

Supporting Information

Tunable Charge Transport through n-ZnO nanorods on Au coated Macroporous p-Si

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Thickness of the gold coating:

The estimated average thickness of the gold layer is about ~24 nm as observed from Field Emission Scanning Electron Microscope (FE-SEM) images shown in Figure S1.

The thin Au buffer layers have two advantages: (a) Au prevents ambient oxidation of the etched Si templates which produces the unwarranted insulating barrier of SiO₂; and (b) It is reported in previous work that Au can act as a catalyst that promotes vertical alignment of ZnO nanorods grown on substrates which is a favorable case from the fabrication point of view.

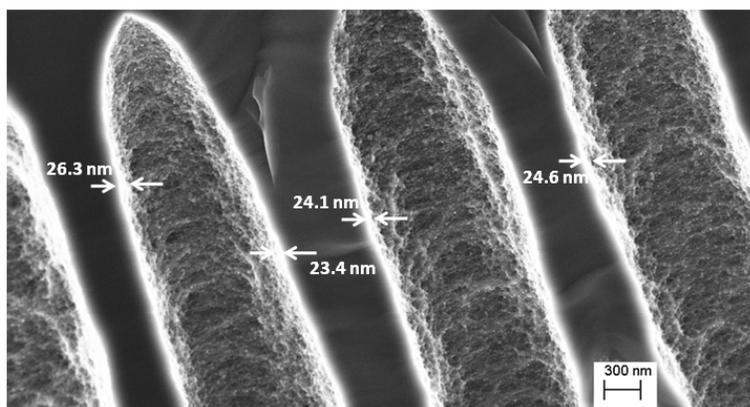


Fig S1 FE-SEM image showing the deposition of a thin layer of Au on the walls of macroporous Si. The average thickness of the Au layer is estimated to be ~24 nm.

SEM images of the top contacts:

We established two contact pads, one on the Si template and the other one on the ZnO rods which are grown on the macroporous Si template. Metallic contacts were fabricated, using a shadow mask, on the ZnO rods by e-beam deposition (Varian) of 600 nm thick and 0.5 mm diameter pads of Ag which were

subsequently annealed at 300°C for 30 s. The Fig. S2 shows the SEM image of the contact pads deposited on the device.

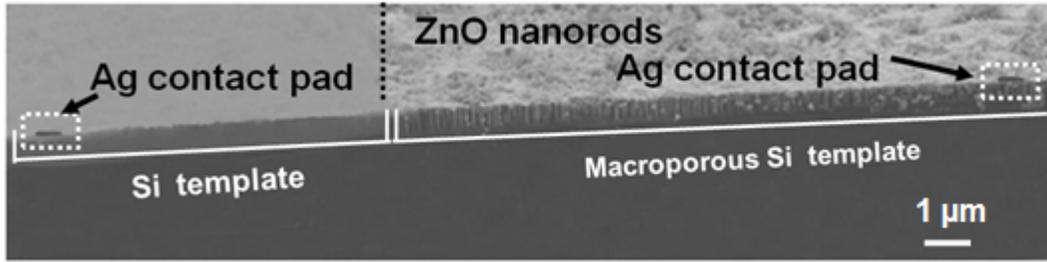


Fig S2: SEM image showing Ag contact on the Si template, as well as on the vertically aligned ZnO nanorods grown on the top of the macroporous Si template.

Contact resistance variation with temperature:

Contact resistance of the system was calculated at different temperatures by using the slope of $I-V$ curve (at different temperatures) at $V=0$ which is plotted in Figure S3. From the curve it has been observed that the variation of the contact resistance is very small, only 0.02 mΩ variation over a temperature range of 200 K. There is negligible amount of decrement in the contact with the increment of operating temperature. However this small contact resistance and its variation will not really affect a great deal in the overall $I-V$ characteristic of the fabricated structure.

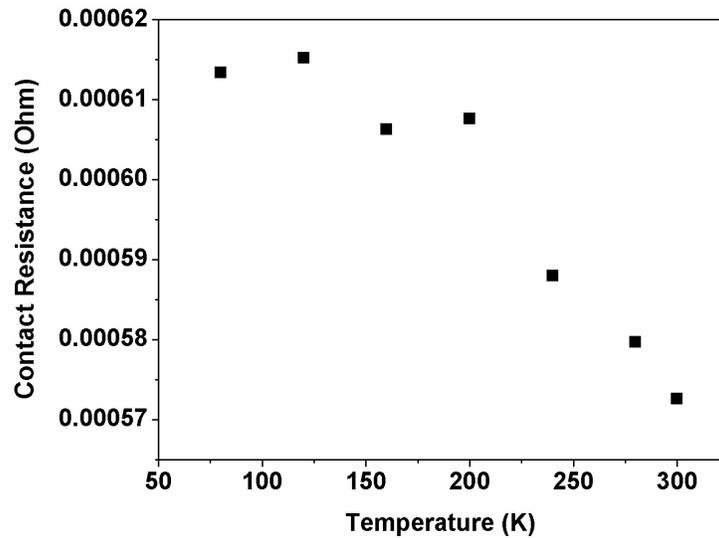


Fig S3: Variation of contact resistance with temperature.