

Abstract Submitted
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High-performance substrate-emitting quantum cascade ring lasers TARIQ MANZUR, Naval Undersea Warfare Center (NUWC, DIVNPT) Newport, RI-02841 — An InP based mid-infrared quantum cascade laser with a ring-shaped cavity is demonstrated in room temperature continuous wave operation. The light is coupled out with a second order distributed feedback grating buried inside the cavity. The device is epilayer-down bonded to a heat spreader and the light is emitted through the substrate. The emission wavelength is around $4.85\ \mu\text{m}$ with a high power output of 0.51 W. Single mode operation persists up to 0.4 W. Far field exhibits concentric ring features. Modal behavior is analyzed using the coupled mode theory, which suggests that the device operates in an extremely high order mode. Polarization measurement indicates that the beam is azimuthally polarized. This unique polarization state with high power output may find applications in tight focusing, optical tweezers, and material processing.

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