ON THE OPTICAL PARAMETERS OF THIN METAL FILMS

N. L. Dmitruk, S. A. Kovalenko, O. S. Kondratenko

Institute of Semiconductors Physics,
Nat. Acad. Sci. of Ukraine,
(*45, Prosp. Nauky, Kyiv 03028, Ukraine*)

S u m m a r y

The optical parameters (ε', ε'' or n, k) of thin (semitransparent) and ultrathin ($d < 5$ nm) Au films on a transparent substrate are determined by the independent methods of multiangle incidence ellipsometry and spectroscopy of reflectance/transmittance of polarized light. The physical size effect caused by the increasing role of surface scattering of electrons (height ε'') is found from the thickness dependences of n and k. The effect of a change of the film topology (from continuous to discrete) with decrease of the film thickness, which is described by Bruggeman's effective medium approximation, is revealed. The conclusion about a change of the film topology with thickness is confirmed by the atomic force microscopy measurements. The coalescence of Au islands on the glass/quartz substrate at room temperature is observed.