Contribution ID: **117** Type: **Poster**

【164】Towards the fabrication of ZnO-based quantum cascade lasers with double-metal waveguides

Wednesday 28 August 2019 19:17 (1 minute)

Zinc oxide is a rather new material for optoelectronic applications. Due to its high LO phonon energy (ELO˜72 meV), it is suitable for THz-devices like quantum cascade lasers (QCLs), which are currently limited to operation temperatures around ˜200 K for typical GaAs material systems.
In this work, we show the development of a full fabrication process for double metal waveguides, processed into ZnO/ZnMgO QCL structures. This includes the development of a CH4-based RIE dry etching process with additional passivation for preventing surface leakage, a thermo-compression bonding (wafer bonding) with a substrate removal procedure and the fabrication of low-resistance ohmic contacts. In addition, we will present first photoluminescence measurements from such ZnO-based QC structure at liquid nitrogen temperatures and above.

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Session Classification: Poster Session

Track Classification: Condensed Matter Physics (KOND)