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Assessing the electrical activity of individual ZnO nanowires thermally annealed in air

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Table 1 | Chemical and physical parameters used for the ZnO NW arrays synthesis. The different annealing temperatures employed for the SCM studies are also added to the table.

Batch		Reactants	Growth duration	Autoclave temperature	Annealing temperature/time
Without NH_4OH	Sample A	• Zinc nitrate hexahydrate $Zn(NO_3)_2$ • Hexamethylenetetramine (HMTA)	15h	85°C	RT
	Sample B				350°C/1.5h
	Sample C				350°C/15h
	Sample D				450°C/15h
With NH_4OH	Sample E	• Zinc nitrate hexahydrate $Zn(NO_3)_2$ • Hexamethylenetetramine (HMTA) • Ammonium hydroxide NH_4OH (29%)	15h	85°C	350°C/15h
	Sample F				450°C/15h

ZnO NWs grown by hydrothermal method lead to pure phase material. The samples present the main diffraction peak of hexagonal würtzite ZnO structure (peak at 34.4° corresponding to the lattice plane (0002) of würtzite ZnO structure) attesting that the NWs grew predominantly along the [0001] direction.

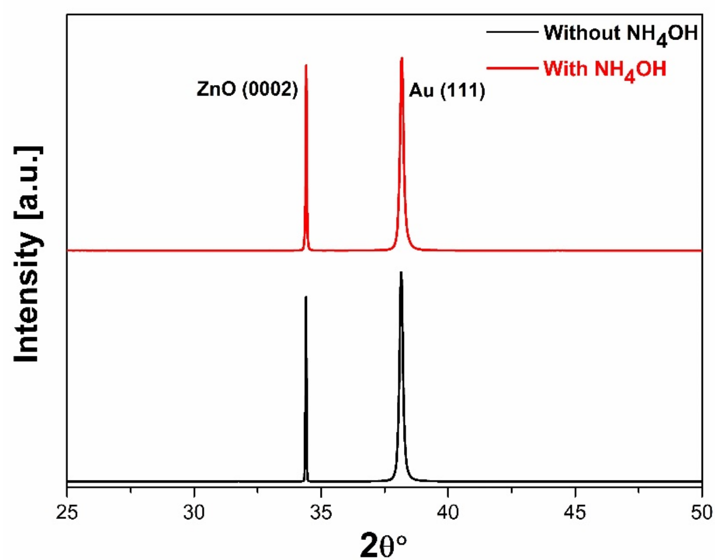

Figure S1 | XRD spectra of the ZnO NWs deposited with and without NH_4OH.

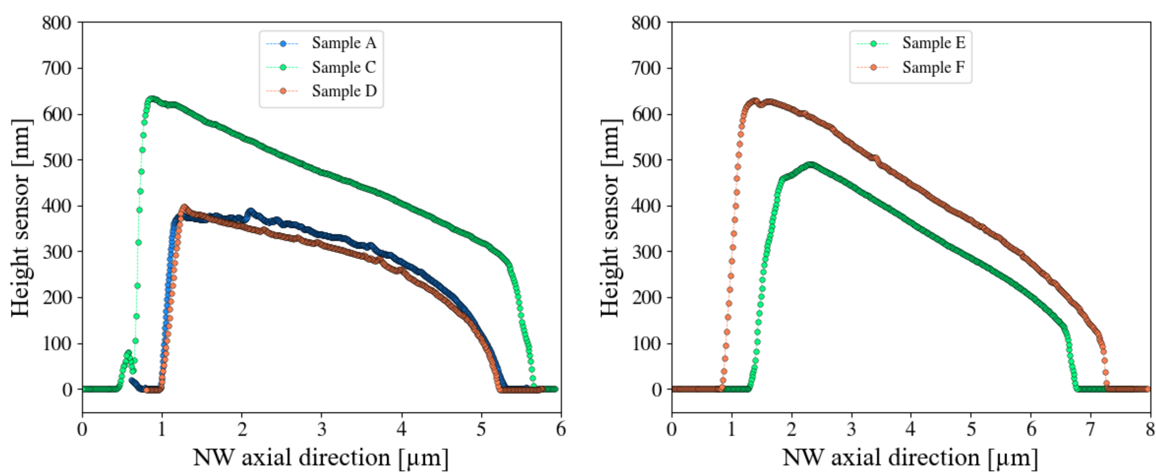

Figure S2 | Topographic profile of the different ZnO NWs.

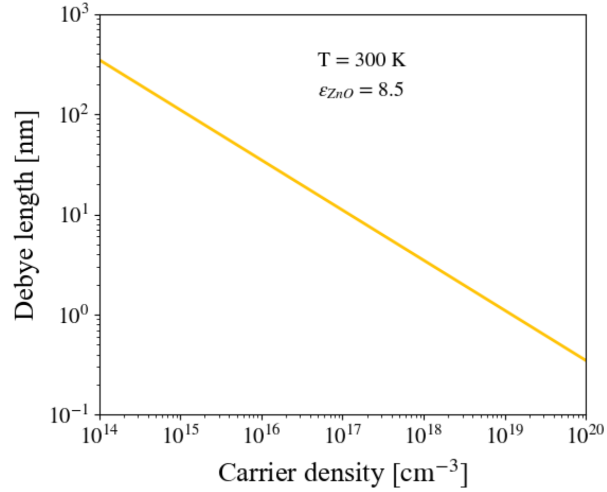

Figure S3 | Extrinsic Debye length as a function of carrier density for ZnO (ε_{ZnO} = 8.5) at room temperature. The carrier density n is related to the Debye length $\lambda = [(k_B \times T \times \varepsilon) / (q \times n)]^{1/2}$ (where k_B: is the Boltzmann constant, T: the temperature, ε: the permittivity of the semiconductor and q: the elementary charge. Lower carrier concentration will lead to a large depletion region and poor spatial resolution of the SCM technique.

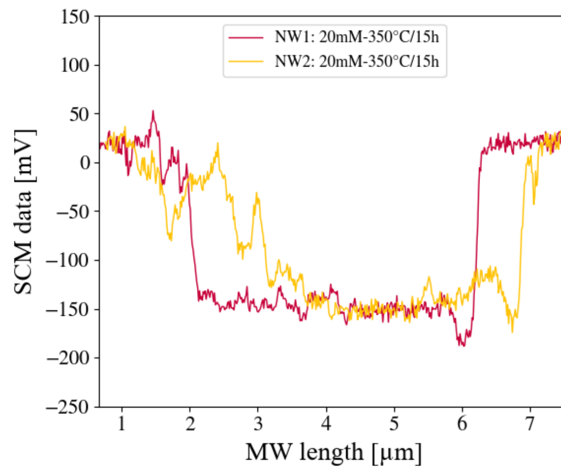

Figure S4 | SCM signals along axial direction of two ZnO NWs grown with 20mM of NH_4OH and annealed at 350°C/15h.

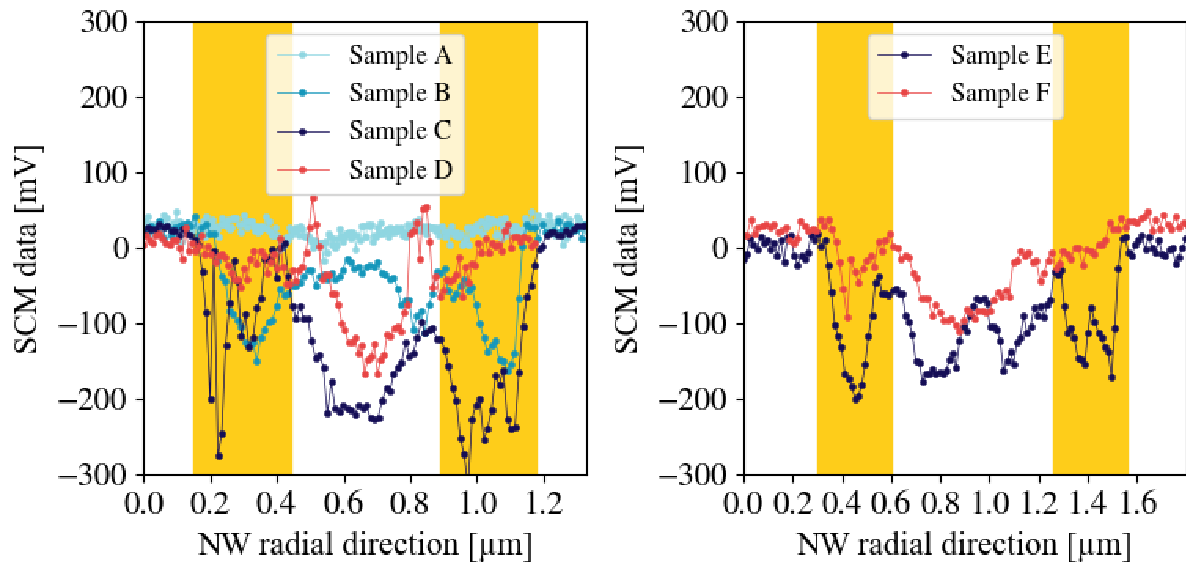

Figure S5 | SCM data evolution along the radial direction of ZnO NWs. The different profiles are extracted at the middle of the NW in the axial direction. The signals inside the yellow bands correspond to the side facets.