Requirement of APD Device

Emitters and photodetectors are key active components in ethernet networks

Increasing sensitivity at the receiving end is an effective way to improve the overall transmission performance

Eg. 25Gb/s high-sensitivity APD has become a key component for 40km photodetection over fiber in 100 Gbit/sec ER-4 system

The application of high speed APD requires large gain-bandwidth with reasonably low dark current

Reduce the avalanche delay time through thickness reduction and prevent edge breakdown at the periphery of mesa.

Methods to Achieve low Noise and High Gain Bandwidth

Select a semiconductor with favorable impact ionization coefficients

Scale the multiplication region to exploit the non-local aspect of impact ionization

Impact ionization engineering (I2E) using appropriately designed heterojunctions.

Current Structure

A novel upside-down structure, rearrange the absorb layer and multiplication layer with different type

Introducing dual charge layers to:

Confine the electrical field within the center of M-layer

Minimize the edge breakdown around the periphery of mesa

Further Performance Tuning

Change the thickness and width of each layer

Rearrange the schematic of each layer

Trying to find a local optimal solution for this top-illustrated APD device