Electronic Properties of Structures Containing Films of Alq3 and LiBr Deposited on Si Crystals

J. Sito, M. Grodzicki, R. Wasielewski, K. Lament, P. Mazur, A. Ciszewski

Institute of Experimental Physics, University of Wrocław, Pl. M. Borna 9, 50-204 Wrocław, Poland

Much interest has been taken in work on the materials that are expected to be of use to organic light-emitting diodes (OLEDs) in recent years. Extensive work on the subject yields a rapid expansion of the OLED technology which is at least applied to the newest TV screens. One of the organic materials used in the technology is the semiconducting monomer Alq_3–$Al(C_9H_6NO)_3$, which is built based on the simplest aromatic hydrocarbon (benzene). Composition of more developed OLED structures includes also insulators.

This presentation concerns the results of a study on the system of organic semiconductor Alq_3 and ionic crystal LiBr as the adsorbate, low-index silicon crystals Si(100), and Si(111) as the substrates. The structures were produced in the ultrahigh vacuum; the Alq3 and LiBr adlayers were obtained by evaporation of the materials from heated quartz cups. The layer thickness and the evaporation rate were controlled by means of quartz resonators. Chemical purity of the substrates and the thin layers was estimated based on the Auger electron spectra taken by a LEED-Auger camera of RFA type. The location of the energy bands for the systems: Si(111)/Alq_3; Si(111)/Alq_3/LiBr; Si(111)/LiBr/Alq_3; Si(100)/Alq_3; Si(100)/Alq_3/LiBr; Si(100)/LiBr/Alq_3 has been determined from UV photoelectron spectroscopy.