Toetab TÜ ja TTÜ doktorikool
"Funktsionaalsed materjalid ja tehnoloogiad" (FMTDK)

ESF projekt 1.2.0401.09-0079

Gas sensing transduction model for continuous Co_3O_4 thin films

I.Kärkkänen[1], N.Barsan[2], T.Avarmaa[1], M.Kodu[1], R.Jaaniso[1]

[1]Institute of Physics, Faculty of Science and Technology, University of Tartu, Tartu, Estonia
[2]Institute of Physical and Theoretical Chemistry, University of Tübingen, Germany

Gas sensing transduction model for thin continuous cobalt oxide films was elaborated. Films were prepared by pulsed laser deposition (PLD) and the morphology was investigated using SEM microscope. Fork function measurements were performed by Kelvin Probe method. The response of dc-conductivity for CO gas was measured at 350^0C. Description of gas sensing mechanism for p-type semiconductors is still in progress. It is not enough investigated in terms of the change of the surface work function during gas exposure. Recently the thick films transduction model was derived [1]. It takes into account grainy structure of the films. Films prepared by PLD with the thickness around 50-70nm have different structure, which is mostly continuous and has to be treated differently. The model also gives more understanding of the thickness of an accumulation layer, which is much thinner than Debye length. Modeled function was compared with preliminary experimental results with good agreement.

References:

[1] N. Barsan, C. Simion, T. Heine, S. Pokhrel and U. Weimar. Modeling of sensing and transduction for p-type semiconducting metal oxide based gas sensors, *Journal of Electroceramics, on-line first, DOI:* 10.1007/s10832-009-9583-x.