**A metal film on a dielectric substrate within jellium model**

P. P. Kostrobij and B. M. Markovych

*Lviv Polytechnic National University, Department of Applied Mathematics, 12 S. Bandera Str., 79013 Lviv, Ukraine, E–mail: bohdan.m.markovych@lpnu.ua*

The thin metal films on dielectric or semiconductor substrates demonstrate properties that are interesting both from the point of view of fundamental science and from the perspectives of their technical applications in nanosized electronic devices.

One of the methods for a theoretical study of thin metal films is the use of model potentials, which are simple enough both to solve the stationary Schrödinger equation analytically and qualitatively correctly reflect the physical picture, namely, they do not allow electrons to leave a metal film [1].

The chemical potential and the work function of an aluminium metal film which is in the vacuum (1) and on a dielectric substrate (2) are obtained using the model of non-interacting electrons limited by an asymmetric rectangular potential well. For the first time, these two characteristics are calculated with correct taking into account the electroneutrality condition. As a result, the values of the chemical potential and the work function tend to their bulk values upon increasing the film thickness. The presence of a dielectric substrate leads to a small shift in the values of these characteristics [2].

# References

[1] P. P. Kostrobij and B. M. Markovych, Effect of Coulomb interaction on chemical potential of metal film, Philosophical Magazine **98** (2018), pp. 1991–2002.

[2] P. P. Kostrobij and B. M. Markovych, The chemical potential and the work function of a metal film on a dielectric substrate (2018), arXiv:1804.08884 (to be published in Philosophical Magazine Letters).