Avalanche Photodiode Epiwafer (APD)

Descriptions

2" or 3" epiwafer grown by MOVPE are available for avalanche photodiode (APD) fabrication. The main advantage of APD is its higher internal gain. This enables the avalanche photodiode to be used in low light level applications, traditionally dominated by the photomultiplier tube (PMT).

Figure 1 shows the standard APD-epiwafer's layer structure. It specially comprises N-InP field control layer and a very thick top InP layer than an InGaAs-PIN's layer structure.

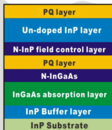

FIG.1

Wafer Characterization

Epiwafers are usually characterized by DCXD and E-CV tests. For some special inquiries, the doping profile could be analysed by SIMS.

Figure 2 shows a typical DCXD rocking curve. The lattice mismatch can be well controlled within ±500ppm.

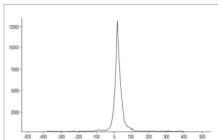

FIG.2

Figure 2 The DCXD rocking curve tested on an APD epiwafer.

Wafer Characterization

Figure 3 shows low background concentration of InGaAs absorption layer. The background concentration is lower than $1X10^{15}$ cm^{-3}.

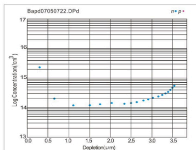

Figure 3 The concentration profile of the U-InGaAs absorption layer tested by depletion mode C-V method.

Typical Epitaxy Parameters

Parameters	Values
Thickness control	Better than $\pm$ 5%
Thickness uniformity	Better than $\pm$ 2.5% at the inner 40mm
N-InP doping (cm^{-3})	Si-doped, 5E15 to 2E17
N-InGaAs doping (cm^{-3})	Si-doped, 1~3E16
i-InGaAsP background C.C. (Cm^{-3})	<2E15 (special requested absorption layer)
i-InGaAs background C.C. (Cm^{-3})	<1E15
Defect density control (Diameter)	<50 cm^{-2}(D>10um)