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Quantum cascade detectors: A 9-μm device optimized for low-attenuation free-space optical communication

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Abstract

We present a novel InGaAs/InAlAs/InP quantum cascade detector (QCD) operating in the long wave infrared (LWIR) range, crucial for the exploitation of new free-space optical telecommunication channels at wavelengths between 8-12 μm. The comparison of differently sized detector ridges, processed on substrates with a 15-period as well as a single-period design, allows a characterization of the spectral photocurrent and a comparison of their performance in terms of sensitivity, spectral responsivity, detector noise etc. The goal is to distinguish design guidelines for the best candidate to establish a monolithic-integrated heterodyne detection system, able to secure high-speed and low-noise free-space data transmission.

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