Docket #: S12-295

A depletion-mode MOSFET-based phototransistor

Stanford researchers have developed a depletion-mode MOSFET-based phototransistor with sub-wavelength dimensions, extremely high responsivity and a low dark current. The device is highly scalable and explicitly CMOS compatible, suggesting that a small output capacitance is achievable. Electron-hole pairs generated in this phototransistor are not immediately collected at the electrodes, unlike those in a photodiode. Instead, they remain in the channel and the substrate of a depletion-mode MOSFET, thereby reducing the depletion region of the channel and modulating the MOSFET's current from source to drain. This device is a promising substitute for photodiodes in optical interconnects and optical detection applications.

Applications

- Optical communications

Advantages

- High responsivity requires less optical power from the light emitter
- Scalable
- Small output capacitance
- Smaller device footprint
- Easily integrated on a silicon chip

Publications

- U.S. Published Patent Application 20140363917, "DEPLETION-MODE FIELD-EFFECT TRANSISTOR-BASED PHOTOTRANSISTOR".

Patents

- Published Application: 20140363917

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