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In short-distance optical communications, vertical-cavity surface-emitting lasers emitting in the 800-850-nm wavelength region require high-quantum-efficiency detectors. Researchers at Boston University (Boston, MA), Bilkent University (Ankara, Turkey), and the National Institute of Standards and Technology (Boulder, CO) recently have fabricated top-illuminated aluminum gallium arsenide (AlGaAs)/gallium arsenide (GaAs) resonant-cavity-enhanced (RCE) Schottky photodiodes that may be suitable for such very high-bandwidth applications.

Molecular-beam epitaxy and standard photolithographic techniques produced the AlGaAs/ aluminum arsenide distributed-Bragg-reflector mirrors and GaAs absorption regions of the detector. The to¥reflector of the RCE-structure is the Schottky metal itself, allowing the resonant wavelength to be adjusted throughout the 800-850-nm range during fabrication by recessing the to¥semiconductor surface before depositing the metal. The device structure produces a low-loss Fabry-Perot cavity for a spectral region at least 50 nm wide, centered around 830 nm. The photodetectors demonstrate a peak quantum efficiency of 0.5 and a 3-dB bandwidth of more than 50 GHz. The bandwidth efficiency product exceeds 25 GH¥within the wavelength range.

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