

InGaAs / InP PD Epiwafer

LandMark

EPWAFERS FOR PHOTODETECTOR (PD)

EPWAFERS FOR VISIBLE-LIGHT LASER DIODE (LD) and RCLD

EPWAFERS FOR LASER DIODE

Descriptions

Two- or three-inch epiwafers grown by MOVPE are available for InGaAs photodiode (PD) fabrication. **Figure 1** shows an epiwafer layer structure, from which, Zn-diffusion method is used by customers to convert the top InP material into P-InP, by exposing wafers to Zn vapor through SiN defined windows. This type of photodiode is called the planar P-i-N PD. For ease of P-ohmic contact after Zn-diffusion process, a thin U-InGaAs layer can be grown on top of N-InP. LandMark also provides the P-InP on top of i-InGaAs for etched mesa-type P-i-N PD. The InGaAs PD is widely used in fiber optic communications as part of a receiver, transceiver or 1310 nm–1550 nm laser power monitor.

U - InGaAs

U-or N⁻ InP

i-InGaAs

U - or N⁻ InP Buffer

N - InP Substrate

FIG. 1

Wafer Characterization

Epiwafers are characterized by DCXD, PL and E-CV tests.

Figure 2 shows a typical DCXD rocking curve. The lattice mismatch can be controlled within 500ppm variation across a 2-inch wafer.

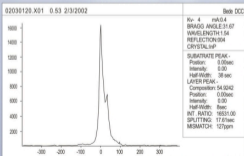


FIG. 2

InGaAs / InP PD Epiwafer

(LD) AND LIGHT-EMITTING DIODE (LED)

EPISAFERS FOR VERTICAL CAVITY SURFACE EMITTING LASER DIODE (VCSEL)

SOLAR CELL EPISAFERS

Wafer Characterization

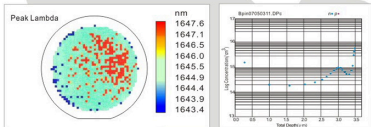


FIG. 3

FIG. 4

Figure 3 shows the PL spectrum of an InGaAs/InP PD epiwafer. PL mapping shows a typical 0.96nm Std deviations across the inner 40mm diameter area. **Figure 4** shows the carrier concentration depth profile from InGaAs/InP/Substrate layers. The background concentration of intrinsic InGaAs material is usually lower than $1 \times 10^{15} \text{ cm}^{-3}$.

Typical Epitaxial 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, $1\text{E}16$ to $5\text{E}17$
P -InP doping (cm^{-3})	Si-doped, $5\text{E}15$ to $1\text{E}16$
I-InGaAsP background C.C. (cm^{-3})	$< 2\text{E}15$ (special requested absorption layer)
I-InGaAs background C.C. (cm^{-3})	$< 1\text{E}15$
Defect density control (Diameter)	$< 50 \text{ cm}^{-2}$ ($D > 10\mu\text{m}$)

InGaAs / InP PD

Epiwafer



EPIWAFERS FOR PHOTODETECTOR (PD)

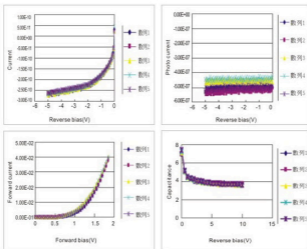
EPIWAFERS FOR VISIBLE-LIGHT LASER DIODE (LD) and RCLED

EPIWAFERS FOR LASER DIODE

Typical Device Performance

Parameter	Symbol	Typical
Dark current @ -5V	I_d	< 500 pA
Capacitance @ -5V	C_j	< 6 pF
Responsivity	Res	~ 0.9 A/W (with AR coating)
Break down Voltage @ 10uA	V_b	> -30 V
Serial resistance	R_s	< 40 Ω
Good device yield	--	> 80%
Zn diffused, planar type PiN		300 μ m aperture

Device Performance (for reference)



(300 μ m diffusion aperture)