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ARTICLE

Gold Nanowire Electrodes in Array: Simulation Study and Experiments

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Supplementary Information

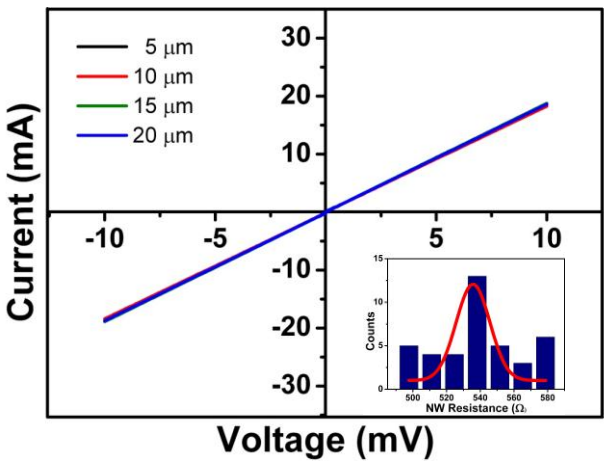

Figure S1: Typical two point I-V characteristics measured for four nanowire arrays with interelectrode separations of 5, 10, 15 and 20 µm, respectively. All nanowire arrays exhibit Ohmic behaviour and low contact resistances resistance regardless of the inter-electrode separation. Inset: histogram showing the distribution of array resistances. Solid red line is a Gaussian fit to the data, average resistance is 539 ± 26 Ω

Standard two-point I-V measurements in air are undertaken as a quality control check to ensure that all nanowire electrodes are fully functional prior to electroanalysis. A voltage bias of ±10 mV is selected to confirm Ohmic behaviour. The low voltage range is chosen to avoid undesired electro-migration effects which may damage the nanowires. The electrical behaviour observed at fully fabricated single nanowires is very reproducible as can be seen in Figure 4 inset. All functioning nanowire array devices display linear Ohmic responses confirming good electrical contact to nanowires by the interconnections tracks. Array devices also exhibit low resistance (539 ± 29 Ω, n=40) regardless of their separation, see Figure 4. This low variation (~5.3%) in electrical performance for discrete nanowire arrays is excellent and is consistent with that observed for nanowire dimensions. Control electrical measurements were obtained in the absence of nanowire arrays, yielding very high resistances (~10 GΩ) typical of an open circuit. This confirms that the underlying silicon oxide functioned as an effective insulating layer preventing electrical coupling with the silicon beneath and that the observed electrical characteristics were exclusively generated by the nanowire arrays. Nanowire array devices that exhibit high resistances or open circuit are discarded and not used for electrochemical analysis

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