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# Thermal switching of the electrical conductivity of Si(111)($\sqrt{3} \times \sqrt{3}$)Ag due to a surface phase transition

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# Corrigendum

**Thermal switching of the electrical conductivity of Si(111)($\sqrt{3} \times \sqrt{3}$)Ag due to a surface phase transition**

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Our recent paper on the surface conductivity of Si(111)($\sqrt{3} \times \sqrt{3}$)Ag [1] contains an error in the numerical simulation of the space charge layer conductance presented in figure 2(b) of the paper. A new version of the figure is presented here as figure 1.

The incorrect version of this figure suggested that the space charge layer conductivity of Si(111)($\sqrt{3}\times\sqrt{3}$)Ag is very similar to that of the clean Si(111)(7×7) surface but actually this is not the case. The space charge layer for Si(111)(7×7) becomes strongly insulating at low temperatures whereas it is rather conductive over the whole temperature range for Si(111)($\sqrt{3} \times \sqrt{3}$)Ag.

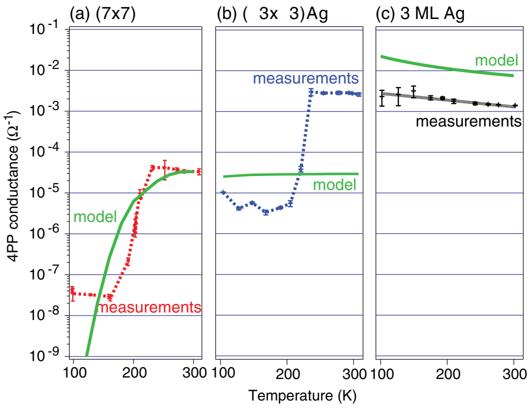


**Figure 1.** Experimental results (broken lines and markers) together with simulations (solid lines) of the conductance. The simulation in (b) has now been corrected, but the figure is otherwise the same as figure 2 from [1]. The model calculation shows the expected conductance of the bulk and space charge layer in (a) and (b) and for the expected conductance of a 3 ML Ag film with bulk properties in (c).

The error in the calculation of the space charge layer conductivity has an impact on the interpretation of the low temperature measurements. Based on the incorrect calculation, it was concluded that the measurements are always surface sensitive, but this is not the case. In fact, the measured conductance in the low temperature regime is now quite similar to the conductance one could expect for the bulk and space charge layer.

The interpretation of the data as a switching due to the surface phase transition is still consistent with results, especially since the transition in conductivity is much steeper than one would expect for a mechanism involving the freezing of carriers in the space charge region. However, we would also like to mention an alternative interpretation at this point. The free-electron like surface state on Si(111)($\sqrt{3} \times \sqrt{3}$)Ag is unoccupied at zero temperature because the bottom of the band coincides with the Fermi energy [2]. At finite temperature, thermally excited carriers are present in the surface state band. It is therefore conceivable that the strong change in surface conductivity is caused by the thermal emptying of the surface state band as the temperature is lowered. At low temperature, the surface state band is devoid of carriers and only transport through the bulk and space charge layer can be observed.

## References

[1] Wells J W, Kallehauge J F and Hofmann Ph 2007 *J. Phys.: Condens. Matter* **19** 176008
[2] Crain J N, Gallagher M C, McChesney J L, Bissen M and Himpsel F J 2005 *Phys. Rev.* B **72** 045312

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