituto de Investigaciones en Ciencia y Tecnología de Materiales (INTEMA-CONICET)

Juan B. Justo 4302, Mar del Plata, Buenos Aires, Argentina; CP 7600

[2] Instituto de Física La Plata (CONICET), Universidad Nacional de La Plata;

Calle 49 y 115, La Plata, Buenos Aires, Argentina; CP 1900

[3] Instituto de Física Gleb Wataghin (IFGW), Universidade Estadual de Campinas – UNICAMP, Campinas, São Paulo, Brazil

ABSTRACT

Shape-memory composites based on a commercial segmented polyurethane and magnetite (Fe_3O_4) nanoparticles (MNPs) were prepared by a simple suspension casting method. The average sizes of individual magnetic particles/clusters were determined by TEM microscopy and corroborated from SAXS patterns. The magnetization properties of selected samples were evaluated using zero field cooling/field cooling (ZFC/FC) measurements and magnetization loops obtained at different temperatures. The results showed that magnetization at high field (20 kOe) and coercitivity measured at 5 K increase with magnetite content and that all the composite films exhibit super-paramagnetic behavior at 300 K. The specific absorption rate (SAR) of the nanocomposites was calculated by experimentally determining both the specific heat capacity and the heating rate of the films exposed to an alternant magnetic field. All nanocomposites were able to increase their temperature when exposed to an alternant magnetic field, although the final temperature reached resulted dependent of the MNPs concentration. What is more, a fast and almost complete recovery of the original shape of the nanocomposites containing more than 3 nominal wt.% MNP was obtained by this remote activation applied to the previously deformed samples.

KEYWORDS: Polymeric nanocomposites; Shape memory properties; Magnetic heating; indirect triggering method.