Journal of Physics D: Applied Physics

CORRIGENDUM • OPEN ACCESS

Corrigendum: Schottky effect on the wavelength threshold for the photo-detachment from charged metallic nanoparticles (2023 *J. Phys. D: Appl. Phys.* 56 29LT01)

OPEN ACCESS
IOP Publishing

Journal of Physics D: Applied Physics

J. Phys. D: Appl. Phys. **56** (2023) 439501 (2pp)

https://doi.org/10.1088/1361-6463/ace9e4

Corrigendum: Schottky effect on the wavelength threshold for the photo-detachment from charged metallic nanoparticles (2023 *J. Phys. D: Appl. Phys.* 56 29LT01)

Mikhail N Shneider[1,*], Yevgeny Raitses[2] and Shurik Yatom[2]

[1] Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ 08544, United States of America
[2] Princeton Plasma Physics Laboratory, Princeton, NJ 08540, United States of America

E-mail: m.n.shneider@gmail.com

Received 30 June 2023
Accepted for publication 24 July 2023
Published 1 August 2023

CrossMark

(Some figures may appear in colour only in the online journal)

In our recent work [1], the coefficient 1/2 was lost in the expression for the image force potential and total potential for an electron in the vicinity of a spherical charged metal nanoparticle. Instead of (3) and (5), the corresponding corrected expressions are as follows:

$$\varphi_{im} = -\frac{e^2 R^3}{8\pi\varepsilon_0 r^2 (r^2 - R^2)}, \; r \geq R \tag{3}$$

$$\Delta W(R,Q,r) = -\frac{e^2 R^3}{8\pi\varepsilon_0 r^2 (r^2 - R^2)} + \frac{e|Q|}{4\pi\varepsilon_0}\left(\frac{1}{r} - \frac{1}{R}\right). \tag{5}$$

Corrected plots (3a), (3b), (5a) and (5b) are qualitatively the same and appear

[*] Author to whom any correspondence should be addressed.

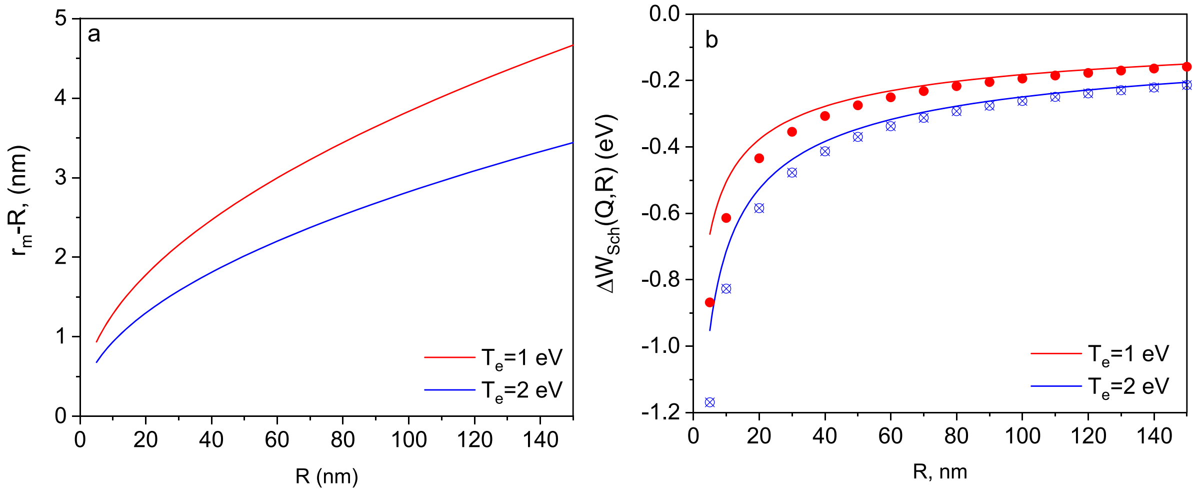

Figure 3. (a) Position of the potential barrier extremum in the vicinity of the particle boundary determined by solving equation (7); (b) corresponding values of the barrier decrease (8) owing to the Schottky effect. Calculations were carried out for a nonequilibrium nitrogen plasma with $T_i = 300$ K and for two cases of electron temperature $T_e = 1$ and 2 eV. The corresponding floating potentials are $\varphi_s = -2.62$ and -4.75 V. The symbols show the corresponding 'analytical' values (E1), calculated for the plain geometry.

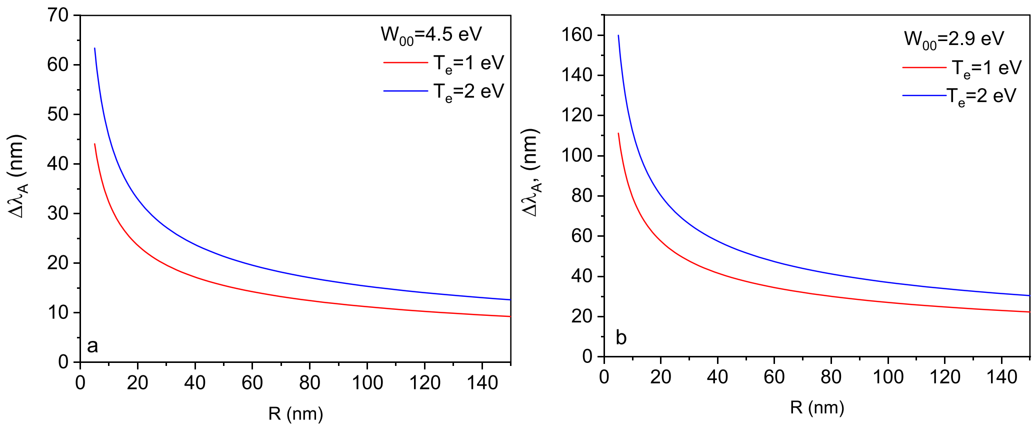

Figure 5. The calculated changes in the red border of the laser radiation wavelength for the electron affinity, at which the photo-detachment of electrons from silver (a) and lithium (b) particles of different radii begins. A weakly ionized nitrogen plasma at $T_i = 300$ K was considered.

In addition, since the calculations show that $(r_m - R)/R \ll 1$, it should be expected that the Schottky barrier shift for a charged spherical particle will be close to the analytical estimate for the planar case [2]

$$\Delta W_{Sch} = -\sqrt{\frac{e^3 |E_s|}{4\pi\varepsilon_0}} \tag{E1}$$

where the electric field is equal to the field on the surface of a charged particle, $E_s = \frac{Q}{4\pi\varepsilon_0 R^2} = \frac{\varphi_s}{R}$. In figure 3(b), along with the calculated values of the reduction in the potential barrier $\Delta W_{Sch}(R, Q)$, the symbols show the corresponding values (E1). It can be seen that with increasing particle radius, the analytical values for the flat geometry coincide with the calculated values for spherical particles. The discrepancy from the flat case becomes noticeable for particles with a small radius $R < 10$ nm.

All conclusions of the work and the rest of the quantitative results remain valid. At the same time, the results of the calculations of a shift in the red border of the laser radiation wavelength change up to an order of magnitude in the direction more favorable for the experimental observation down to submicron particle sizes.

ORCID iDs

Mikhail N Shneider https://orcid.org/0000-0002-2925-7008
Yevgeny Raitses https://orcid.org/0000-0002-9382-9963

Reference

[1] Shneider M N, Raitses Y and Yatom S 2023 *J. Phys. D: Appl. Phys.* **56** 29LT01
[2] Schottky W 1914 *Phys. Z.* **15** 872