

Nanocomposites and nanomaterials

Features of photoacoustic and laser ultrasound responses formation in a nanocomposite system "porous silicon - liquid"

K.Voitenko¹, D. Andrusenko¹, A. Pastushenko², M. Isaiev¹, A. Kuzmich¹, R. Burbelo¹

¹*Taras Shevchenko National University of Kyiv, 64/13, Volodymyrska str., 01601 Kyiv, Ukraine*

E-mail: voitenkokateryna@gmail.com

²*Institut des Nanotechnologies de Lyon, CNRS, Université de Lyon, 7 Avenue Jean Capelle, Bâtiment Blaise Pascal, Villeurbanne, France*

The porous materials based nanocomposite systems are attractive materials for various usages in optoelectronic, including light-emitting devices, in solar photovoltaic devices. Moreover, tuning of chemical and physical properties allows widely application of such composites for biomedical applications, for instance in drug delivery systems, theranostic, sensorics etc. In particular, porous silicon is one of the most promising porous materials. The main advantages of this material are well establish and well studied physic-chemical properties, respectively cheap method of fabrication.

Our report is devoted to the study of photoacoustic signal and laser ultrasound responses formation in a nanostructured composite system "porous silicon - liquid". As a porous matrix mesoporous silicon with different values of porosity was chosen. The two regimes of the elastic response excitation with the use of low frequency modulated and short pulse laser radiations were studied. The experimental measurements were performed for the empty matrix and matrix filled with fluid. As filler different viscous liquids such as glycerol and chorological oil were used. The significant enhancing of acoustic response for the filled matrix was observed for the both excitation regimes. The reason of such enhancing is related with significant increasing of thermal expansion coefficient of nanocomposite system "porous silicon-liquid".