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标题: Long-term frequency and amplitude stability of a solid-nitrogen-cooled, continuous wave THz quantum cascade laser
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摘要: Operational temperature increase of CW THz QCLs to 77 K has enabled us to employ solid nitrogen (SN2) as the cryogen. A roughing pump was used to solidify liquid nitrogen and when the residual vapor pressure in the nitrogen reservoir reached the pumping system's minimum pressure the temperature equilibrated and remained constant until all the nitrogen sublimated. The hold time compared to liquid helium has thereby increased approximately 70-fold, and at a greatly reduced cost. The milliwatt CW QCL was at a temperature of approximately 60 K, dissipating 5 W of electrical power. To measure the long-term frequency, current, and temperature stability, we heterodyned the free-running 2.31 THz QCL with a CO2 pumped far-infrared gas laser line in methanol (2.314 THz) in a corner-cube Schottky diode and recorded the IF frequency, current and temperature. Under these conditions the performance characteristics of the QCL, which will be reported, exceeded that of a device mounted in a mechanical cryocooler.
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