Free-standing millimetre-long Bi_2Te_3 sub-micron belts catalyzed by TiO_2 nanoparticles
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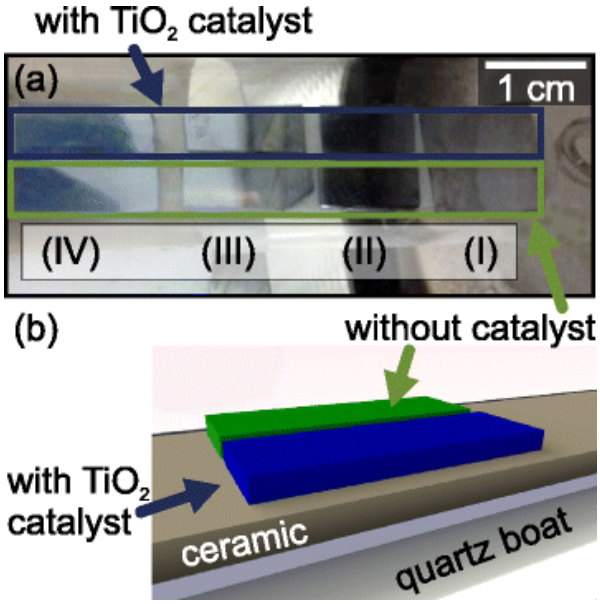
Physical vapour deposition (PVD) is used to grow millimetre-long Bi_2Te_3 sub-micron belts catalysed by TiO_2 nanoparticles. The catalytic efficiency of TiO_2 nanoparticles for the nanostructure growth is compared with the catalyst-free growth employing scanning electron microscopy. It is found that the catalyst enhances the yield of the belts. Very long belts were achieved with a growth rate of 28 nm/min. A ~1-mm-long belt with a rectangular cross section was obtained after 8 h of growth. The thickness and width were determined by atomic force microscopy with a ratio of ~1:10. Temperature-dependent conductivity measurements show a characteristic increase of the conductivity at low temperatures.



Above. Substrate arrangement. (a) Image of eight Si(100) substrates placed onto the ceramic insert in the quartz boat. The metal housing and the white isolation material of the furnace can be seen on the right-hand side. The *blue frame* indicates the four substrates coated with TiO_2 catalyst nanoparticles, and the *green frame* indicates four pristine substrates without catalyst. (b) Sketch of the substrate arrangement. Two substrates with (*blue*) and without catalyst (*green*) are placed next to each other. The ceramic insert assures the position of the substrates remains unchanged.