Supporting Information to

Transparent conductive nanoporous aluminium mesh prepared by electrochemical anodizing

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Evaluation of ϕ_f and ϕ_{crit} values for the hexagonally arranged *Al* nanoporous mesh

Figure S1 shows the geometrical model based on [1] for the calculation of *Al* nanoporous mesh volumes ϕ_f and ϕ_{crit}. According to this model, the values of ϕ_f and ϕ_{crit} are:

$$\phi_f = \frac{V_{r_f} - \left(V_p - V_{ppi} - V_{pc_f}\right)}{V_{r_f}}, \tag{1}$$

$$\phi_{crit} = \frac{V_{r_{crit}} - \left(V_p - V_{ppi} - V_{pc_{crit}}\right)}{V_{r_{crit}}}, \tag{2}$$

where V_r is the volume of the simulation rectangular unit cell, V_p is the volume of semisphere, V_{ppi} is the volume of the semisphere-semisphere intersection and V_{pc} is the volume of the spherical cap. The parameters V_p and V_{ppi} are same for both ϕ_f and ϕ_{crit}. Taking into account that the simulation unit cell contains two whole pores, V_p and V_{ppi} are:

$$V_p = \frac{1}{3}\pi d^3, \tag{3}$$

$$V_{ppi} = \frac{1}{4}\pi(2d + a)(d - a)^2, \tag{4}$$

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where *d* and *a* are the pore diameter and the interpore distance respectively.

The values of V_{r_f}, $V_{r_{crit}}$, V_{pc_f} and $V_{pc_{crit}}$ can be calculated by

$$V_{r_f} = \sqrt{3}a^2\left(\frac{d}{a} - h_i\right), \tag{5}$$

$$V_{r_{crit}} = \sqrt{3}a^2\left(\frac{d}{a} - h_{crit}\right), \tag{6}$$

$$V_{pc_f} = \frac{2}{3}\pi h_i^2\left(\frac{3}{2}d - h_i\right), \tag{7}$$

$$V_{pc_{crit}} = \frac{2}{3}\pi h_{crit}^2\left(\frac{3}{2}d - h_{crit}\right), \tag{9}$$

where h_i and h_{crit} are the distances from the bottom of pore to the substrate as shown in Fig. S1. h_i is varied from zero to h_{crit}.

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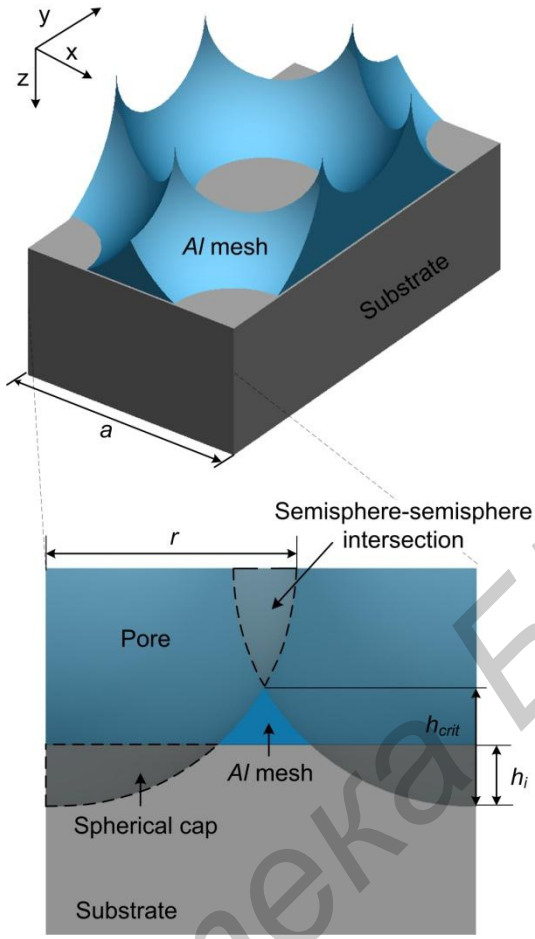

Figure S1 Schematic diagram (left) and cross-section (right) of the simulation unit cell of the hexagonally arranged *Al* nanoporous mesh.

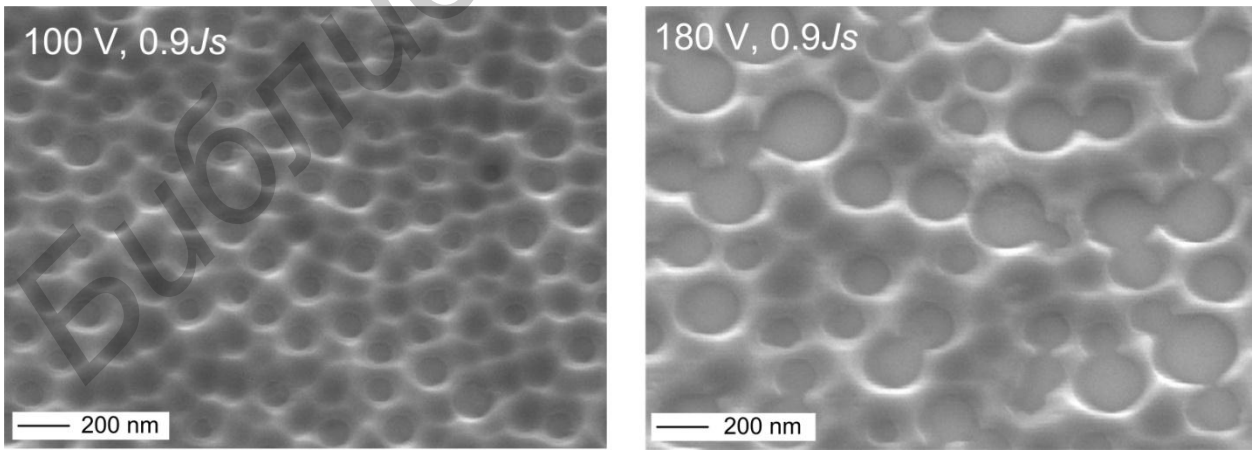

Figure S2 Enlarged SEM images of the *Al* nanoporous mesh obtained by the anodizing at the applied voltages of 100 (left) and 180 (right) V and the current density $0.9J_1$.

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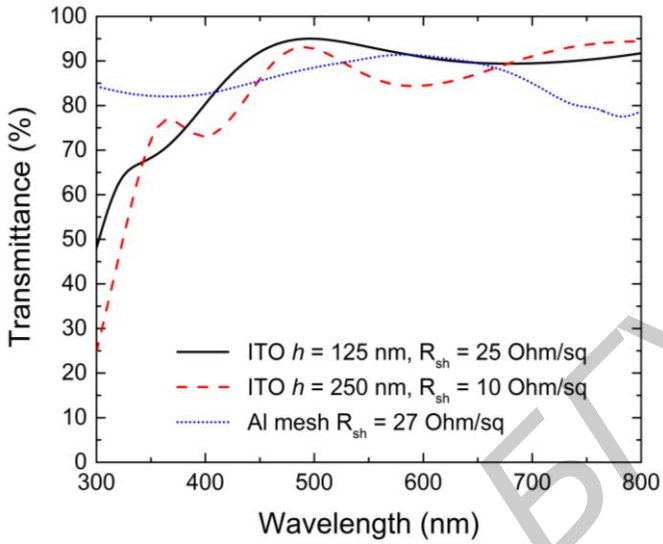

Figure S3 The calculated transmittance against wavelength for the bulk ITO with thickness of 125 and 250 nm and *Al* nanoporous mesh on the glass substrate. The diameter of pores and interpore distance of the *Al* nanoporous mesh are 180 and 200 nm respectively.

Reference

[1] F. Keller, M. Hunter, and D. Robinson, J. Electrochem. Soc. **100**, 411 (1953).

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