

## Determination of optical constants for heterostructures with inner layer of Cu (Ag) by ellipsometric method

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The heterostructures of  $\text{Cr}_1\text{Ag}_{45}\text{TiO}_2$ ,  $\text{Cr}_{1.2}\text{Cu}_{40}\text{TiO}_7$ , and  $\text{Cr}_{1.2}\text{Cu}_{43}$ , prepared by chemical vapour deposition method were investigated using ellipsometric measurement method in order to calculate optical constants by two models namely Tautz-Lorentz and the effective medium model at the vicinity of the principal angle of the light incidence. Each sample contains a buffer layer of chromium that was deposited on quartz glass. Besides thin upper layer of  $\text{TiO}_2$  was deposited on sample by high-frequency magnetron sputtering.

As a result of optical measurements, within the range from  $190\text{nm}$  to  $25\mu\text{m}$  and carried out by Semilab SE-2000 device, two ellipsometric parameters  $\psi$  (an azimuth of the restored linear polarization) and  $\Delta$  (a phase shift between the p- and s-components of the polarization vector) were obtained, then the values were compared for the given heterostructures including a thin layer of copper and silver. Thereby it was found that upper layer of  $\text{TiO}_2$  deposited on surface does not significantly affect the absorption of these structures in the selected wavelength range. Eventually it was demonstrated 8% difference between the values of the reflection coefficient for the Tautz-Lorentz model and the values for the effective medium model. In addition it was found that heterostructure which contains only a pure layer of copper without upper layer of  $\text{TiO}_2$  gives the largest difference for the values of the reflection coefficient when compare these two models (approximately  $n$ - 10%,  $\kappa$ -15%,  $\sigma$ - 4%,  $R$ -10% ) and may indicate the formation of such oxide film on sample surface.

### Topics

Session A. Physics of condensed matter and spectroscopy

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