Spectroscopic Ellipsometry Material Model of a Thin Au Layer Prepared by Evaporation

Juraj Chlpík,^{1, a)} Soňa Kotorová¹, Michal Bennár², Ján Dérer², Ján Šoltýs², and Július Cirák¹

 ¹ Institute of Nuclear and Physical Engineering, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava, Ilkovičova 3, SK-812 19, Bratislava, Slovak Republic.
² Institute of Electrical Engineering, Slovak Academy of Sciences, Dúbravská cesta 9, SK-841 04 Bratislava, Slovak Republic

^{a)} Corresponding author: juraj.chlpik@stuba.sk

Abstract. After deposition of gold layers by evaporation, granular droplets ranging in size from one to several tens of nanometers commonly remain on the surface. In such metal nanostructures, localized surface plasmons can be formed upon interaction with light, similar to the case of gold nanoparticle layers. We have proposed a parametric material model that describes the effective refractive index of a 5 nm thick Au layer on Si substrate with roughness of a few nanometers based on the multioscillator Lorentz permittivity model.

ACKNOWLEDGMENTS

This work was financially supported by the grant of Cultural and Educational Grant Agency (KEGA) of the Ministry of Education, Science, Research and Sport of the Slovak Republic No. 006STU-4/2022, and by the grant of the Slovak Research and Development Agency, project No. APVV-20-0437.