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Growth behavior of ZnO nanowires depending on substrates

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One-dimensional (1-D) semiconductor nanostructures (nanowires, nanotubes) have many interesting properties for nanometer-scale applications. In this research, we focus on the growth behavior of ZnO nanowires, because the alignment of ZnO nanowires is very important for device applications. The ZnO nanowires were grown on silicon, sapphire, gallium nitride substrates by thermal chemical vapor deposition (CVD) at 950°C. Before growth, we deposited Au metal thin film using pulsed laser deposition (PLD) technique under a pressure of 10⁻⁶Torr. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) were used to observe the orientation and alignment of ZnO nanowires on substrate. SEM and TEM images show that the growth direction of zinc oxide nanowires depends on the crystalline structure of substrates. The size of zinc oxide nanowires is 80nm in diameter and a few micrometers in length. X-ray diffraction pattern shows that zinc oxide is wurtzite crystalline structure. And Photoluminescence analysis shows strong band edge emission(379nm) with narrow full width at half maximum (FWHM).