

The CUNY Center for Advanced Technology In Photonics Applications (CUNY CAT)
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Enhanced Performance Photodetector

This research involves the development of high performance electromagnetic resonance (ER) modes to “channel” ; enhancements in Si, InGaAs and other semiconductor particular are metal-semiconductor-metal photodetector below.

This pioneering work has shown that past research assumptions about how light enters the semiconductor, propagates, scatters and is absorbed in the structure have been incorrect. However using electromagnetic resonances including surface plasmons, diffracted modes and resonant cavity modes *in combination* the following can be achieved

1. Channel light around the metal contacts and into the semiconductor
2. Localize light near the contact/semiconductor interface

With the ER modes performing both 1 and 2 above

a dramatic improvement in the device performance is achieved. This work, especially in Si MSM-Photodiodes has dramatically enhanced *both* the responsivity and bandwidth of these devices. Typical devices in development (bulk-Si MSM-PD) are showing that 30GHz bandwidth and 0.4A/W responsivity are possible. The photocurrent, bandwidth, responsivity and circuit analysis has been performed.

This technique can also improve the performance of silicon-on-insulator (SOI) MSM detectors to enhance the bandwidth and responsivity beyond 50GHz and 0.3 A/W respectively

Applications include MEMS devices, photodetector arrays and many other uses for Si detectors. The technique can also be applied to InGaAs and HgTeCd infrared detectors.

This technology opportunity sheet describes continuing efforts in this area. Several patents may have been issued or are pending and which may be available for licensing.

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