NASA SBIR/STTR Technologies

High Gain, Position Sensitive, Avalanche Photodiodes for Optical Communication

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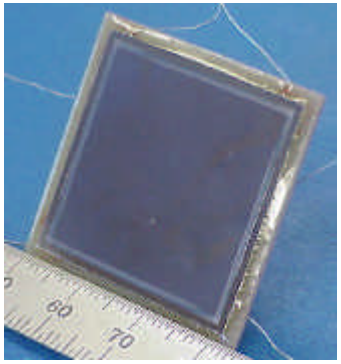
Identification and Significance of Innovation

One of the barriers of achieving global and intersatellite free-space optical communication links is the need for a complex pointing system. The pointing system derives from the necessity of satellites to maintain visual contact over a distance of tens of thousands of kilometers. Avalanche photodiodes (APDs) are of particular interest as receivers for such optical systems because of their high-speed response, internal gain and sensitivity to near-infrared wavelengths. We propose to develop a silicon-based, low noise, high gain, position-sensitive APD sensor for near-IR tracking and pointing applications.

APD array



Lateral-effect APD

Technical Objectives

The goal of this work is to design, develop and fabricate a position-sensitive APD module, with associated electronics and readout that would offer a significant improvement over presently available detectors.

Work Plan

Task 1. Design lateral-effect APD and APD quadrant detectors.
Task 2. Fabricate detectors.
Task 3. Characterize quadrant APD arrays.
Task 4. Characterize the lateral-effect APD arrays.
Task 5. Design Phase II module.

NASA Applications

free-space optical communication, LADAR, vehicle docking, navigation, and guidance

Non-NASA Applications

optical communication systems, LADAR, ranging, near-IR spectroscopy and optical triangulation

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