STI-bounded Single-photon Detector in a Deep-submicron CMOS Process

Tech ID: 21158 / UC Case 2006-228-0

TECHNOLOGY DESCRIPTION

Researchers at the University of California , San Diego , have invented a compact Silicon single-photon Avalanche Photodetector (SPAD) that is manufacturable using commercially available deep-submicron standard CMOS processing methods.

The uniqueness of the device is in its compact ability to prevent premature breakdown. The benefits of the device over existing technology are improved timing accuracy, increased dynamic range due to decreased dark current, increased frame rate due to reduced capacitance, reduced time lag inaccuracy (jitter), enhanced spatial resolution, and reduced power consumption and heat generation.

By integrating an array of such detectors, with appropriate timing, biasing, and counting circuitry, and with active illumination, one may acquire a low-light-level two or three-dimensional image with a higher dynamic range than present detectors. Alternatively, one could acquire an image of a fluorescent sample with improved S/N using Time-Correlated Single-photon counting techniques. Finally, this device allows one to generate two distinct, but simultaneous, electrical signals in the same pixel—one corresponding to absorption of a short wavelength photon, the other being a longer wavelength photon.

STATE OF DEVELOPMENT

This technology is in early-stage development, but is presently available for licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,065,002	06/23/2015	2006-228
United States Of America	Issued Patent	8,188,563	05/29/2012	2006-228

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- All Optical Inverter, Logic and Memory Circuits based on Vertical Cavity Semiconductor Optical Amplifier-like Devices
- Frequency Up-conversion via Hot Carrier Luminescence

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OTHER INFORMATION

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics

RELATED CASES

2006-228-0