Supplementary Information for Enhanced adhesion of ZnO nanowires during in situ scanning electron microscope peeling

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Identifying a NW's inflection location

A NW's inflection location, point B, was identified by fitting the following exponential function to co-ordinates that were extracted from along the length of the NW. The exponential function provides a general S-shape curve containing only a single inflection location, and is therefore not sensitive to the fit range.

$$\delta(x) = \frac{C}{1 + e^{B\,x\,-\,A}}, \qquad (S1)$$

where A, B, and C are fitting constants. The inflection location was identified as the point at which the second derivative of deflection with respect to *x* was zero, $d^2\delta/dx^2(x) = 0$.

Uncertainty within the obtained interfacial adhesion energies

The maximum SEM resolution was expected to be approximately 6 nm, therefore '*a*' was considered to have an absolute uncertainty of, $\Delta a = \pm 3\ nm$. The fitting of eqn (1) was sensitive to the range of the co-ordinate set extracted from a snapshot. Therefore, '*h*', and, '*s*', were considered to have an absolute uncertainty of, $\Delta h = \pm 0.05\ \mu m$, and, $\Delta s = \pm 0.1\ \mu m$, respectively. The uncertainty within Γ was then computed using the propagation of uncertainty rule for general functions: [1]

$$\Delta\Gamma = \sqrt{\left(\frac{\partial\Gamma}{\partial a}\cdot\Delta a\right)^2 + \left(\frac{\partial\Gamma}{\partial h}\cdot\Delta h\right)^2 + \left(\frac{\partial\Gamma}{\partial s}\cdot\Delta s\right)^2} \qquad (S2)$$

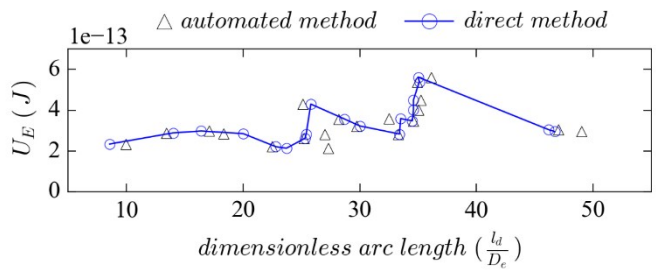

Fig. S1 Strain energy evolution of NW14, showing the difference in arc length, calculated using an automated method and measured directly.

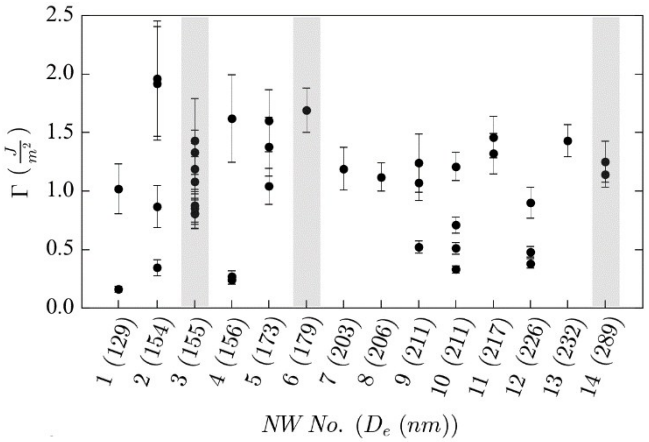

Fig. S2 The interfacial adhesion energy obtained for all identified equilibrium states of all tested NWs. Bars illustrate the maximum and minimum uncertainty associated with the nominal Γ for each snapshot.

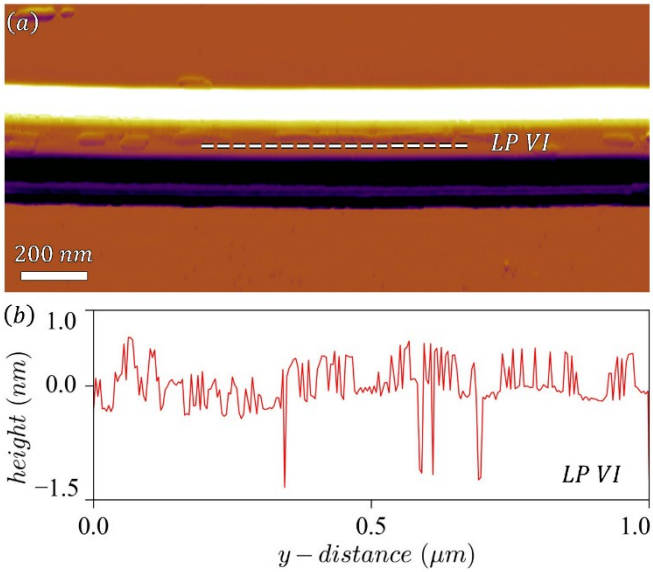

Fig. S3 (a) AFM micrograph of a typical ZnO NW adhered to a mica substrate. Line-profile VI is demarcated. (b) Line-profile of the top surface of the adhered NW (LP VI).

References

1. C. Ratcliffe and B. Ratcliffe, *Doubt-Free Uncertainty In Measurement: An Introduction for Engineers and Students*, Springer International Publishing, Cham, Switzerland, 2015.