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The Growth of Gallium Oxide Nanowires

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The growth of β-gallium oxide (Ga_2O_3) nanowires has been achieved by the solid-liquid method. In Argon atmosphere, pure gallium was heated to produce gallium vapor and oxidized by introducing oxygen gas with a certain flow rate at high temperatures (~1000℃) with a vertical tube furnace. Since β-Ga_2O_3 is the most thermodynamically stable phase of Ga_2O_3 at standard temperature and pressure, and has the monoclinic crystal structure, β- Ga_2O_3 nanowires are grown in a specific direction. For the growth of β- Ga_2O_3, two kinds of substrates were prepared: The first kind is the quartz substrates coated with Ga_2O_3 thin film of 100 nm by using an electron beam evaporator, and the second kind is quartz substrates deposited with gold nanoparticles with a DC sputtering coater. The correlation between the gold nanoparticle diameter and the thickness of Ga_2O_3 nanowire was studied. The growth orientation was also investigated for these two kinds of substrates.

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