Semiconductor nanowires


![Image of TEM images](image)

**Figure 1** In situ TEM images recorded during the process of nanowire growth. (a) Au nanoclusters in solid state at 500°C; (b) alloying initiates at 800°C, at this stage Au exists mostly in solid state; (c) liquid Au/Ge alloy; (d) the nucleation of Ge nanocystal on the alloy surface; (e) Ge nanocystal elongates with further Ge condensation and eventually forms a wire (f). (Reprinted with permission from Reference 12, copyright Am. Chem. Soc., 2001.)

VLS growth of Ge nanowires starting from a gold seed.

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GaN nanowires grown by VLS using gold nanoparticle templates. The image in (b) shows a gold nanoparticle at the end of a nanowire.
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ZnO nanowires grown by a hydrolytic route involving the amine-templated hydrolysis of Zn salts in solution.

Figure 4 ZnO nanowire array on a 4-inch silicon wafer. Centered is a photograph of a coated wafer, surrounded by SEM images of the array at different locations and magnifications. These images are representative of the entire surface. Scale bars, clockwise from upper left, correspond to 2 μm, 1 μm, 500 nm, and 200 nm. (Reprinted with permission from Reference 57, copyright Wiley-VCH, 2003.)
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Si/Si-Ge superlattices can be grown by pulsing the starting CVD precursors.

Figure 5 Transmission electron microscopy (TEM) image of two Si/SiGe superlattice nanowires.
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Core/sheath nanowires are also possible by using the core as a template to grow the sheath.

**Figure 6** Transmission electron microscopy image of a GaN/AlGaN core-sheath nanowire.
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Lasing with 266 nm pumping