< 발표 II-8 >

Structural Characterization of Epitaxial GaAs on Si(100) Grown by Ionized Source Beam Epitaxy

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Work is described which elucidates the growth process of epitaxial GaAs films on exactly oriented Si(100) using the Ionized Source Beam Epitaxy (ISBE) process. To compare the growth modes of MBE and ISBE, three different growth scenarios were investigated: MBE-like growth using neutral Ga and As beams, use of a partially ionized As-source beam, and acceleration of the partially ionized As beam. Crosssection transmission electron microscopy was used to characterize the structure of the epitaxial GaAs layer and the heterointerface. TEM analysis indicates that 2-D growth is favored at low temperatures (≤ 300°C) when the As source beam is either ionized or ionized and accelerated. This result is in contrast to the 3-D growth observed for the MBE-like growth process at the same temperature. Based on the structural analysis of defects which include misfit dislocations, threading dislocations, microtwins, stacking faults, and antiphase domain boundaries, the mechanisms underlying ISBE are proposed.

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