Research of The Growth Mechanism of Solvothermally Synthesized Sb_2Te_3 Nanosheets

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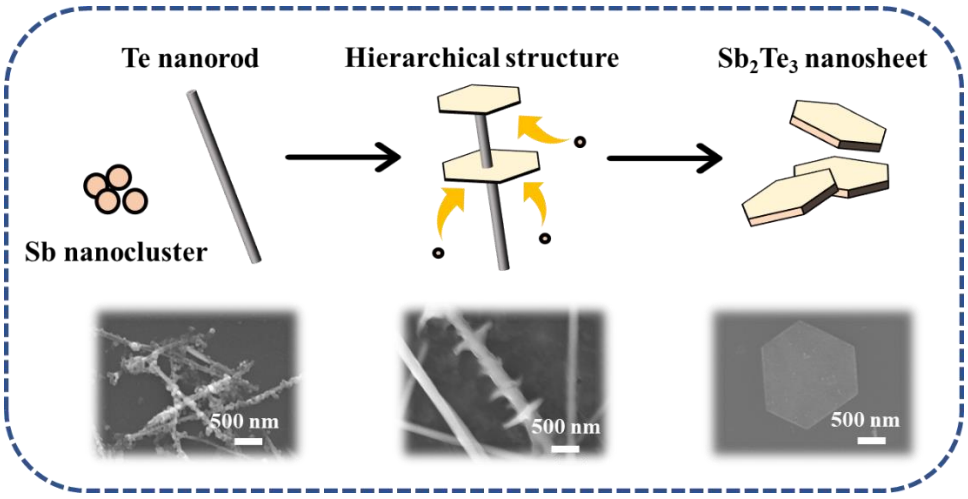
Sb_2Te_3 is one of the topological insulated (TI) materials. Owing to the strong electron spin-orbital coupling, TI materials have conductive surfaces, and the inside parts are insulated. One of the most critical factors in showing the topological insulating property is the thickness of the materials. In this work, we successfully synthesized Sb_2Te_3 nanosheets by solvothermal method. Inspecting the growth process using scanning electron microscopy showed that we obtained Te nanowire initially. Te nanowire then turned into Sb_2Te_3-Te hierarchical nanostructure with increasing of time and finally into Sb_2Te_3 nanosheets. We can suggest the growth mechanism of Sb_2Te_3 nanosheets from the results. We also found that the absorption range in UV-Vis was different by the difference of experimental products. It has become a convenient method to identify the section of the as-prepared products. Furthermore, we also found that by tuning the concentration of NaOH or increasing temperature, we can successfully synthesize nanosheets with a radius and thickness of 1.5 μm and 9.8 nm, respectively. Being able to well-control the thickness of Sb_2Te_3 nanosheets is very helpful for the subsequent component fabrication.



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