GaAs

\[ \eta = \frac{(1 - R_m)(1 + R_{\text{back}} e^{-i\phi}) (1 - e^{-i\phi})}{1 - 2\sqrt{R_m R_{\text{back}} e^{-i\phi}} \cos(2\beta L \cos \theta + \phi_1 + \phi_2) + R_m R_{\text{back}} e^{-2i\phi}} \] (1)

\[ \theta = \sin \theta, \eta \quad \text{DBR} \] (2)

1 RCE [1, 2]

2 RCE [1, 2]
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由此我们推导出角度相关的谐振模式

$$
\lambda_{\text{mode}}(\theta) = \lambda_0 \cos\left(\sin^{-1}\frac{\sin\theta}{n}\right)
$$

(3)

$$
\alpha(\theta) = \frac{1 - R_{\text{in}} e^{-\frac{\lambda_0}{n}}}{(1 - R_{\text{in}} e^{-\frac{\lambda_0}{n}})^2} - \frac{1 - R_{\text{back}} e^{-\frac{\lambda_0}{n}}}{(1 - R_{\text{back}} e^{-\frac{\lambda_0}{n}})^2}
$$

(5)

$$
\text{FWHM} = \frac{\lambda^2}{2\pi n_0 L_{\text{eff}}} \times \frac{1}{(R_{\text{in}} R_{\text{back}} e^{-\frac{\lambda_0}{n}})^{\frac{1}{2}} e^{-\frac{\lambda_0}{n}}} \times \frac{1}{(1 - R_{\text{in}} e^{-\frac{\lambda_0}{n}})^2}
$$

(4)

Fig. 1 Model of RCE PD

![Model of RCE PD](image)

Fig. 2 Different angle incidence for GaInAs QW RCE PD (a) Measured photocurrent; (b) Analysis

![Different angle incidence for GaInAs QW RCE PD](image)
3. GaInNAs RCE PD

(a) Measured photocurrent; (b) Analysis

Fig. 3 Different angle incidence for GaInNAs QW RCE PD

$0^\circ \sim 5^\circ \sim 0.8 \text{nm} \sim 5^\circ$, RCE PD $0^\circ \sim 25^\circ \sim 12 \text{nm} \sim 0^\circ$.

RCEPD, $\theta \sim 10^\circ \sim 60^\circ \sim 40 \text{nm}$.

3

Properties of GaAs Based Resonant Cavity Enhanced Photodetectors*

Tang Jun, Chen Hongda, Liang Kun, Du Yun, Yang Xiaohong, and Wu Ronghan

(State Key Laboratory on Integrated Optoelectronics, Institute of Semiconductors, Chinese Academy of Sciences, Beijing 100083, China)

Abstract: The theoretical analysis and experimental measurement on the incident angle dependence of quantum efficiency of GaAs based resonant cavity enhanced (RCE) photodetector are presented. By changing the angle of incoming light, about 40 nm wavelength variation of peak quantum efficiency is obtained. The peak quantum efficiency and optical bandwidth at different mode corresponding to different angle incidence are characterized with different absorption dependence on wavelength.

Key words: resonant cavity enhanced photodetectors; quantum efficiency; GaAs

PACC: 7280E