KN2500

Characterisation of magnetron sputtered SnZnOx by means of spectroscopic ellipsometry

Andreas Hertwig[1], Martin Kormunda[2], Petr Ryšánek[2], Lyuboslav Ivanov[3]

[1]BAM, Berlin, Germany [2]J.E.Purkinje University, Usti nad Labem, Czech Republic [3] Angel Kanchev University of Ruse, 7017, Bulgaria

andreas.hertwig@bam.de

Transparent conductive oxide (TCO) films are a vital part of a large part of modern technology. The production of TCO materials has sparked much development in plasma coating technology. Quality control measurements of these layers are therefore important in many fields of optics and electronics such as high efficiency thin film photovoltaics. In this presentation, we report on optical measurements of ZnSnOx layers generated by DC/RF magnetron plasma co-sputtering. By changing the respective power on two different targets, the overall power, the gas composition and post-treatment, the properties of this type of layers can be varied in a number of parameters. The optical, electrical, and chemical properties of TCO layers are the technically most important properties together with the layer thickness. The dielectric function of layers is accessible by means of spectroscopic ellipsometry, which also yields the very important value for the layer thickness at the same time. It would be a significant step forward in quality control to use this non-destructive method also as a fast test for electrical properties. Therefore, we report on the optical properties connected to the production parameters, and also on our preliminary results connecting the optical dielectric function (in the visible and near infrared) to the electrical conductivity of the layers. We discuss the effect of deposition parameters on the optical properties of the layers and present an approach for correlating optical and electrical properties. Further, we discuss the question of accuracy of optical properties gained from model-fit-based optical methods and the use of different parameterised models for the dielectric function to achieve this.

Keywords
Mixed Oxides
TCO
Quality Control
Ellipsometry
Optical Constants