Accepted Manuscript

Magnetic properties of novel magnetic porous glass-based multiferroic nanocomposites

A. Ciżman, K. Rogacki, E. Rysiakiewicz-Pasek, T. Antropova, O. Pshenko, R. Poprawski

PII: S0925-8388(15)30503-X

DOI: 10.1016/j.jallcom.2015.07.106

Reference: JALCOM 34797

To appear in: *Journal of Alloys and Compounds*

Received Date: 12 March 2015

Revised Date: 7 July 2015

Accepted Date: 13 July 2015

Please cite this article as: A. Ciżman, K. Rogacki, E. Rysiakiewicz-Pasek, T. Antropova, O. Pshenko, R. Poprawski, Magnetic properties of novel magnetic porous glass-based multiferroic nanocomposites, *Journal of Alloys and Compounds* (2015), doi: 10.1016/j.jallcom.2015.07.106.

Magnetic properties of novel magnetic porous glass-based multiferroic nanocomposites

A. Ciżman[1a], K. Rogacki[2], E. Rysiakiewicz-Pasek[1], T. Antropova[3], O. Pshenko[3] and R. Poprawski[1]

[1]*Institute of Physics, Wrocław University of Technology, Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland*

[2]*Institute of Low Temperatures and Structure Research, Polish Academy of Sciences, Okólna 2, 50-422, Wrocław, Poland*

[3]*Grebenshchikov Institute of Silicate Chemistry, Russian Academy of Science, Nab.Makarova 2, Saint Petersburg,, 199034, Russia*

Abstract

In this paper we report on the first experimental studies of the magnetic and electric properties of the ferroelectric materials incorporated in magnetic porous glasses with the controlled pore size. This new material exhibits very small electrical conductivity which allows us to examine the dielectric and magnetoelectric characteristics of these porous glasses concerning magnetite. The magnetic measurements of empty porous glasses and glasses with multiferroic nanocomposites demonstrate the Verwey transition in magnetite. Ferroelectric phase transitions were observed together with hysteresis loops as irrefutable proof of the ferroelectricity in multiferroic nanocomposites based on magnetic porous glasses. The observed exceptional electrical properties show large potential of this novel group of multiferroics for modern applications.

Key words: A: nanostructured materials, A: ferroelectrics, B: chemical synthesis,

C. magnetization, C. dielectric response

[a] Corresponding author at: Wrocław University of Technology, Wybrzeże Wyspiańskiego 27, Wrocław Poland E-mail address: Agnieszka.Cizman@pwr.wroc.pl (A.Ciżman)