

Preparation of bimetallic catalysts for nanowire growth

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One-dimensional growth is usually, yet not always, performed using metal seed, which acts as a catalyst for growth itself. It has been shown, that incorporation of impurities from catalyst particle during the growth of nanowires from vapour phase changes their basic properties.

The most frequently used catalyst particle is made from gold. However, gold is responsible for so-called reservoir effect and is known to create deep traps in the band gap decreasing the carrier mobility which renders the nanowires incompatible with the CMOS technology.

In view of this, usage of other suitable materials, or their combinations as catalysts, can suppress unwanted effects or introduce advanced properties which open progressive possibilities for further applications. For example aluminium catalyst particle can lead to massive p-type doping [1], while alloyed gold-gallium catalysts are demonstrated to weaken reservoir effect, which can be used to grow sharp Si/Ge interfaces within the nanowire [2].

In our contribution we will describe preparation process for bimetallic particles with emphasis on gold or silver particle combined with other group III or group V element. Further on, we will demonstrate the results with germanium nanowires grown from these catalysts and discuss their effect on resulting properties.

[1] Moutanabbir, Oussama, et al. *Nature* 496.7443 (2013): 78-82.

[2] Gamalski, Andrew D., et al. *ACS nano* 7.9 (2013): 7689-7697.

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