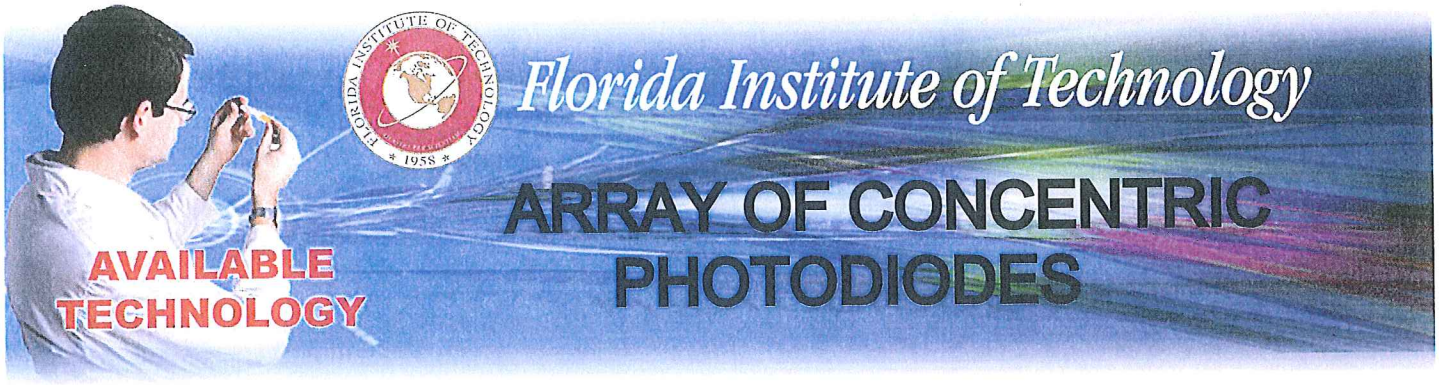

Summary

Success of SDM based systems requires enabling solutions for mass production, for example, as may be provided by standard CMOS (complementary metal oxide semiconductor) technology. CMOS electrical and optical properties are very compatible with the requirements of photonics industry and it can provide a fast and inexpensive route for mass production. Hence a unique and novel array of concentric photodiodes using CMOS technology is shown and shown according to the disclosed inventive principles, to detect and reliably de-multiplex optical energies carried by the spatially multiplexed channels. This innovative array of photo-detectors may also be applied to other applications such as sensors. Multiple devices have been designed and fabricated using standard 0.25 um CMOS technology and packaged in an open cavity packaging (OCP) to allow exposure to the incident light. Initial results are satisfactory.

Applications

- This is a novel devise that serves both as detector and demultiplexer for spatial domain multiplexed (SDM) optical channels.

Advantages

- Photo-diodes/photo-detectors have long been in existence, however this presents a novel and first of a kind array of concentric photodiodes.

The Technology

As would be well known to those skilled in the art, a photodiode is a transducer that converts incident optical energy into electrical energy. The electrical and optical properties of a P-N junction and the depletion region are of prime importance in the operation of a photodiode. A simple P-N junction is formed when a P-type material comes in contact with an N-type material during monolithic fabrication process and a depletion region is created at the P-N junction due to recombination of electrons and holes, which annihilate each other during their random motion around the junction. This leaves excess fixed charges: positive donor ions at the N-type region and negative acceptor ions at the P-type area. These charges create a field at the P-N junction that consequently blocks further transport of the charge carriers. Similar to rectifying diodes, only the leakage current flows in the reverse bias region of the photodiode, in the absence of any illuminating optical energy. However electron-hole pairs are generated as a function of the intensity of light absorbed by the material, provided a photo detector is exposed to a light source with frequencies that correspond to energies greater than the band gap of the detector material. Hence the reverse current of the photodiode increases in proportion to the incident light intensity, in the presence of an applied electric field.

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