Growth of GaAs Solar Cells on Ge Substrates by Metal Organic Vapor Phase Epitaxy

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ABSTRACT

The thesis was devoted to the growth of high quality GaAs Solar Cells on Ge substrates using metal-organic vapor-phase epitaxy (MOVPE) technique. According to published references, a two-step growth process must be adopted to grow high quality GaAs epi-layers on Ge substrates. The two-step growth process needs a nucleation layer grown at lower temperature. In this work, the conditions of the nucleation layer, including growth temperature and thickness, were varied to study the effect on the GaAs epi-layers ’ quality. First, GaAs epi-layers were grown on Ge substrates with various nucleation layers. The surface flatness of GaAs epi-layers was examined with atomic force microscopy (AFM). The crystallization of GaAs epi-layers was examined with high-resolution x-ray diffractometer (HR-XRD). Finally, the samples of GaAs solar cells grown on Ge substrates with various nucleation layers were prepared to evaluate the device performance.

Keywords : MOVPE ; GaAs ; Ge ; Nucleation layer ; GaAs Solar Cell

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