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【138】Optoelectronic devices based on non-polar ZnO/ZnMgO quantum wells

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The performance of state-of-the-art GaAs-based THz-QCLs is limited by parasitic LO phonon transitions, preventing above-200 K operation. This can be overcome by using material systems with higher LO-phonon energies like ZnO, for which above-room-temperature operation in THz-QCLs is predicted. Using novel optoelectronic materials like wurzite Zn(Mg)O with no internal fields in the m-plane [10-10] orientation, simplifies the design of any QC structure. After the recent demonstration of intersubband absorption in such m-plane ZnMgO structures, we present the first mid-IR Zn(Mg)O-based QCD with peak responsivity of 0.15 mA/W (77 K) at 3 μm wavelength. The responsivity persists up to 300 K.
In addition, we show first photoluminescence measurements from m-plane Zn(Mg)O THz-QCL structures, emitting at ˜4.8 THz at liquid-nitrogen temperatures.

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