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Fabrication of 110 Silicon Nanowire Oriented with Direct Band Gap

Abstract

Today, the challenges of getting fast switching semiconductor device based device is the phonon generation mechanism for light-emitting by device such as diodes. The increase in efficiency of the device determine by the green light part of the emitted light spectrum. Silicon nanowire growth in the direction of 110 structure has indirect band gap, which tremendously improved the green emission efficiency at the lower Nano regime. Several band structure calculations have be predicted direct band for 110 growth silicon nanowire. Thus, the study report the fabrication of silicon nanowires with diameter between 20 to 50nm which demonstrate the direct nature of the band gap. A strong photoluminescence at wave spectrum of 597 nm with micro-second lifetime indicating it direct band gap. This study have demonstrated new nanostructure engineering based on silicon nanowire orientation which will allow new ways getting silicon nanowire functionality.