



# Nanoscale Crystal Growth: The Importance of Interfaces and Phase Boundaries

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## Nanoscale Crystal Growth: The Importance of Interfaces and **Phase Boundaries**

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Nanoscale Crystal Growth: The Importance of Interfaces and Phase Boundaries Brent A. Wacaser Surfaces and interfaces have special significance to nanotechnology because the surface/volume ratio of nano- is larger than for bulk-materials. Investigating the interfaces therefore leads to greater understanding. Growth of some nanocrystals has been explained in the context of crystalline interfaces. This has helped improve production of devices that are both scientifically and commercially beneficial. This dissertation expands on the atomistic processes occurring at interfaces; explaining growth and control of different nanocrystals. A review of crystal growth terminology and theory is given, a new technology to produce compound semiconductor quantum dots is described, and growth of one-dimensional nanostructures is explained. A review the fundamental processes of the currently accepted vapor-liquid-solid (VLS) growth mechanism is expanded. Although the focus is on nanowires, most of the discussion may be applicable to whiskers, nanotubes, and other unidirectional growth. Due to the fundamental similarities in mechanisms with different names, the name 'Preferential Interface Nucleation' (PIN) is suggested as a replacement for VLS-like names.



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