

Electrical contacts to semiconductor materials

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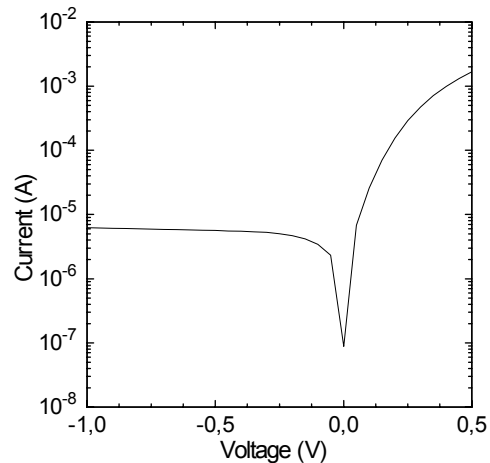
Preparation of good quality electrical contacts to semiconductor materials isn't an easy task. A simple metal/semiconductor contact is usually rectifying, but it exhibits relatively low barrier height and high leakage current, while good quality Schottky contacts require high barrier height and as low leakage, as possible. On the other hand, ohmic contacts require non-rectifying current-voltage characteristics and low contact resistance, much lower, than the bulk resistance of the semiconductor substrate.

Our group has expertise in preparation and analysis of electrical contacts to semiconductors. We have experience in both Schottky and ohmic contacts (including transparent electrodes) to different single, multi- and nanocrystal, amorphous, and even porous elementary and compound semiconductors as well, as in theoretical analysis and computer simulation of different behaviour, unusual phenomena and anomalies. We have also worked out several evaluation methods to extract information from the electrical characteristics of the contacts. Below a few examples of our experimental results are shown.

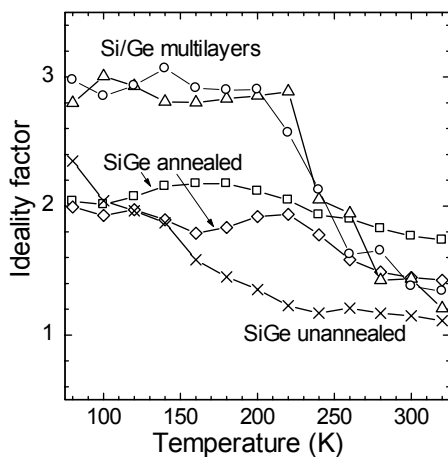
Effect of chemical treatment on the behaviour of Al/p-Si Schottky contacts
[Horváth et al., Appl. Surf. Sci. 190, 441].

Treatment	Barrier height (eV)	Ideality factor
Acetone	0.75	1.14
HF	0.38	1.05
HNO ₃	0.86	1.06
H ₂ SO ₄ + H ₂ O ₂	0.91*	1.17

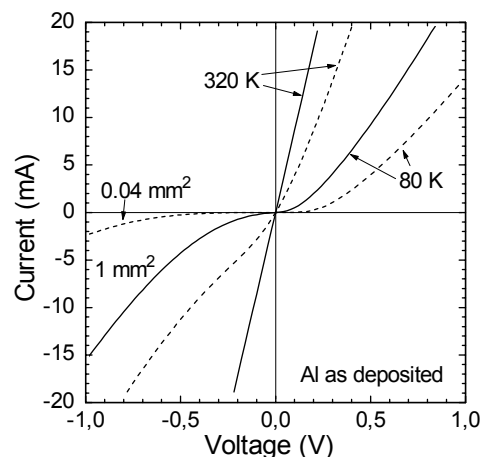
*One of the highest barrier height ever published for p-Si.



Current-voltage characteristics of a metallic polypyrrole/p-Si diode
[Cakar et al., Proc. ASDAM 2000, p. 255].



Temperature dependence of ideality factor of different sputtered amorphous Si/Ge multilayers and SiGe layers
[Horváth, Current Appl. Phys. 6, 205].



Rectification behaviour of Al/n-GaN contacts: temperature and area dependence
[Dobos et al., Appl. Surf. Sci. 253, 655].