

بسمه تعالی

اطلاعیه برگزاری سمینار علمی

عنوان:

A Monolithically Integrated Butt-Coupled 3D Bulk CMOS Silicon Photodetector Array with a Fiber Couplers Platform on a Single-Chip

ارائه دهنده:

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Abstract:

A linear array of 55 butt-coupled 3D photodetectors based on silicon substrate is presented with a monolithically integrated tapered U-grooves platform for embedding strands of a fiber bundle into a silicon chip. This structure enables a direct coupling of the fiber strands with diameter of $\text{Ø}30\mu\text{m}$ to the vertical photoactive areas of a silicon detector array one-by-one without the requirement of a waveguide, a tapered fiber, and a passive fiber-chip connector. The prototype was fabricated by exploiting 3D-CMOS and MEMS technology. Novel ultra-deep trench isolation with a passivation method consisting of a shallow n^+/p junction, SiO_2 -liner, and SU-8 filling of the trenches was carried out to minimize dark current and leakage current in this detector. This method realizes a low dark current of 1.14nA at 2V reverse bias.

The characterization of the fabricated device demonstrated a high photoresponsivity and a high quantum efficiency in the visible spectral range under low light intensity.

This proposed 3D detector array integrated with a fiber bundle brings outstanding features for non-telecom and high efficiency remote optical fiber sensor applications (e.g. head motion tracking) in harsh environments, where involve high electromagnetic fields or RF signals such as magnetic resonance imaging (MRI) or positron emission tomography (PET).

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