Nanowires for basic science and for applications in electronics and photonics

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The nanowires (NWs) that I will talk about are single-crystalline semiconductors which form via guided self-assembly, replicating the crystalline structure of the substrate and with location and dimensions controlled by top-down lithography. One advantage of our approach is that high-performance III-V devices structures can be grown using silicon wafers as templates. I will initially dwell on our present understanding of the way nanowires grow, including recently explored manipulation and control of the growth of cubic and hexagonal NWs. After an overview of the physical properties of homogeneous as well as hetero-structured NWs I will concentrate on recent device studies, such as the realization of state-of-the-art wrap-gate controlled NW field-effect transistors, and on the potential for single-QD emitters, NW-light emitting diodes and NW-based solar-cells.