Silicon Nanowire with a Complex Structure.

Dřínek, Vladislav
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Silicon nanowire with a complex structure

V. Dřínek [1*], J. Kupčík [2]
[1] Institute of Chemical Process Fundamantals ASCR, Rozvojová 135, 165 02 Prague 6, CZ
[2] Institute of Inorganic Chemistry ASCR, Řež u Prahy 100, 250 68, Czech Republic
[*] The corresponding author e-mail: drinek@icpf.cas.cz

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Nowadays a continual growing demand for green energy production, smart grids, energy storage, electric vehicles etc. boosts up a need for new technology approaches. One of the solutions is conversion of the solar energy into various forms of energy mostly chemical bond or electric energy.

At this moment, silicon seems to be the best choice for the sunlight absorbing materials. Nevertheless, indirect bandgap of crystalline silicon and relatively low conductivity of amorphous silicon are the great disadvantage in construction of photovoltaic devices. We hope that prepared silicon nanowires (SiNWs) with a complex structure allow a solution of such challenge.

SiNWs long up to 10 μm and thick about 100 nm were synthetized using silane as a precursor by means of CVD technique at 500 °C on molybdenum or stainless steel substrates in a qurtz tube placed in a furnace. Transmission Electron Microscopy showed that the jacket consists of nanocrystal of size 1–2 nm. Thin crystalline core thick ~10 nm grew in <110> direction. It is commonly recognized that very small silicon nanocrystalls having size less than 5 nm are governed by quantum size effects; for example their indirect bandgap merges into a direct one (Fig.).

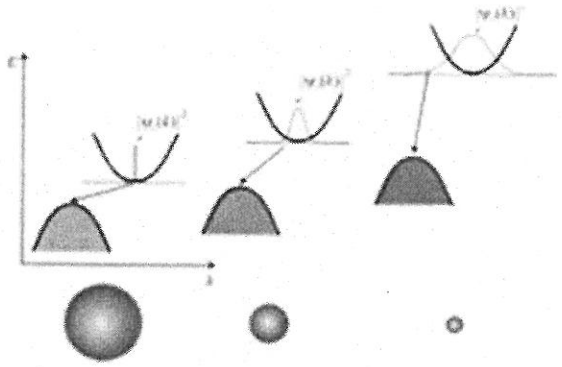

Figure: Quantum size phenomenon for semiconductor with indirect bandgap [1]

Reference
[1] J. Dian, I. Jelínek, *Chem. listy*, **104**, 770–777 (2010)

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