

Supplementary Information

Structurally Engineered Heat Loss Suppression in Nanogap-Aligned Nanowires for Power Efficient Heating

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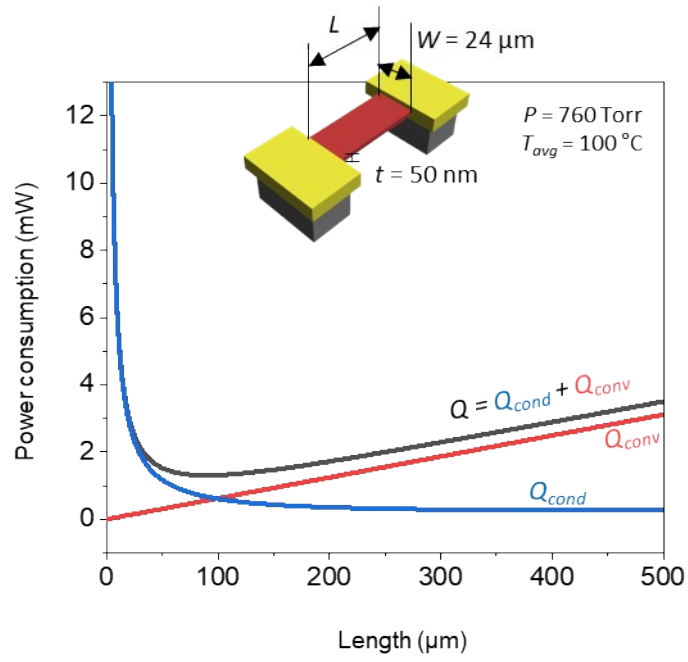


Figure S1. The analytic calculations of power consumption required to reach an average beam temperature of 100 °C at 760 torr in a 50 nm-thick, 24 μm-wide Pt thin film as a function of length (up to 500 μm), along with the trends in conduction and convection.

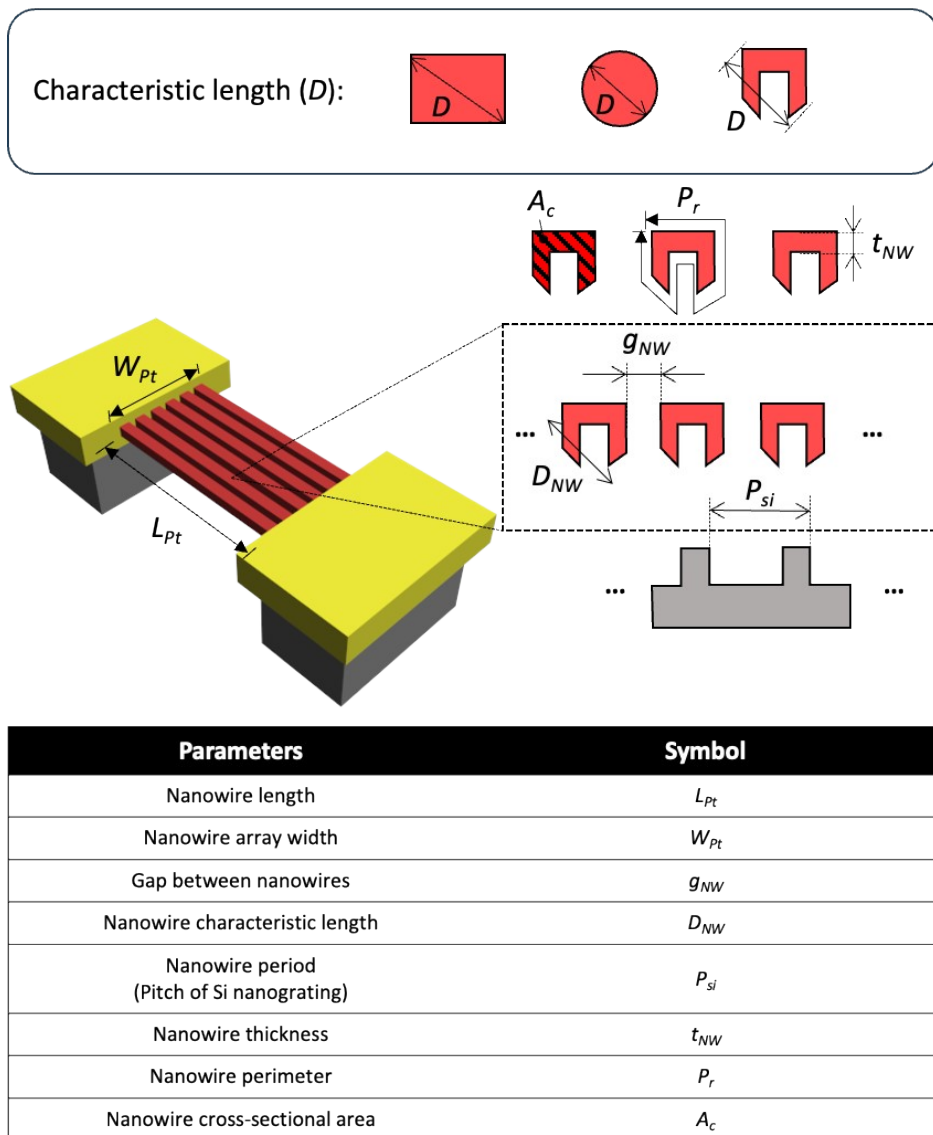


Figure S2. Geometrical parameters and symbols in the fabricated nanowire array for the calculation.

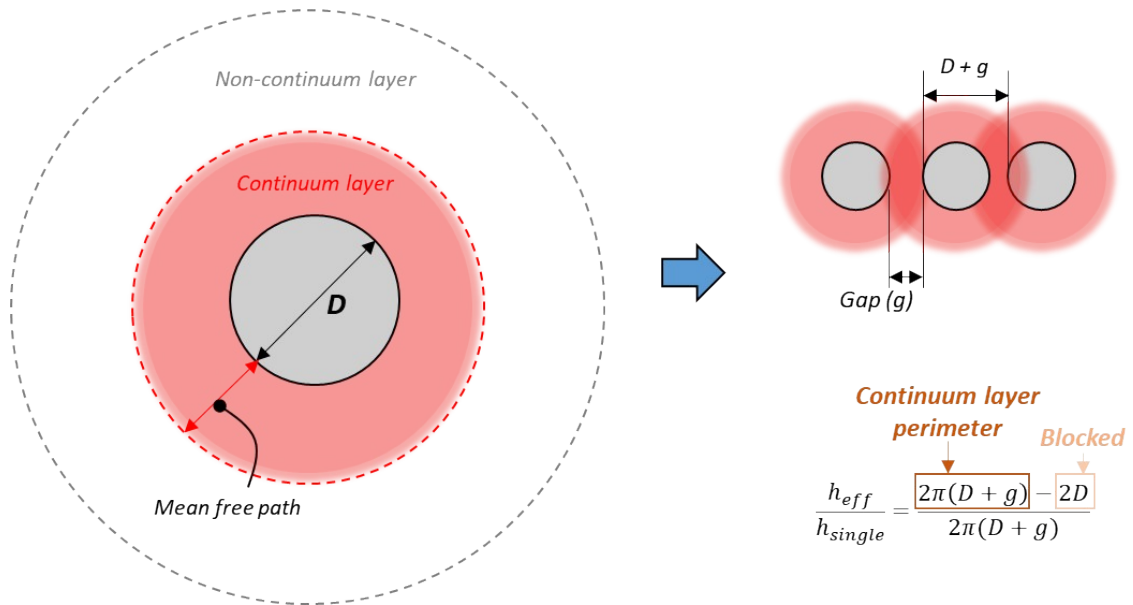


Figure S3. Schematic of the two-layer model showing the continuum layer and the change in the effective convective heat transfer coefficient when materials are close enough for their continuum layers to overlap, blocking molecular interactions.

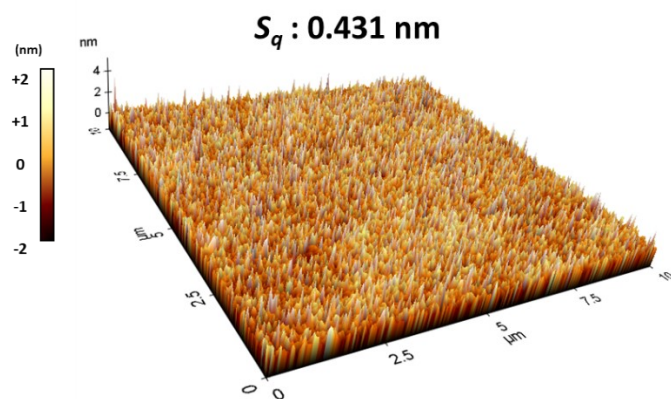


Figure S4. Measured surface roughness using atomic force microscopy for a 30 nm Pt film with a 10 nm Cr adhesion layer at the same deposition and annealing condition with other Pt samples.

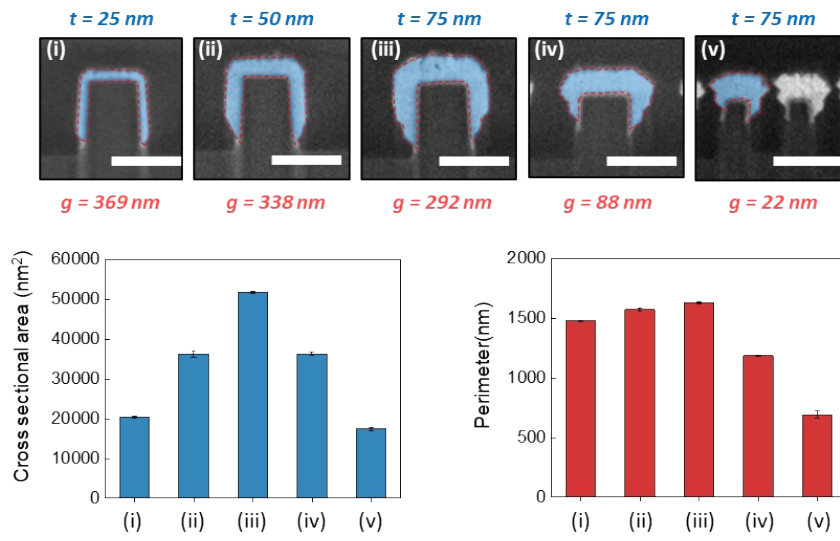


Figure S5. The cross-sectional area and perimeter of the fabricated C-shaped nanowires measured from the respective SEM images.

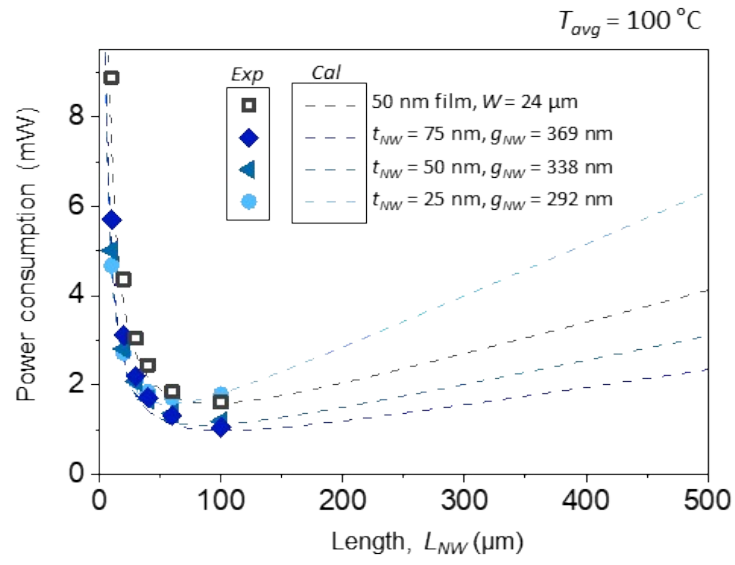


Figure S6. Power consumption with respect to length, up to 500 μm , as an extended plot of Figure 4d.

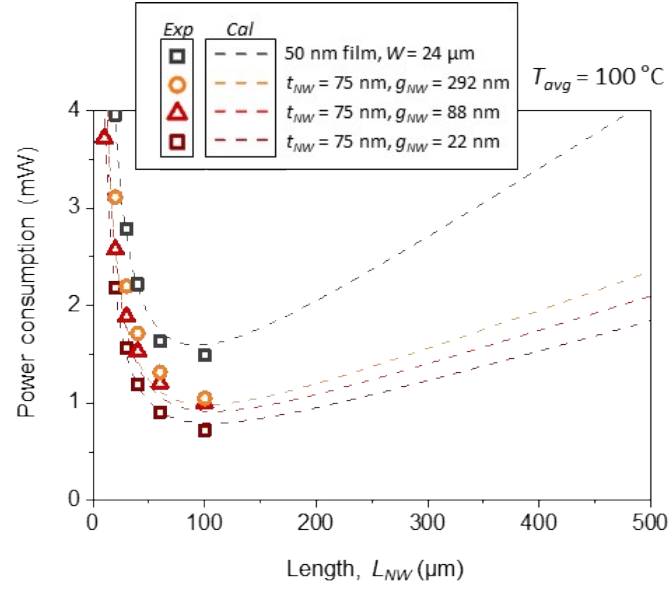


Figure S7. Power consumption with respect to length, up to 500 μm , as an extended plot of Figure 5c.