Nanostructures- à la carte.

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Semiconductor nanostructures have received increasing attention as potential building blocks for nanoscale electronic and optical devices. A variety of methods has been employed during the last years for the manufacturing of nanocrystals and nanowires. These methods include chemical vapor deposition (CVD), pulsed laser depositon (PLD), chemical beam epitaxy (CBE), and thermal evaporation methods. Frequently, the preparation requires complicated experimental setups or do not permit the desired degree of growth control with respect to position and size of the quantum dots and nanowires. Ways are needed to grow nanocrystals or nanowires at the desired position, with a specific length and diameter, and a controlled material composition.

Methods for size control for Si quantum dotes are summarized. A method is demonstrated which enables the growth of Si nanocrystals in a dense arrangement and by using Si standard technology. Light emitting materials and devices based on Si are the future goal of this research. Figure 1 shows the TEM image of a dense array of Si quantum dots fabricated by our new method.

The engineering of materials on the nanometer scale is an emerging interdisciplinary field based on solid-state physics, chemistry and materials science. A controlled growth of nanowires is in the focus of such research. The talk will give an overview over the used growth methods as well as the methods used for position control (template development), and characterization. An example of an ordered array of ZnO nanowires grown at our institute is given in figure 2.

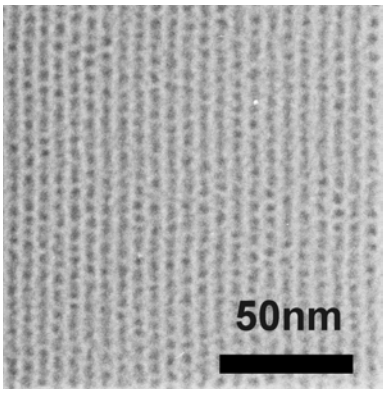

Fig. 1: Size controlled Si nanocrystals

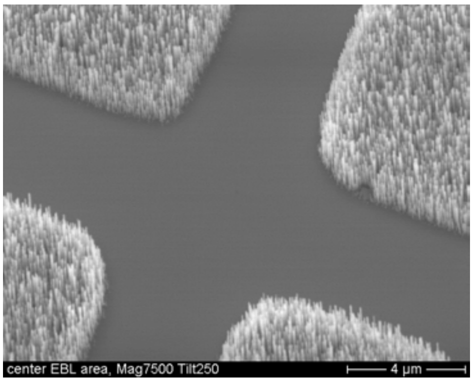

Fig. 2: Ordered arrays of ZnO Nanowires