Conference program

Book of abstracts

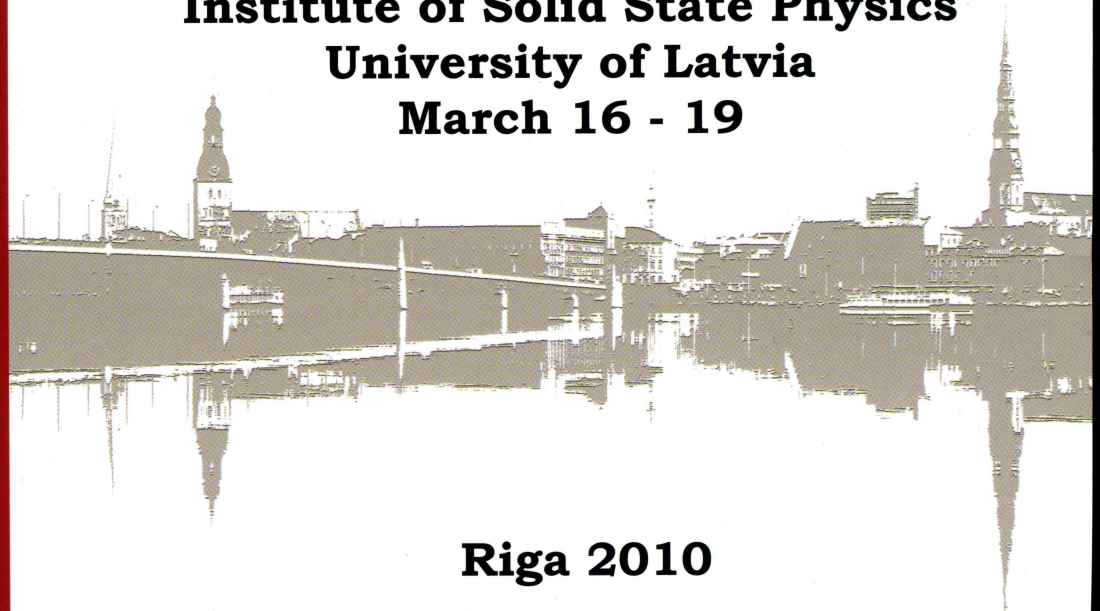
International conference

FM&NT

Functional materials and nanotechnologies 2010

Institute of Solid State Physics
University of Latvia

March 16 - 19



Riga 2010

OR-41

THE INVESTIGATION OF ORGANIC SOLVENT VAPOUR SENSING MECHANISM ON POLYMER-NANOSTRUCTURED CARBON COMPOSITE

G. Sakale, M. Knite, V. Teteris

Riga Technical University, Institute of Technical Physics, Latvia

e-mail: gitasakale@inbox.lv

It is known from our previous research that determinative electric resistance change mechanism, which is responsible for polymer-carbon black composite organic solvent vapour (osv) sensing, is tunneling current decrease between carbon black aggregates in thin layers of matrix. Obtained results from in-situ electric resistance and the composite length change measurements (toluene vapour concentration ~ 500g/m^3) indicate that above mentioned is true only for relatively small vapour concentrations and for short exposure time. Conductive channel destruction starts to dominate in electric resistance change mechanism, when relative deformation of polyisoprene-nanostructured carbon composite (PNCC) is larger than 0,018.

The PNCC sensitivity has been tested to osv like: tetrahydrofuran, benzene, ethyl acetate, dichloroethane, toluene, acetone, chlorbenezene, p-xylene, o-xylene and propanol (sensitivity to vapour decrease in line). We observed no response to polar osv. It can be explained by polyisoprene and vapour molecule incompatibility due to very large difference in dielectric permeability values [1]. Changing the composite matrix material from non-polar polyisoprene to a polar polymer the composite sensitivity to polar osv can be improved.

References

1. G. Sakale, M. Knite, V. Teteris. Polyisoprene – nanostructured carbon composite material for volatile organic compound detection. Proceedings of the International Conference on Biomedical Electronics and Devices, Porto, Portugal, January 14-17, 2009, INSTICC Press, 117-122.