

## Local Fabrication of Nanowires with High Aspect-Ratios using a Diffusion Mixing Reaction System for Temperature Sensing

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Nanofabrication has greatly promoted the miniaturization and integration of devices, and has led to extensive research in this area. Benefiting from the large surface-to-volume ratio of nanostructures, nanostructured sensors have been utilized for the highly sensitive and specific detection.

We developed a novel approach for selective fabrication of conductive nano-wires on a solid surface via diffusion mixing reaction system formed by a chemical pen.<sup>1,2</sup> The nanoscale-mixing region was achieved by appropriately adjusting the viscosity of the solution and other parameters with the aid of dyes functioned as a flow boundary indicator. Under the optimal parameters, high aspect ratio silver nanowires (aspect ratio  $\approx 1800$ ) were obtained.

The theoretical value of the temperature coefficient of resistance (TCR) for silver was  $0.0038 \text{ } \Omega/^{\circ}\text{C}$ . A single silver wire temperature sensor with 7-fold increase in temperature coefficient resistance ( $0.0261 \text{ } \Omega/^{\circ}\text{C}$ ) was fabricated to show the advantages of the chemical pen in the fabrication of nanowire sensors.<sup>3</sup>

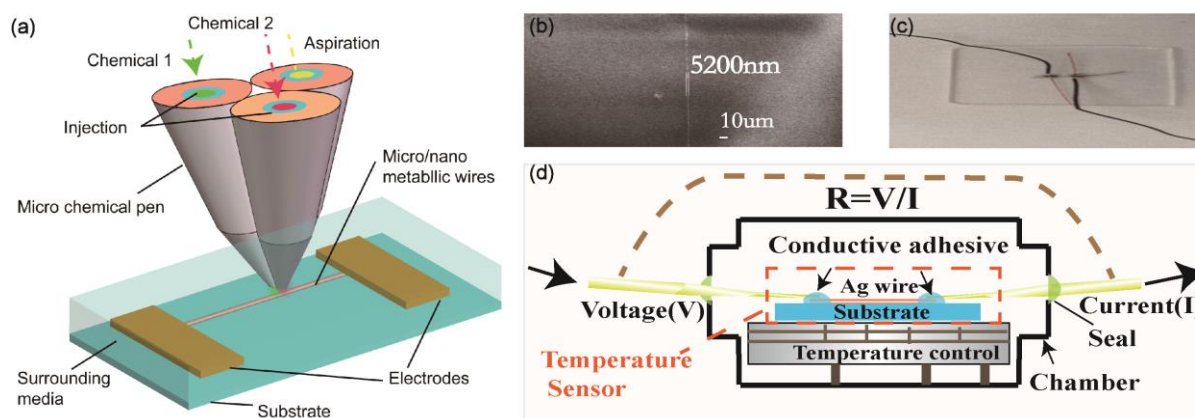


Figure 1. Single nanowire temperature sensor. (a) Scheme of the nanowire fabrication. (b) SEM image of the fabricated nanowire. (c) Photo of the temperature sensor. (d) Illustration of temperature sensing.

## References

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