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The ABCs of mid-infrared quantum-well lasers

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Mid-infrared quantum-well lasers have known a renewed interest during the last years when several groups demonstrated lasing at 3.3 µm in the continuous wave regime at room temperature. This wavelength corresponds to the peak of absorption of methane and makes these lasers perfectly suited for designing hydrocarbons sensors based on tunable diode absorption spectroscopy. The lasers at 3.3 µm can be seen as the latest developments of a race initiated in 1980 with the advent of the first GaInAsSb/AlGaAsSb lasers emitting at 1.8 µm. Inevitably, a question emerges from this latest result. Can mid-infrared quantum-well lasers go longer as far as wavelength is concerned? Answering this question necessitates an examination of the so-called A, B, C coefficients of quantum well lasers (A stands for monomolecular recombination coefficient, B, for radiative recombination and C, for Auger recombination). We will then consider the relationship combining threshold current, voltage, characteristic temperature and thermal resistance which determines the maximum temperature of operation reachable by these lasers.

Biography

Yves Rouillard received his Doctor of Philosophy in Sciences from the University of Rennes (France) in 1994. His thesis is based on the design of optoeletronic devices based on GaSb for telecommunication applications. In 1997, he joined the University Montpellier 2 (France) where he is now Associate Professor in Electronics. His activity concerns the design and the growth by molecular beam epitaxy of quantum well lasers emitting in the range 2.0-3.4 µm. He is author or co-author of 67 scientific papers and 73 communications in international conferences.

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