

Inorganic semiconductor nanowires: rational synthesis and novel properties

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Nanowires are of both fundamental and technological interest. They not only exhibit interesting electronic and optical properties intrinsically associated with their low dimensionality and the quantum confinement effect, but also represent the critical components in the potential nanoscale electronic and photonic device applications. With the ever-decreasing sizes of these 1D nanostructures, the "bottom-up" chemical approach is playing increasing role due to its capability of making much smaller features as compared to the "top-down" approach. Major challenge, however, remains in order to fully exploit these 1D nanostructures, namely, the development of suitable chemical strategies for the general synthesis, organization and integration of these nanoscale building blocks. In this talk, I will introduce the vapor-liquid-solid crystal growth mechanism for the general synthesis of nanowires of different compositions, sizes, orientation and doping profile. I will discuss some of the unique linear and nonlinear optical properties of the nanowires and their potential applications including nanolaser, nanosensor and optical switch. Strategies towards controlled assembly of these 1D building blocks will also be discussed.